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Beyond the Degree:
Fertility Outcomes of 'First in Family' Graduates

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ABSTRACT
This paper examines the link between higher education and fertility, with particular attention to the role of intergenerational educational mobility in shaping this relationship. Drawing on data from the 1970 British Cohort Study, we estimate differences in completed fertility across three groups: first-in-family university graduates (FiF), graduates with at least one university-educated parent (non-FiF graduates), and individuals who did not attend university (non-graduates). Our findings show that although graduate women generally have fewer children than non-graduates, this gap is primarily driven by FiF graduates. FiF women have lower fertility than both non-FiF graduates and non-graduates, who exhibit similar fertility patterns. The fertility gap between FiF and non-FiF graduates emerges after age 35, mainly on the extensive margin: FiF women are more likely to remain childless, but those who become mothers have an average number of children similar to non-FiF graduates. Similar patterns are observed for men, however, the gaps are smaller and not statistically significant. We identify child-related preferences, self-esteem, and exposure to maternal employment during childhood as potential drivers of the relationship between FiF status and fertility. In contrast, labour market outcomes, financial constraints, partnership status, and health outcomes do not appear to contribute to the FiF fertility gap. These findings highlight key considerations for policies aimed at supporting both intergenerational mobility and fertility.

JEL codes: I26, J13, J16, J24
Keywords: First in family (FiF) graduates, fertility, childlessness, intergenerational educational mobility, gender economics

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A diploma másik oldala:
Az elsőgenerációs diplomások fertilitási kimenetei

ÖSSZEFOGLALÓ

A tanulmány a diplomaszerzés és a fertilitás közötti kapcsolatot vizsgálja, különös tekintettel a generációk közötti oktatási mobilitás szerepére. Az 1970-es British Cohort Study adataira támaszkodva három csoport fertilitási különbségeit becsüljük meg: az elsőgenerációs diplomásokét (FiF), a legalább egy egyetemet végzett szülővel rendelkező diplomásokét (nem-FiF diplomások), és azokét, akik nem jártak egyetemre (nem diplomások). Eredményeink azt mutatják, hogy bár a diplomás nők kevesebb gyermeket vállalnak, mint a nem diplomások, ezt a különbséget elsősorban az FiF diplomások vezetik. A FiF és a nem-FiF diplomások közötti termékenységi különbség 35 éves kor után jelenik meg, főként az extenzív határon: a FiF nők nagyobb valószínűséggel maradnak gyermektelenek, de azok, akik anyává válnak, átlagosan hasonló számú gyermeket vállalnak, mint a nem-FiF diplomások. Hasonló minták figyelhetők meg a férfiaknál is, azonban a különbségek kisebbek és nem statisztikailag szignifikánsak. Az FiF státusz és a fertilitás közötti kapcsolatot három faktor befolyásolja: a kamaszkori gyermekvállalási preferenciák, az önbecsülés, és hogy a diplomás nők anyja gyerekkorukban dolgozott-e. Ezzel szemben a munkaerőpiaci eredmények, a pénzügyi korlátok, a párkapcsolati státusz és az egészségi különbségek nem járulnak hozzá a FiF fertilitási különbséghez. Ezek az eredmények kulcsfontosságúak a generációk közötti mobilitást és a fertilitást támogató szakpolitikák számára.

JEL kódok: I26, J13, J16, J24

Kulcsszavak: elsőgenerációs diplomások, fertilitás, gyermektelenség, generációk közötti oktatási mobilitás, neme közötti különbségek gazdaságtana

1 Introduction

The trend of declining fertility is prevalent across the globe. The average Total Fertility Rate (TFR), reflecting the lifetime number of children per woman, plummeted from 2.84 to 1.58 between 1970 and 2020 across the OECD countries (OECD, 2023b). Despite the evident heterogeneity among different countries, the TFR remains beneath the replacement level of 2.1 in all OECD nations. In 2011, the proportion of childless women aged between 40-44 in the UK stood at 20%, a figure speculated to increase in subsequent years (OECD, 2016). At the same time, there has been a notable increase in educational attainment; the percentage of people between 30-34 who have a tertiary degree has doubled from 1995 to 2019 in the EU, exceeding 40% (OECD, 2023a). As a result, a considerable proportion of recent university graduates in the UK, around two-thirds (Henderson et al., 2020), represent the first in their families (FiF) to attain a degree. This is a surprisingly large social group. According to our estimates, there are about 3-4 million FiF graduate women (and roughly the same number of men) aged between 25 and 49 in the UK.[1] Given these trends, we investigate the relationship between higher education and fertility, with an eye on the role of intergenerational educational mobility. We explore whether FiF graduates exhibit different fertility outcomes compared to their non-FiF graduate counterparts and those who did not graduate from a university (non-graduates).

Human capital theory suggests that women decide whether and when to have children based on the perceived costs and benefits of childbearing (Becker, 1960). In Becker's model, having a tertiary degree increases women's labour market prospects and thus the opportunity cost of childbearing, leading to their lower fertility (substitution effect). On the other hand, it can increase fertility by making childbearing more affordable (income effect). Furthermore, through assortative mating, higher education may also change relationship patterns. More recent literature emphasizes that it is not just the overall costs and benefits of children that matter for fertility, but also the distribution of costs and benefits within the household (Doepke and Kindermann, 2019). That is, both parents have to agree for a child to be born and disagreement over fertility is closely related to the distribution of childcare activities within the household. Fertility rates are lowest in countries where men contribute the least to domestic work, and women in these contexts are particularly likely to oppose having additional children.

There is an emerging literature exploring the relationship between higher education and fertility outcomes. Currie and Moretti (2003) examine the expansion of colleges in the United States between 1940 and 1996, and find that tertiary education reduces fertility, but more educated mothers give birth to healthier children. Similarly, Tequamem and Tirivayi (2015) find that Ethiopian women with tertiary education were 25% less likely to give birth compared to those without it. In the context of South Korea, Choi (2018) argues that the expansion of tertiary education reduced fertility rates among college-educated women. James and Vujić (2019) exploit higher education expansion in England and Wales during the late 1980s to early 1990s and find that attending post-compulsory education leads to postponing motherhood and fatherhood. The mechanisms behind these relationships are due to a combination of human capital accumulation and signaling effects. Kamhöfer and Westphal (2019) investigate the increase in the number of colleges in Germany be-

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[1] Source: Authors' calculations based on the 2021 Census and Henderson et al. (2020).

tween the 1960s and 1980s, finding that college reduces the probability of childbearing, but graduate women who decide to have children have more children on average than non-graduates. They attribute this to the family-friendliness of jobs available to graduate women. Kountouris (2020) examines the expansion of higher education and a concurrent schooling reform in Greece, concluding that these changes had a significant negative effect on fertility by age 30, primarily driven by the rising opportunity costs of childbearing. A recent paper by Bharati et al. (2021) summarizes this relatively scarce literature and draws attention to the identification issues which might bias previously reported estimates on the relationship between post-compulsory education and fertility outcomes. They analyse the impact of Taiwan's tertiary education expansion from 1996 on women who were beyond the typical college-entry age. Their findings show a decline in fertility among women who were up to 30 years old at the start of the expansion. Additionally, they demonstrate that the expansion reduced fertility rates for both women with and without tertiary education, indicating that the effect extended beyond education itself.

We extend the existing literature by providing new empirical evidence on the association between higher education and completed fertility, and by examining how this relationship varies by FiF status. FiF graduates face particular challenges during their educational and career paths that may impact their fertility choices and outcomes. They often come from low-income and minority backgrounds, have less academic preparation and access to information, inadequate finances, heavier work and care obligations, lack support systems, and have less contact with faculty (Kim et al., 2021; Aruguete and Katrevich, 2017; King et al., 2019). FiF students must also navigate the "hidden curriculum", or set of unspoken norms, values, and beliefs conveyed in the classrooms and social environment (Margolis, 2001; Gable, 2021). Graduating from college as a FiF student requires great effort, which can impact their mental and physical health (House et al., 2020; Lipson et al., 2023). FiF graduates' preferences regarding careers and having children may be impacted by their efforts (high sunk costs). Differences may also arise after graduation; for example, FiF graduate women in England have been shown to suffer a wage penalty in the labour market (Adamecz-Völgyi et al., 2020).

In order to estimate gaps in completed fertility between FiF graduates, non-FiF graduates, and non-graduates, we rely on the 1970 British Cohort Study (BCS70) dataset, which follows a cohort born in 1970 in Great Britain until the age of 46 (CSL, 2023).[2] The BCS70 includes rich data on individual characteristics, including birth circumstances, parental background, cognitive and non-cognitive skills, educational and labour market outcomes, and mental and physical health. We study two measures of fertility outcomes: the number of children and the probability of childlessness at age 46. We find that, conditional on background characteristics and various measures of human capital, FiF graduate women have on average 0.17 fewer children and are 7.6 percentage points more likely to be childless at age 46 compared to non-FiF graduate women. Although non-FiF graduate women postpone childbearing relative to non-graduates, they tend to catch up after age 35, ultimately reaching similar levels of completed fertility—unlike their FiF counterparts. We find similar patterns among men, however, the fertility differences are smaller and mostly non-significant. Restricting the sample to mothers, we find no difference between the number of children of FiF and non-FiF graduates, suggesting that the FiF fertility gap is realised on the extensive margin, through childlessness. The FiF childlessness gap appears to be shaped by personal and early-life factors, such as fertility preferences, self-esteem, and maternal employment during childhood, rather than by labour market conditions, financial barriers, or health.

These results contribute to the emerging literature that explores the relationship between higher education

[2]For men, there is no clear biological age limit of fertility; thus, we do not see their completed fertility. Still, as shown in Figure 1, the number of children among men is fairly stable after age 40.

and fertility outcomes in four key ways. First, the finding that higher education only has negative fertility returns among FiF graduate women is a novel result that nuances the previous evidence on the relationship between higher education and fertility outcomes. Second, our findings draw attention to an important further consequence of intergenerational educational mobility, particularly for women. Third, we show that the FiF fertility gap emerges after age 35 and is due to a higher probability of childlessness among FiF graduate women. While FiF and non-FiF graduate women report similar child-related preferences at age 16 and have similar exposure to maternal employment, fertility gaps emerge among those without strong preferences regarding children or working mothers. Our exploratory analysis of the mechanisms highlights the complexity of simultaneous fertility and educational decisions and the role of non-financial factors in influencing them, and points to key directions for further research. Fourth, while much of the literature on educational mobility and fertility focuses on women, the fertility outcomes of men remain underexplored. Understanding how educational mobility affects male fertility outcomes provides a comparative perspective on the economics of family formation.

Our findings point to the need for a broader understanding of the non-economic barriers to fertility among upwardly mobile women. They indicate that lower fertility among women is not inherently driven by the pursuit of higher education, but rather by the distinct challenges faced by those for whom university attendance marks a break from their family's educational history. From a societal perspective, policies that support upward educational mobility without compromising fertility can help address the increased demand for skilled labour, mitigate population ageing, and promote gender equality in access to opportunities. Higher education institutions are implementing a variety of programs aimed at easing the unique challenges of FiF students.[3] Our analysis suggests that the potential impacts of such investments extend beyond academic and career outcomes, as they may also affect simultaneous fertility decisions.

The remainder of the paper is structured as follows. Section 2 presents the background, reviews the existing evidence on FiF graduates, and outlines the potential mechanisms through which FiF status may be related to fertility decisions and outcomes. Section 3 describes the dataset used in our analysis and the details of the empirical methodology. Section 4 starts by providing descriptive evidence of the relationship between graduation, FiF status, and fertility outcomes, then presents our main empirical estimates of the fertility gaps. Section 5 utilizes the rich set of variables available in the BCS70 dataset to carry out a heterogeneity analysis, focusing on the female FiF gap in childlessness. It also present a decomposition of the FiF gap. Section 6 concludes with a discussion of the results, limitations, policy implications, and future research directions.

2 Theoretical Background

2.1 Higher Education and Fertility

Figure OA1 in the Online Appendix presents the share of graduate women and the total fertility rate for various OECD countries between 1980 and 2020. It shows a steep increase in the share of women with degrees, and concurrent decline in fertility over the time period. While there is a negative correlation between educational attainment and fertility, the literature is ambiguous about whether this relationship

[3] Such programs include informational and mentoring programs, ad campaigns publicizing the perseverance of FiF alumni, financial and in-kind support, health and mental health care, and community building events. See for example: https://firstgen.naspa.org/ and http://www.firstinfamily.com.au/. Empirical evidence of the impact of such programs is also emerging, for example, financial aid tied to high grades combined with academic support services was shown to especially benefit FiF students' academic performance (Angrist et al., 2022).

is causal. There is plenty of evidence that being in school reduces the probability of teenage motherhood (Black et al., 2008). Still, the evidence regarding the effects on completed fertility is inconclusive (Fort et al., 2016; Monstad et al., 2008). Furthermore, most of the literature looks at the effects of growing educational attainment concentrating on those in compulsory education by exploiting exogenous changes in the related legislation (Fort et al., 2016), however, only a handful of papers study the effects of post-compulsory education (Currie and Moretti, 2003; Tequamem and Tirivayi, 2015; Choi, 2018; James and Vujić, 2019; Kamhöfer and Westphal, 2019; Kountouris, 2020; Bharati et al., 2021). Our study provides estimates of the impact of higher education on completed fertility, and highlights the role of intergenerational mobility in shaping the fertility returns to higher education.

2.2 First-in-Family Graduates

FiF individuals are known under different 'labels'. First in family or first-in-family (vs. non-FiF) is the dominant terminology in the UK and Australia. In the US, they are referred to as first-generation (vs. continuing-generation) graduates, or first-generation college students (FGCS). These terms refer to individuals who attend or graduate from college, but whose parents did not do so. The research to date shows that FiF students often face complex and multiple forms of disadvantage that shape their schooling and transition to university. Going to university can be daunting new territory for these students, their families and even their communities.[4] Patfield et al. (2022) argue that FiF status should be treated as an additional underrepresented target group within the national equity framework and be supported accordingly.[5]

There is very limited evidence on FiF graduates and their health and socio-economic characteristics in general, and for the UK in particular. For example, the recent paper of Henderson et al. (2020) uses cohort-study data for England and examines the individual and socio-demographic characteristics of those who are FiF graduates. The paper finds that within children of non-graduate parents, certain ethnic minorities and those with higher pre-university educational performance (i.e, exam scores) are more likely to graduate and thus become FiF. At the same time, FiF graduates are more likely to study law, economics, and management, as well as education, and less likely to study medicine, social sciences, arts and humanities than graduate children of graduate parents. Furthermore, FiF graduates are less likely to graduate from elite universities and are at a greater risk of dropout in general, pointing to their weaker 'intergenerational safety net'. The paper by Adamecz-Völgyi et al. (2020) examines how recent FiF graduates fare in the labour market in England at age 25. Looking at a cohort born in 1989/1990, the authors show that female FiF graduates earn 7.4% less on average than non-FiF female graduates. A decomposition of this early labour market female FiF wage penalty reveals that two-thirds of the gap is explained by having lower pre-university educational attainment, not attending an elite university, selecting particular degree courses (especially education), working in smaller firms, working in jobs that do not require their degree, and motherhood (although at age 25, the share of mothers is very low among both FiF and non-FiF graduates in this cohort at around 7%). The authors do not find a significant FiF wage penalty among men.

Outside of the UK, using data from a German university, a paper by Adler et al. (2025) finds substantial differences in expected earnings between FiF and non-FiF students. FiF students are less likely to select study fields based on expected earnings, partly because they anticipate lower personal ability and poorer non-wage amenities in high-earning fields. Using national data on top-performing university graduates in Germany,

[4] Source: https://www.qtac.edu.au/first-in-family-students-pave-the-way-to-university-success/

[5] In the Australian context, existing six underrepresented target groups are Indigenous Australians, people from low socio-economic status backgrounds, people from regional and remote areas, people with disabilities, people from non-English speaking backgrounds, and women in non-traditional areas of study.

Shure and Zierow (2023) find that first-generation students, despite high academic achievement, are more likely to attend less prestigious and geographically closer universities, choose lower-return fields of study, and prioritise job security in the labour market. These patterns persist even when prior attainment is held constant. Additionally, female first-generation graduates are less likely to value networking opportunities offered by elite scholarship programs. Using data from an elite university in Australia, Edwards et al. (2022) find that FiF students, especially women, have lower grade-point averages (GPAs) and are more likely to drop out after the first year, a pattern not seen in the broader tertiary sector. The main driver of these academic gaps is lower cognitive ability.

Studies like Stuart (2006), Capannola and Johnson (2022) and Apps and Christie (2023) use qualitative phenomenological designs to explore the role of friendship and family relationship experiences of FiF graduates as they transition to and persist through university (college). Drawing on life history methods to gather the data for the UK, Stuart (2006) examines the different experiences of working- and middle-class students and highlights the role of friendship as a key determinant in deciding to stay in higher education as well as in creating student success once at university. Capannola and Johnson (2022) conclude in the US context that parents, despite lacking college experience, offer educational, financial, and emotional support which students consider essential to their success. Many first-generation college students also state that setting an example and forging a path for younger siblings helped motivate them to persevere through hardships. Both of these papers stress the importance of 'social' or 'cultural capital' (Apps and Christie, 2023) which can operate to offset the effects of middle-class cultural and economic capital. The paper by Groves and O'Shea (2019) discusses how FiF students have had limited exposure to the higher education environment and offers practical insights into how we might support and engage this cohort and their parents (Apps and Christie, 2023) to improve higher education application and retention.

2.3 Potential Mechanisms Behind the FiF Fertility Gap

Building on the findings of previous literature, there are several potential mechanisms through which we may expect fertility differences to arise, particularly among women. This subsection reviews six potential mechanisms, the roles of which we will descriptively test in this paper.

1) *Labour market outcomes and financial constraints.* The evidence detailed in the previous subsection suggests that FiF graduates may differ in terms of debt upon graduation, and in other ways upon entering the labour market, such as employment, occupation, and earnings. This may lead to different financial constraints that impact fertility decisions. The impact of liquidity constraints on fertility has been a long-standing topic in economics. In his economic analysis of fertility, Becker (1960) uses a rational utility maximising framework to show that fertility decisions are influenced by economic factors: raising children offers potential future returns, but there are also costs involved, including the opportunity cost of the time spent raising children. Building on this foundation, Nakamura et al. (1979) focus on labour market outcomes of married women in Canada, linking fertility decisions to expected income levels and hours worked. In both studies, women with higher incomes tend to have fewer children due to the increased opportunity cost. As mentioned above, Adamecz-Völgyi et al. (2020) find that FiF graduate women earn less compared to non-FiF women following graduation, but find no earnings penalty among men. Lower earnings may mean tighter liquidity constraints following graduation from a university, which could lead to different fertility decisions.

2) *Skills and human capital.* There is an established literature on the intergenerational transmission of cognitive and non-cognitive Skills (Anger, 2012; Grönqvist et al., 2017; Conti and Kopinska, 2018), showing that the educational attainment and labour market outcomes of children are strongly related to parents'

cognitive and non-cognitive skills. FiF graduates may differ in cognitive or non-cognitive skills due to differences in family home environments and schooling quality. These differences may influence academic success, aspirations, choice of university, field, and occupations. These, in turn, may also impact fertility decisions.

3) *Family background and gender roles.* Literature stresses the importance of the intergenerational transmission of family influence (Eshaghnia et al., 2022) and gender norms (Farré and Vella, 2013). For example, among children with highly educated parents, children of single mothers are less likely to be highly educated themselves relative to children who grow up with both biological parents (Martin, 2012). Women with partners who grew up with a working mother are more likely to participate in the labour force, work longer hours and earn higher labour income (Schmitz and Spiess, 2021). Bredtmann et al. (2020) show that women's labour market participation is significantly positively related to the gender role attitudes in her mother-in-law's country of origin, however they don't find evidence that intergenerationally transmitted gender role attitudes affect the fertility behaviour of native American women. In line with this literature, FiF graduates' fertility choices may be influenced by differing experiences and learned norms in their childhood. They may have had different numbers of siblings themselves, grown up in different family structures, or their parents may have had different views regarding the roles of mothers and gender equality. Differences in family background could then shape their fertility decisions.

4) *Mental and physical health.* The literature shows that education accumulation leads to delays in fertility (Wilson, 2012; Fort et al., 2016; James and Vujić, 2019). Advanced maternal age is associated with negative offspring health outcomes (Royer, 2004; Myrskylä and Fenelon, 2012; Fall et al., 2015) and may ultimately lead to childlessness. Bellés-Obrero et al. (2023) show that a reform which led to women's greater access to economic opportunities in Spain delayed fertility but did not impact the completed fertility of affected women. They also document a detrimental impact on the health of children at delivery, due to the postponement of motherhood and the deterioration of mothers' health habits (such as smoking and drinking). However, in the medium run, these more educated mothers reverse the adverse health shocks through maternal vigilance and investment in their children's health habits. Therefore, FiF graduates, particularly women, may be more likely to face health issues that impact their ability or willingness to have children. These may arise due to differences in childhood background, or as a consequence of experiences during university, for example, due to added stressors. As a result, FiF women could be more likely to have fertility issues or miscarry. They may also have worse experiences when they give birth, and hence be less likely to choose to have further children. FiF graduate women may postpone having their first child, and so risk a higher chance of infertility and have less time to have more children, directly affecting completed fertility. Prior research suggests that male fertility decisions are influenced by economic stability, partner selection, and labour market trajectories (Lundberg and Pollak, 2007). College-educated men often delay fatherhood but are less constrained by biological limitations compared to women.

5) *Child-related preferences.* Bloemen and Kalwij (2001) suggest that the decline in fertility and the rise in female employment over the past decades can be attributed to a fundamental shift in unobserved preferences regarding work and family. This argument ties back to the works of Becker (1960) and Becker and Lewis (1973) about the quality-quantity trade-off that women face. Educated women prefer fewer children (quantity) but with higher human capital (quality), which they increase by providing better care at home (Kim, 2023). However, in his analysis of the demographic transition, Galor (2012) critiques these theories based on shifts in preferences, arguing that these shifts are for the most part unobservable. Despite Galor's critique, preferences play an important role in fertility decisions, and they get passed on through

generations: the parents of individuals who have low taste for children are likely to have similar low taste (Gobbi, 2013).

It is important to differentiate between desired fertility, the number of children an individual would ideally like to have, and realised fertility, which is impacted by real life opportunities and constraints. University may impact desired fertility differently for FiF and non-FiF graduates, which is not necessarily a loss, and may even be seen as a positive consequence of women's empowerment. However, it may also impact realized fertility due to constraints resulting from challenges FiF graduates face, which is a loss from both an individual and societal perspective. Berrington et al. (2015) study gaps between intended and realised fertility (number of children and childlessness) in 19 European countries and the US based on a cohort approach, finding the highest gap among highly educated women, but with significant cross-country and regional differences that suggest that contextual factors such as norms, policies, and labour market conditions likely play a role. As FiF graduates face particular challenges, we may expect these to constrain their fertility, and lead to a larger gap between their desired and realized fertility.

Therefore, FiF graduate women (men) may prefer to have fewer children compared to non-FiF women (men). Differences in child-related preferences may arise prior to, during, or after university, and are a result of a complex set of factors. They may arise as a result of university attendance, or due to pre-existing differences between FiF and non-FiF students. Differences in preferences could be a result of differences in learned parental roles and norms. Mothers of FiF graduates may have been less likely to work when they were children than the mothers of non-FiF graduates, so FiF graduates may be less likely to internalize the idea of a working mother. They may have different expectations regarding their ability to balance careers and motherhood. FiF graduates may value their careers relatively more highly due to the large investments they made into achieving their higher human capital (sunk costs), and choose to focus more on work rather than having children or more children. Because the opportunity cost of raising children for FiF graduates is higher than it was for their lower-educated parents, this might make them more likely to have fewer children or remain childless.

6) *The role of partnerships and family structure.* Classic economic theory predicts specialisation, where a high-income-potential partner works and a low-income-potential partner handles household tasks and child-rearing. This would make highly-educated men and low-educated women the most desired in the marriage market (Becker, 1960). On the other hand, we may instead observe assortative mating based on education, especially in recent decades with more women pursuing higher education than men (Greenwood et al., 2014). Additionally, changing societal values make both partners more likely to develop careers and share household chores equally. Consequently, marriage now serves as a commitment device for investing in children rather than for gender specialisation (Lundberg and Pollak, 2014; Fahn et al., 2016). The partner's level of education can impact fertility in different ways, depending on who bears the opportunity cost of raising children. If this only concerns the mother, the father's higher income, which is often associated with a higher level of education, could mainly compensate for the mother's opportunity cost (income effect). If the opportunity cost of both partners matters, then the education effects would reinforce each other, and the substitution effect would prevail (Davia and Legazpe, 2015). Doepke and Kindermann (2019) argue that fertility decisions are influenced not only by the overall costs and benefits of having children, but also by how these costs and benefits are distributed within the household. Consistent with theoretical predictions, fertility rates are lowest in countries where men contribute the least to household work, and women in these countries are particularly likely to oppose having another child.

3 Data and Methods

3.1 Data

In our analysis, we use the 1970 British Cohort Study (BCS70). The BCS70 is a nationally representative birth cohort study that follows the lives of 17,000 individuals born in England in a specific week in 1970. The original sample included all babies born after the 24th week of gestation from 00.01 hours on Sunday, 5th April to 24.00 hours on Saturday, 11th April, 1970 in England, Scotland, Wales, and Northern Ireland.[6] Thus, the BCS70 has no sampling unit. The BCS70 collects rich data on family background, childhood and adolescent cognitive skills, preferences, and labour market and other life outcomes up until age 46.

To maximize available information, we pool information from all waves (age 26, 30, 34, 38, 42 and 46). By "children", we mean the biological children of cohort members, regardless of whether they live with their parents or not.[7] We use two main outcome variables: the total number of children, which is an integer, and childlessness, which is a binary variable. We also investigate the number of children among those who did have children, so we can differentiate between any gaps on the extensive (childlessness) and the intensive margin (number of children among parents).

The BCS70 captures the educational attainment of the cohort members' parents in the age 10 wave. A person is 'potential FiF', potentially the first in their family to go to university if neither of their parents earned a university degree, i.e. a BA/BSC degree or anything higher. Similarly, we define graduation among cohort members as earning a BA/BSc degree or anything higher by age 46, reported in any wave. By 'FiF graduates', we mean university graduates whose parents did not go to university (they are thus those potential FiF individuals who went on to university and earned a degree), and 'non-FiF graduates' are university graduates who had at least one graduate parents. Table A1 in the Appendix shows that 87% of individuals are potential FiF. Among them, 21% earned a university degree, while the graduation rate among those with graduate parents is 56%.

We use the following control variables in our main models: region of birth, parental socio-economic status (SES) (high vs low-SES, based on the National Statistics Socio-economic Classification (NS-SEC) categorization of parents when the cohort member was born), ethnicity (white or not), mothers year of birth, number of siblings, whether the individual was a first-born child, cognitive skills (a summary measure of 18 tests on various facets of cognitive skills measured at ages 5, 10 and 16), and mathematics grades from age 16 (O-level examinations, CSE examinations, or equivalent). These variables are meant to capture demographic and family background as well as cognitive skills that might affect both graduation and fertility outcomes. While we are aware of the fact that all of these variables could be 'bad controls' in the sense that could be affected by parental education, our goal is to look at the difference in fertility outcomes above these baseline characteristics. Controlling for background differences allows us to decrease the role of selection in determining fertility differences and estimate the statistical relationship between graduation and fertility outcomes in a meaningful way.

Our main analytical sample contains those who participated in the age 46 wave and reported information on the number of their biological children, have information on parental education (from the age 10 wave) and their own graduation from any waves ($N = 8,428$). For the control variables, we employ missing flags if needed, except for maternal year of birth, for which we employ mean imputation. The final sample consists of 4,351 women and 4,077 men when we look at the fertility returns of graduation, and 1,133 graduate women

[6] Babies born in Northern Ireland were not followed up later.

[7] However, we also replicate our main results using the number of children in the household at age 46 as the dependent variable and find very similar results.

and 994 graduate men when we compare FiF and non-FiF graduates. We show that these sample restrictions (i.e., attrition and non-response) are not likely to drive our main results via three robustness tests detailed in the next subsection. The descriptive statistics of the graduate sample are presented in Tables A2 and A3 in the Appendix. Selection into graduation is investigated in Tables OA7 and OA8 in the Online Appendix.

3.2 Empirical Methods and Robustness Checks

As a first step in our analysis, we document the evolution of raw fertility outcomes (number of children and childlessness) of FiF graduates, non-FiF graduates, and non-graduates over their life cycle up to age 46, without controlling for any individual characteristics. This allows us to observe the age when differences in fertility emerge.

Second, we estimate the fertility returns to university graduation while controlling for the background characteristics detailed above. We estimate these models on the full sample of individuals separately for men and women as follows:

$$y_i = \alpha + \beta_1 * graduate_i + \beta_2 * potentialFiF_i + \beta_3 * FiFgraduate_i + \beta_4 * X_i + u_i, \quad (1)$$

where y_i stands for one of the two alternative fertility measures, $graduate_i$ is a dummy variable indicating the graduate status of individual i, $potentialFiF_i$ captures potential FiF individuals (a binary variable that equals 1 if none of individual i's parent had a degree and 0 otherwise), $FiFgraduate_i$ is the interaction term of the two previous variables ($graduate_i$ and $potentialFiF_i$), X_i is a vector of individual characteristics, and u_i is a usual heteroscedasticity-robust error term.[8] This model allows us to estimate the overall relationship between graduate status and fertility in the sample, while β_3 captures its heterogeneity by FiF status. We estimate this model additively, by gender: in Model 1, we look at the unconditional relationship between fertility and graduation; in Model 2 we extend the model with the control variables and we introduce the interaction term of interest in Model 3. Lastly, for an easier interpretation, we re-estimate Model 3 separately on the subsample of potential FiF individuals (children of non-graduate parents) and the subsample of children of graduate parents. While Model 3 estimated on the pooled sample implicitly assumes that the fertility returns of individual characteristics are the same for these two groups, estimating it separately by groups relaxes this assumption. When we report our results in the next section, we report these last set of results (Model 3 estimated separately for the two subgroups, by gender) in the main text and present the estimates of Models 1-3 on the pooled sample (but by gender) in the Online Appendix.

Third, we restrict the analytical sample to graduates and explore completed fertility differences between FiF and non-FiF graduates only. We have emphasized above that as neither having graduate (or non-graduate) parents nor cohort member's graduation status are randomly allocated, we are not able to estimate the causal impact of graduation or being a FiF graduate.[9] Still, as we can control for rich individual background characteristics, we believe that our results provide meaningful conclusions, similar to the vast literature looking at conditional wage returns. The main advantage of restricting the analytical sample to graduates is getting rid of one of the selection issues: selection to graduation. By comparing graduates only, we can make better-grounded comparisons so we consider these models providing our main results. Formally, we estimate the following models by gender:

[8] The sample of BCS70 included all babies born during a specific week; thus, there is no sampling unit in the sample. Hence, we do not cluster the standard errors.

[9] Similar to Currie and Moretti (2003), we considered using availability of tertiary education in parents' region of residence when they were below 18 to account for the endogeneity of educational attainment, but we didn't have such information at our disposal.

$$y_i = \alpha + \beta_1 * FiFgraduate_i + \beta_2 * X_i + u_i, \tag{2}$$

where the estimated β_1 coefficient captures the fertility differences between FiF and non-FiF graduates. We use this specification to conduct a heterogeneity analysis of the FiF fertility gap as well.

We provide the following robustness tests in the Online Appendix to support our main results. First, we re-estimate Equation 2 with leaving out two control variables from the model: parental SES and age 16 math grades. Parental SES could theoretically bias our results towards zero as it is highly related to parental education. In the main specification, we are interested in the relationship between being a FiF graduate and fertility outcomes above and beyond parental SES, but we also want to test whether this control variable might mitigate the relationship we are after. Furthermore, age 16 math grades are missing for a large part of the sample, and we account for missing data with missing flags in our main model. In this robustness test we leave out math grades to make sure that our results are not affected by missing math grades.

Second, for simplicity, we use OLS to estimate our main results; however, the number of children is a count variable while childlessness is binary. Thus, we show that choosing OLS does not bias our results by re-estimating Equation 2 using Poisson regressions when the outcome is the number of children and probit models when the outcome is childlessness.

Third, we show that attrition and non-response in BCS70 does not bias our results via three methods. First, using the sample and the variables of the first two waves (ages 0 and 5: region of birth, socio-economic background of parents, whether their mother and father had any qualifications, ethnicity, low ($<$ 2500 g) birthweight, mother's year of birth, being a first-born child, age when mother left education, whether mother was married when the cohort member was born, whether cohort member was conceived before or outside of marriage, number of siblings, being an only child in the household at age 5, whether mother worked at the time of the age 0 and age 5 waves), we directly model the probability of being in the analytical sample using a probit model separately by gender. Then, we re-estimate our main results using the inverse of these predicted probabilities as analytical weights. Second, we repeat this procedure applying random forest models instead of probit models to estimate the weights. Lastly, we employ a balancing technique, entropy balancing (Hainmueller, 2012) to re-weight the analytical sample to match the observable characteristics of the left-out observations. These procedures lead to similar conclusions as our main empirical strategy. As usual, we cannot exclude potential unobserved sources of sample selection.

Fourth, we apply a quasi-experimental identification strategy, inverse probability weighting (IPW) to increase the comparability of FiF and non-FiF graduates. We estimate logit models to predict the probability of being a FiF graduate on the subsample of graduates using the same control variables as detailed above, and use the inverse of these predicted probabilities to re-weight the regressions. Note that while this method does not solve any potential omitted variables bias, it is reassuring that our main results still hold after this procedure.

Fifth, we investigate how our main results would change in the presence of such an unobserved variable that is correlated with both fertility outcomes and being a FiF graduate. We follow the procedure of Masten et al. (2024) who provide a method to test the sensitivity of the main estimated coefficient to relaxing the conditional independence (unconfoundedness) assumption. In particular, they introduce the concept of *conditional partial independence* and a framework in which a single parameter c captures how far we deviate from conditional independence. Parameter c ranges from 0 to 1. When c equals 0, it corresponds to the assumption of conditional independence. For any c greater than 0, conditional independence is only partially satisfied, meaning the exact values of a treatment effect parameters cannot be determined. Instead, we can only establish bounds for these parameters. Masten et al. (2024) describe these bounds as a function of c, where smaller values of c result in narrower bounds, and larger values of c lead to wider bounds. Furthermore, the method estimates the value of c that would already result in changing the sign of the original estimate, termed as *breakdown c-value*. Using the `tesensitivity` package in Stata, we estimate c for all outcomes by gender, and investigate 1) the value of c that would change the sign of the estimated parameter, 2) the c values of our observed control variables as a point of comparison, and 3) how our main estimated coefficient would change if we left out each observed control variables (one at a time) as if it was unobservable. While the method does not give clear sensitivity thresholds in terms of how large c should be, we conclude that our estimates are fairly insensitive to potential omitted variable bias if 1) the estimated c is at least moderate and 2) leaving out observable characteristics with similar c's from the model would only cause a small change in the estimated coefficient.

3.3 Heterogeneity Analysis

After estimating the magnitude of the FiF fertility gap on average, we exploit the rich BCS70 data to explore the heterogeneity of our results. We split the data into subsamples based on the individual characteristics and interim outcomes of the individuals, and re-estimate Equation 2 within these subsamples. Note that as we mentioned earlier, most of these variables are 'bad controls' as they could have been affected both by parental education and fertility intentions or outcomes. Therefore, for example, it doesn't make sense to control for employment outcomes in our main model to see whether these moderate the statistical relationship between being a FiF graduate and fertility outcomes, because education, employment and fertility decisions are made jointly. Thus, we cannot just extend our main model with a long list of controls for these potential moderators, rather, we conduct a heterogeneity analysis.

First, we gather all possible variables from BCS70 that could capture the mechanisms discussed in the previous section and investigate the FiF gap in all of these variables among men and women. These simple comparisons help us to understand the compositional differences between FiF and non-FiF graduates. Then, we re-estimate our main model (Equation 2), i.e. the conditional FiF fertility gap, on subsamples that appear to be important based on the group level mean gaps and compare the results. This heterogeneity analysis provides suggestive evidence of which variables may play a role in shaping the FiF fertility gap.[10]

3.4 Decomposition Analysis

Lastly, we investigate the role of the important characteristics (as identified by the previous steps) in the female FiF gap in childlessness by implementing a Kitagawa-Oaxaca-Blinder decomposition (Oaxaca, 1973; Blinder, 1973; Kitagawa, 1955). This decomposition technique allows us to measure how much of the FiF gap in childlessness comes from different individual characteristics (endowments) between FiF and non-FiF graduate women, and how much of it remains unexplained, stemming from different returns to these characteristics. We report common coefficients estimated from a pooled regression (Neumark (1988)). This means that the estimated coefficient of the unexplained gap is the same as the gender coefficient in a pooled regression model. The value added of this method compared to a linear regression is that it shows the magnitude of each endowment's relative contribution to the raw gap as well as how the returns to these

[10]As we have emphasized earlier, we suffer from a low-power problem throughout the analysis. While we acknowledge that the best practice would be to apply multiple testing procedures for the heterogeneity analysis, as most comparisons will result in overlapping confidence intervals, we do not perform formal multiple testing analysis. If we did, that would probably question all results in this subsection.

characteristics differ across FiF and non-FiF graduate women in one step.

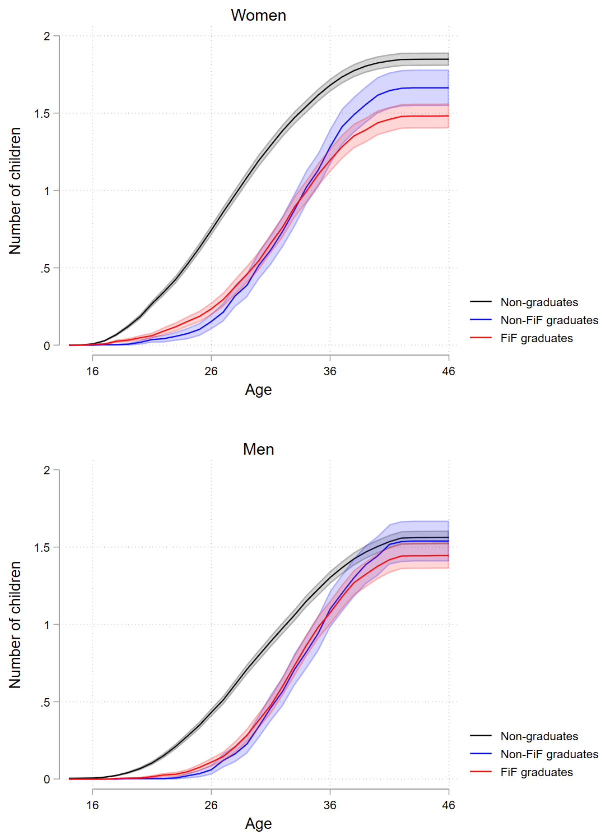
4 Results

4.1 Raw Fertility Outcomes by Age

Figure 1 shows the evolution of the average number of children of FiF graduates, non-FiF graduates, as well as non-graduates by age, separately for men and women. For men, non-graduates have a significantly higher number of children from around age 18, however, this difference decreases and the number of children of graduates catches up to that of non-graduates by age 46. This suggests that graduate men delay having children, but eventually catch up with non-graduates. FiF graduate men have a lower number of children on average at age 46, however, the difference is not statistically significant.

Among women, we also see that a large difference emerges between graduates and non-graduates in the number of children prior to age 20; however, unlike in the case of men, this difference remains significant even at age 46. This could mean that, similarly to men, graduate women also delay having children compared to non-graduates, however, they are not able to catch up at later ages as much as men do. FiF graduate women have a slightly higher number of children than non-FiF graduate women in their early twenties, during the time period when they are most likely to be studying in higher education. However, this trend reverses as they age: FiF graduates have a significantly lower number of children by the time they reach their forties. The fertility gap grows gradually after age 35. While both FiF and non-FiF graduate women postpone having children compared to non-graduates, non-FiF women later catch up to some degree, while FiF women do not.

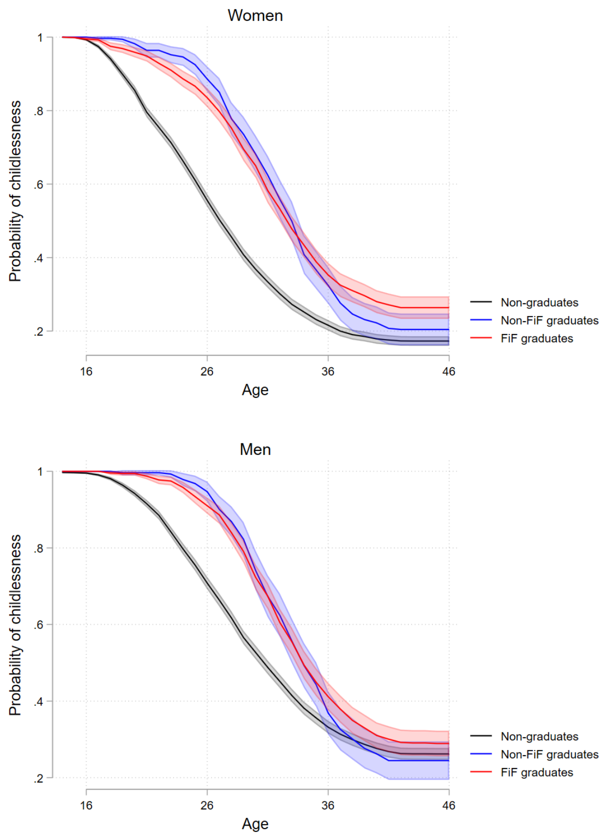
Figure 1: Number of children among FiF and Non-FiF graduates and non-graduates by age



Source: Authors' calculations based on BCS70. The averages are plotted along with their 95% confidence intervals. No. of observations: 8,428.

Figure 2 shows a similar pattern in the probability of childlessness by age. Among men, graduates have a significantly higher likelihood of childlessness compared to non-graduates in their twenties and early thirties, however, the gap disappears by their forties. FiF graduates have a slightly higher probability of childlessness, though this difference is not significant. Among women, non-graduates have a significantly lower probability of childlessness compared to graduates from an early age. The gap between graduates and non-graduates decreases by age 46. We see a lower probability of childlessness for FiF graduates compared to non-FiF graduates in their twenties, however, this reverses in their thirties, leading to a higher probability of childlessness by age 46. FiF graduate women have lower completed fertility based on both the number of children and the probability of childlessness.

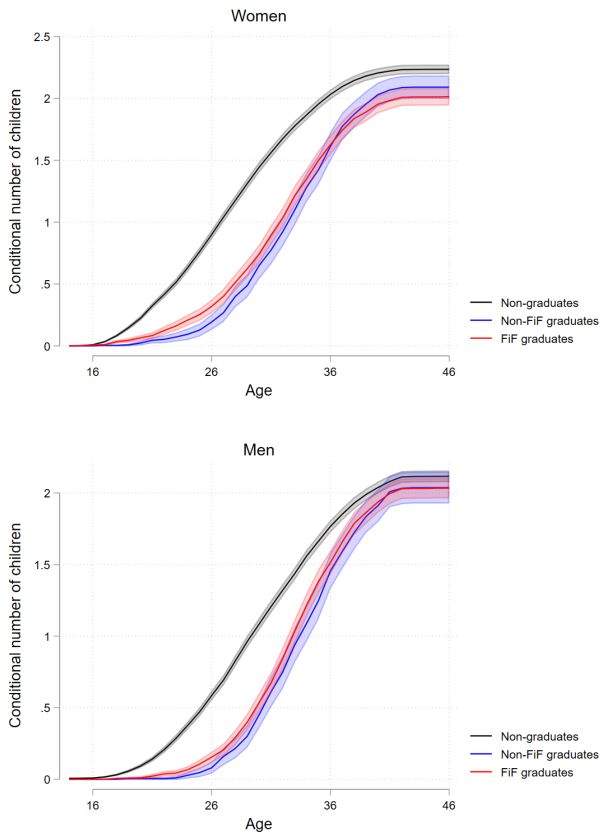
Figure 2: The probability of childlessness among FiF and Non-FiF graduates by age



Source: Authors' calculations based on BCS70. The averages are plotted along with their 95% confidence intervals. No. of observations: 8,428.

Figure 3 concentrates only on those who have children, i.e. looks at the differences in the number of children among mothers and fathers. In this subsample, there are hardly any differences between graduate and non-graduate men. Among women, graduate mothers have slightly fewer children than non-graduate mothers, but there is no significant difference between FiF- and non-FiF graduates. This suggests that the fertility gaps observed in the number of children are due to FiF graduates' higher probability of childlessness, rather than FiF parents having a lower number of children.

Figure 3: Number of children among FiF and Non-FiF graduate and non-graduate mothers and fathers by age



Source: Authors' calculations based on BCS70. The averages are plotted along with their 95% confidence intervals. Subsample of those who have children. No. of observations: 6,510.

4.2 Fertility Returns to Graduation

We now investigate the fertility returns of graduation based on the full sample of individuals (both graduates and non-graduates) and Equation (1), controlling for their background characteristics. Table 1 summarizes our main results for women, separately for potential FiF women (those whose parents are not graduates) and for women whose parents are graduates.[11] Among potential FiF women, university graduates have a significantly lower number of children (-0.272, Column 1); however, among women who are children of graduate parents, graduation is not associated with having fewer children at age 46 (0.022, Column 2). The difference between these two estimates is significantly different from zero at 0.22 children (-0.348+0.130=-0.218) in the pooled model (Column 3 in Table OA1 in the Online Appendix).

Interestingly, while graduate women have 0.31 fewer children on average than non-graduate women (Column 1 in Table OA1 in the Online Appendix), differentiating by parental graduation reveals that graduation is only associated with having fewer children among those who are first in their families to graduate from a university. Among children of graduate parents (Column 2 in Table 1), graduation is not correlated with

[11] Tables OA1 - OA3 in the Online Appendix provide more detailed estimates of Equation (1), including the interaction term of potential FiF*graduation (β_3 in Equation 1) for each outcome.

the number of children.

Table 1: Fertility returns to graduation: women (age 46)

VARIABLES	(1) Potential FiF	(2) Children of grad. parents	(3) Potential FiF	(4) Children of grad. parents	(5) Potential FiF (parents only)	(6) Children of grad. parents (parents only)
Graduate, age 46	-0.272***	0.0222	0.0803***	-0.0588	-0.130***	-0.129
	(0.0515)	(0.107)	(0.0184)	(0.0395)	(0.0460)	(0.0902)
Constant	-34.78***	-41.27*	12.03***	15.41*	-10.66	-8.413
	(8.173)	(24.48)	(2.627)	(8.685)	(7.211)	(20.93)
Observations	3,786	565	3,786	565	3,072	444
R-squared	0.043	0.071	0.024	0.068	0.036	0.071
Controls	Yes	Yes	Yes	Yes	Yes	Yes

*Source: BCS70. Regressions based on Equation (1). Additional control variables: region of birth, parental socio-economic background (SES), mother's year of birth, being a first born child, No. of siblings, ethnicity, cognitive skills, math grades from age 16. Robust standard errors in parentheses (*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$).*

Looking at the probability of childlessness as the outcome variable, Columns 3 and 4 in Table 1 show that while among potential FiF women, graduates are 8 percentage points more likely to stay childless than non-graduate women, this relationship is not significant among women whose parents are graduates (and even negative). The interaction term in the pooled version of Equation 1 is again significantly different from zero at 0.10 (Column 3 in Table OA2 in the Online Appendix), confirming that FiF and non-FiF women differ significantly in terms of how graduation relates to their fertility. Thus, we see the same pattern as we saw in the number of children: graduation is associated with a higher probability of childlessness among those whose parents did not have higher education, but not among women whose parents are graduates.

Lastly, we investigate the number of children among those who had children in Columns 5 and 6 of Table 1. These results control for the impact of the decision whether or not to have a child, and investigate the number of children among those who decided to have children. Interestingly, the association between graduation and the number of children is similar in terms of magnitude in the two groups (-0.130 among potential FiF women and -0.129 among children of graduate parents); however, it is only significant among the potential FiF. As the number of observations is relatively low among those whose parents are graduates, we conclude that looking at mothers specifically, the returns to graduation in terms of the number of children are negative, and do not differ by FiF status.[12] These results suggest that the FiF fertility gap operates more through the increased probability of childlessness rather than through the number of children among those who have children.

Table 2: Fertility returns to graduation: men (age 46)

VARIABLES	(1) Potential FiF	(2) Children of grad. parents	(3) Potential FiF	(4) Children of grad. parents	(5) Potential FiF (parents only)	(6) Children of grad. parents (parents only)
Graduate, age 46	-0.0870	0.131	0.0236	-0.0757*	-0.0503	-0.0346
	(0.0530)	(0.113)	(0.0205)	(0.0447)	(0.0448)	(0.0992)
Constant	-52.11***	-12.12	17.93***	10.86	-21.27***	12.48
	(8.576)	(29.18)	(3.055)	(10.40)	(8.007)	(26.13)
Observations	3,545	532	3,545	532	2,609	385
R-squared	0.025	0.048	0.018	0.058	0.030	0.060
Controls	Yes	Yes	Yes	Yes	Yes	Yes

*Source: BCS70. Regressions based on Equation (1). Additional control variables: region of birth, parental background (SES), mother's year of birth, being a first born child, No. of siblings, ethnicity, cognitive skills, math grades from age 16. Robust standard errors in parentheses (*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$).*

Table 2 shows the same set of results for men.[13] Graduation is not significantly related to the number of children among men, neither among those with no graduate parents, nor among those who have a graduate parent (Columns 1 and 2). Unlike what we observed among women, university graduation is not associated with a higher probability of childlessness among men without a graduate parent (Column 3); however, it is negatively correlated with childlessness among children of graduate parents (Column 4). When we re-estimate fertility returns in terms of number of children while restricting the samples to fathers in Columns 5 and 6, we find that graduation is not related to the number of children in either group.

[12] Interestingly, the pooled model in Table OA3 in the Online Appendix results in a significant coefficient (-0.159) on the interaction term of parental graduation and own graduation, suggesting an overall difference of -0.159+0.0579=-0.1011 between the number of children among FiF and non-FiF graduate mothers (even though the difference coming from the separate models is zero in Columns 5 and 6 of Table 1). This phenomenon is driven by the non-potential FiF group. The estimated fertility returns to graduation for potential FiF mothers are similar in the interaction model (Column 3 in Table OA3: -0.159+0.0579=-0.1011) and the model estimated on the subsample of potential FiF mothers (Column 5 in Table 1: -0.13). However, for non-potential-FiF mothers (who are children of graduate parents), the estimated returns indeed differ (0.0125 in Column 3 in Table OA3 vs. -0.129 in Column 6 in Table 1). This is due to differential fertility returns to cognitive skills among mothers: fertility returns to cognitive skills are positive for non-potential-FiF mothers but negative for potential-FiF mothers (Table OA35 in the Online Appendix). Among potential FiF mothers, higher cognitive skills are associated with fewer children while among non-potential FiF mothers, this is the other way around. Interestingly, among men, there is no association between cognitive skills and the number of children for either group. We investigate the role of cognitive skills further in Section 5.

[13] Again, more detailed estimates of Equation (1), including the interaction term of potential FiF*graduation (β_3 in Equation 1) for each outcome are reported in the Online Appendix, in Tables OA4 - OA5.

4.3 The FiF Fertility Gap Among Graduates

Next, we restrict the analytical sample to graduates as indicated by Equation (2) (Table 3). We find that for women, being a FiF graduate is significantly negatively related to the number of children (-0.17; Column 1) and positively related to the probability of childlessness (0.08; Column 3). Among graduate mothers, the relationship between being a FiF graduate and the number of children is insignificant (Column 6). This result again suggests that the large FiF gap in terms of the average number of children is mostly the consequence of their higher probability of childlessness.

We do not see a significant difference among graduate men in any of these three outcome variables. In terms of the average number of children (Column 2) and the probability of childlessness (Column 4), the estimated coefficients are smaller in magnitude than the same coefficient estimates for women, but they are not very close to zero. The coefficient for the number of children among fathers, however, is not just insignificant but also very close to zero. Overall, we conclude that we do not find evidence for the presence of a FiF fertility gap among graduate men.

Table 3: The FiF fertility gap among graduates (age 46)

VARIABLES	(1) No. of children Women	(2) No. of children Men	(3) Childless-ness Women	(4) Childless-ness Men	(5) No. of children Mothers	(6) No. of children Fathers
FiF graduate	-0.171**	-0.0812	0.0757***	0.0470	-0.0212	0.0147
	(0.0764)	(0.0852)	(0.0283)	(0.0320)	(0.0636)	(0.0725)
Constant	-7.625	-23.06	6.922	10.89*	9.170	-1.865
	(14.50)	(15.88)	(5.411)	(6.521)	(12.21)	(13.72)
Observations	1,133	994	1,133	994	854	719
R-squared	0.034	0.028	0.034	0.022	0.040	0.046

*Source: BCS70. Regressions based on Equation (2). Additional control variables: region of birth, parental background (SES), mother's year of birth, being a firstborn child, No. of siblings, ethnicity, cognitive skills, math grades from age 16. Robust standard errors in parentheses (*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$).*

4.4 Robustness Checks

The results of all robustness tests described in the previous section are shown in the Online Appendix. They confirm that the choice of the control variables (Table OA9), the estimation methods (Table OA10), attrition and missing data in BCS70 (Table OA11), and observable selection to being a FiF graduate (Table OA12) are not likely to bias our results.

The results of the sensitivity analysis (i.e., how sensitive our results would be to the presence of unobservable selection and/or omitted variable bias) are less straightforward to interpret. Based on the considerations detailed in the previous section and the estimated c parameters reported in Table OA13, we conclude that our most robust finding is the association between childlessness and being a FiF graduate among women.

While this result seems to be only moderately sensitive to potential omitted variable bias, the rest of our results are more sensitive. Thus, in the next section, we conduct a heterogeneity analysis for the relationship between childlessness and being a FiF graduate among graduate women only, but we also report the heterogeneity analysis for all three outcome variables for both men and women in the Online Appendix.

5 Potential Mechanisms Behind the FiF Fertility Gap

5.1 Heterogeneity Analysis

We turn our attention to the role that the potential mechanisms described in Section 2 may play in shaping the FiF fertility gap. First, we look at mean differences between FiF and non-FiF graduates (the FiF gap) in various key characteristics that may impact fertility decisions. These variables are defined in Tables A4-A10 in the Appendix. We plot the mean differences in these characteristics separately for women and men and present them in the Online Appendix. We also examine group differences in various balance tables by gender, which are in line with the results discussed below.[14] Next, we estimate FiF fertility gaps (according to Equation (2)) within subsamples characterized by the most important differences. This allows us to evaluate whether any observed differences in characteristics are contributing to the FiF fertility gap. We present the estimated FiF gaps in the childlessness of graduate women in these subsamples in Figure 4 in six blocks, following the structure of the potential mechanisms described in Section 2.3. The full results, including the estimates for the (conditional) number of children for women and for all outcome variables for men are reported in the Online Appendix.[15]

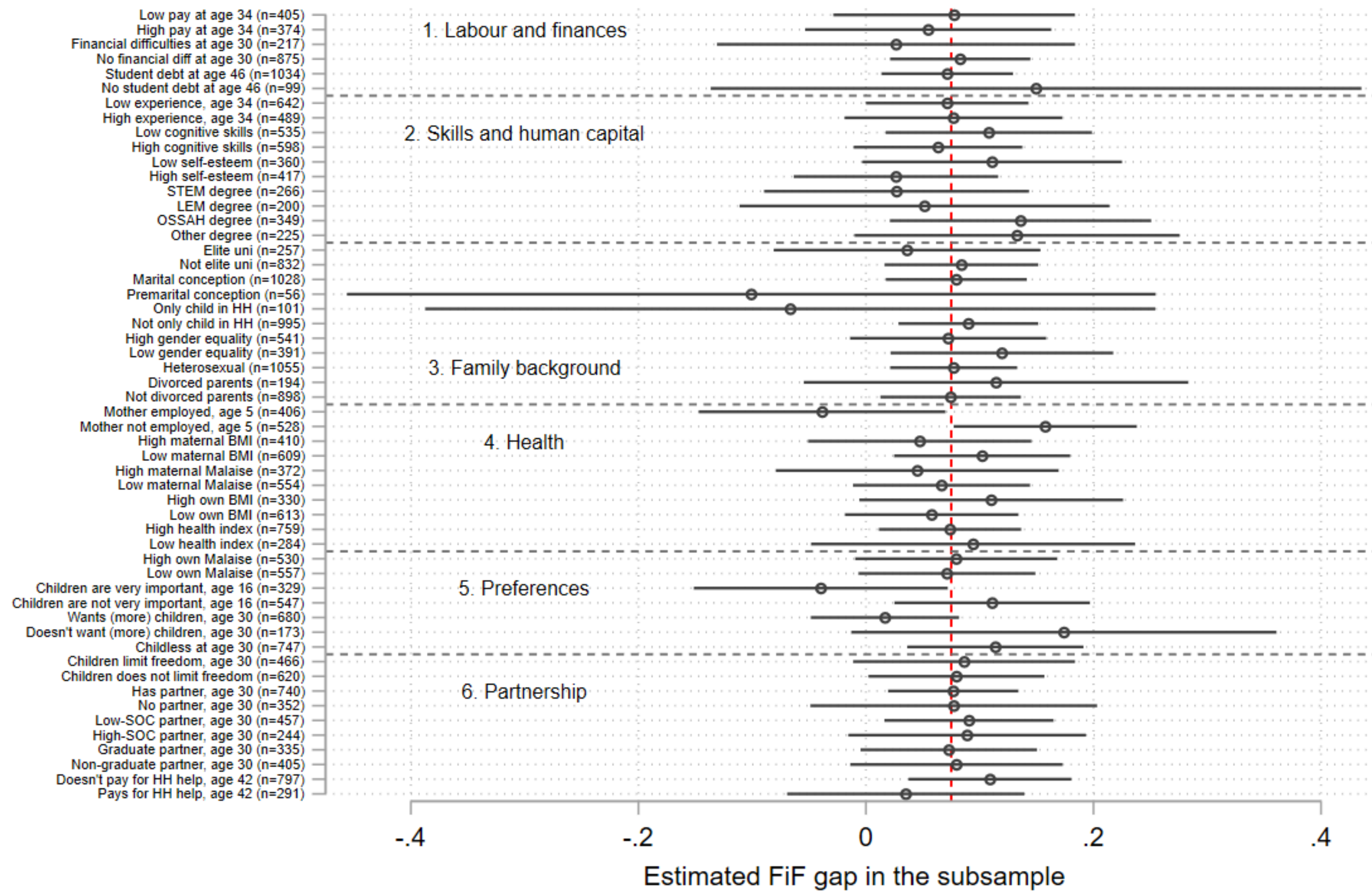
1) *Labour market outcomes and financial constraints.* As the fertility difference emerges between FiF and non-FiF graduate women after age 35, we look at the role of employment outcomes right before this divergence from the age 34 wave. We look at employment, hours worked, several measures of wage, labour market experience, as well as reported financial difficulties at age 30, and having student debt at age 46 (Table A4 in the Appendix). Figure OA2 in the Online Appendix depicts the FiF gap in labour market and financial liquidity-related characteristics. Compared to non-FiF graduate women, FiF women have higher student debt at age 46, and lower employment, hourly, and weekly pay at age 34. If these labour market and financial gaps contribute to the FiF fertility gap, we expect the female childlessness gap to be different across these groups. However, this doesn't seem to be the case. Block 1 of Figure 4 shows that the FiF gap in childlessness is roughly the same in all of these subsamples.

2) *Skills and Human Capital.* We next investigate the role of skills and human capital: cognitive skills, self-esteem, degree course (field), and elite university attendance (Table A5 in the Appendix). Figure OA3 in the Online Appendix shows that FiF graduates have lower cognitive skills and self-esteem in adolescence. They were more likely to obtain "other" degrees and less likely to obtain STEM and OSSAH degrees, and were less likely to study at elite universities compared to graduate children of graduate parents. Block 2 of

[14] Balance tables between FiF graduate and non-FiF graduate women (Appendix Table A2) and men (Appendix Table A3) show that, among graduate women, FiF graduates are more likely to have low- or medium-SES parents and have lower cognitive skills and math grades. We see similar patterns among men, with a key difference of no significant gaps in fertility. We compare potential FiF individuals to cohort members who had at least one graduate parent (Tables OA23-OA24 in the Online Appendix), and graduates to non-graduates among the potential FiF (Tables OA25-OA26 in the Online Appendix) and among children of graduate parents (Tables OA27-OA28 in the Online Appendix). These confirm differences in ethnicity, SES status, number of siblings, and cognitive skills between potential FiF and children of graduate parents, as well as between graduate and non-graduate potential FiF women and men.

[15] The detailed estimation results are given as follows: Block 1 on labor market outcomes in Table OA14; Block 2 on Skills and Human Capital in Table OA15; Block 3 on Family Background and Gender Roles in Table OA16; Block 4 on Health in Table OA17; Block 5 on Preferences in Table OA18; Block 6 on Partnerships in Table OA19.

Figure 4: Heterogeneity analysis: the FiF gap in childlessness (graduate women, age 46)



Source: BCS70. All plotted coefficients are estimated in separate models according to Equation (2). The vertical red dashed line indicates the average FiF gap in childlessness as in Column 3 of Table 3. All coefficients are plotted along with their 95% confidence intervals based on robust standard errors. The differences in the estimated pairwise coefficients are statistically significant in two cases only: mother employed or not at age 5 (diff: 0.19, $p<0.001$) and whether having children was said to be very important at age 16 or not (diff: 0.15, $p<0.05$).

Figure 4 shows that the estimated FiF gaps are very similar to the main average results and to each other in most subsamples, with one exception. The FiF childlessness gap is somewhat higher in the low self-esteem group, while it is small and insignificant in the high self-esteem group. Although this difference is not statistically significant, self-esteem still could contribute to the FiF childlessness gap through an endowment effect that we test in the next subsection.

3) *Family background and gender roles.* Next we investigate family background characteristics and gender roles in individuals' childhood homes as well as in their adult homes (Table A6 in the Appendix). Figure OA4 in the Online Appendix depicts the FiF gaps in these characteristics. Parents of FiF graduates are more likely to have relatively negative (traditional) views related to gender equality compared to non-FiF graduates. We do not see significant differences in terms of having siblings, or the employment of women's mothers. FiF women however have a higher likelihood of having been conceived outside of marriage and having divorced parents. Looking at the FiF gap in subsamples based on these characteristics, Block 3 of Figure 4 shows that there is a significant difference in the estimated FiF fertility gaps based on whether an individual's mother worked when they were aged 5. The FiF gap is positive and significant only among individuals whose mothers did not work when they were five years old, while the gap is zero among those whose mothers worked. In other words, parental graduation only matters for childlessness among those whose mothers did not work in their childhood. This may suggest that FiF graduate women whose mothers did not work have particular difficulties reconciling the challenges of employment and careers with having children.

4) *Mental and physical health.* We rely on several measures to explore the role of mental and physical health (Table A7 in the Appendix). Figure OA5 in the Online Appendix depicts the FiF gap in overall measures of mental and physical health measures. These reflect significantly more negative health outcomes at various ages among FiF graduate women. FiF graduates have a higher average Malaise score, particularly in the years following graduation from university, indicating a higher frequency of mental health issues. They tend to have a higher BMI at both age 26 and 46. The composite health index indicates that FiF women tend to have lower overall health, especially at age 38 and 42, the time period when the FiF fertility gap appears. FiF women's mothers also have a higher BMI and Malaise score, suggesting that these impacts may be passed on across generations. Focusing on measures of reproductive health specifically (Table A8 in the Appendix) and Figure OA6 in the Online Appendix), however, FiF and non-FiF graduate women don't appear to differ significantly. Block 4 of Figure 4 shows the estimated FiF fertility gaps in subsamples based on the above-mentioned health measures. The results do not point to health being an important contributor of the FiF fertility gap.

5) *Child-related preferences.* BCS70 captures child-related preferences at different ages (Table A9 in the Appendix). Figure OA7 in the Online Appendix depicts the FiF gap in preferences related to having children. FiF women were less likely to want (more) children at age 30. They also tended to believe that having children interferes with parent's freedom, though this difference is not significant. There is no difference in childbearing preferences at age 16 between FiF and non-FiF graduates. Block 4 of Figure 4 suggests that child-related preferences appear to be a potential driver of the FiF fertility gap. The FiF childlessness gap is basically zero among those who stated at age 16 that children are very important. However, among those who did not find children very important at age 16, FiF graduate women have 0.23 fewer children and are 11 percentage points more likely to stay childless than non-FiF graduate women. Interestingly, age 16 preferences are not related to the probability of graduation among the potential FiF. The role of preferences at age 30 is similarly strong. As we have previously shown that the FiF fertility gap emerges after age 35,

we further investigate the subsample of individuals who did not yet have children at age 30. The results are in line with our expectations in that this is indeed the group that drives the FiF fertility gaps.

6) *The role of partnerships and family structure.* Lastly, we test the role of partnerships and family structure (Table A10 in the Appendix). Figure OA8 in the Online Appendix depicts the FiF gap in the characteristics of partnerships. FiF and non-FiF graduates have the same likelihood of having a partner and show similar levels of relationship happiness. Their partners have similar characteristics regarding employment and wages, but the partners of FiF graduates left education earlier than their non-FiF counterparts. The lower education level but equal income of partners might be because union formation happens later than it used to, and this has shifted focus from education to income as the primary indicator of economic prospects in partners (Van Bavel et al., 2018). We do not see a significant difference in contraceptive use or sterilization rates. Figure OA9 in the Online Appendix depicts the FiF gap in various chores carried out by women and men within households at age 42. We cannot observe FiF women carrying a systematically higher burden of household tasks withing the family; however, they are less likely to pay for certain chores to be carried out. Subgroup FiF gap estimates by partnership measures and household work characteristics presented in Block 6 of Figure 4 show that the FiF gap is very similar among those who had or did not have a co-habiting partner at age 30; had low-SOC or high-SOC or graduate or non-graduate partner. The FiF gap appears to be somewhat lower and insignificant among those who did pay for household help.

We further evaluate whether fertility gaps in terms of biological children may be related to differential patterns in terms of having adopted or having step children in the household. One potential explanation behind the FiF fertility gap could be that FiF graduates substitute having biological children by adopted children or the children of their partners. However, this doesn't seem to be the case. Our FiF fertility gap estimates are very similar if we use the number of children in the household at age 46 instead of the number of the cohort member's biological children. As Table OA20 in the Online Appendix shows, the FiF gap in the number of children in the household is -0.19 while the FiF gap in childlessness is 7.4 percentage points among women, very similar to our results on the number of biological children.

Overall, based on the heterogeneity analysis, we find a few key characteristics that exhibit differences between FiF and non-FiF graduate women and appear to help explain the FiF fertility gap. In particular, cognitive skills, self-esteem, maternal employment, and childbearing-related preferences may shape the FiF gap in fertility.

5.2 Decomposition of the Female FiF Gap in Childlessness

Next, we use the Kitagawa-Oaxaca-Blinder decomposition of the female FiF gap in childlessness to further assess the roles of cognitive skills, self-esteem, maternal employment, and childbearing-related preferences in our results. The decomposition results are shown in Table A11 in the Appendix while the underlying group-specific regressions are available in Table OA38 in the Online Appendix.

The decomposition shows that the raw FiF gap in childlessness among female graduates is 6 percentage points, and the overall share of this gap explained by the different characteristics (endowments) of FiF and non-FiF graduate women is small and insignificant (-0.010).[16] Within endowments, there are two significant

[16]Tables OA29-OA34 in the Online Appendix give further support of the small role of these characteristics. They show how the estimated coefficient of being a FiF graduate in our main model changes as we add the control variables gradually. These results confirm that in most cases, control variables play a limited role in the magnitude of the estimated coefficient. The only exception is the number of children for women (Table OA29): controlling for their number of siblings and whether they were the first child in their family decreases the FiF gap from -0.181 to -0.167, i.e. their childhood family experience explains about 8 percent of the fertility gap.

elements: cognitive skills and self-esteem. As childlessness is positively correlated with cognitive skills for both groups (Table OA38), the contribution of cognitive skills is negative (-0.022) to the FiF gap, i.e., FiF graduate women having lower cognitive skills on average (Table A2 in the Appendix) makes FiF graduate women less likely to be childless. Self-esteem, on the other hand, has a small positive contribution to the female FiF gap in childlessness (0.008), as childlessness is negatively correlated with self-esteem (women with higher self-esteem are less likely to stay childless, Table OA38) and FiF graduate women have on average lower self-esteem than non-FiF graduate women (Table A2 in the Appendix).

As endowments have only a small and insignificant contribution to the female FiF gap in childlessness (and if anything, they work in the opposite direction), most of the gap remains unexplained (0.069). The unexplained part comes from the two groups of women receiving different returns to their endowments and the interactions between endowments and returns. Note that as we estimate a pooled decomposition model, the unexplained contribution is the same as the estimated coefficient on FiF in a pooled regression (this is shown in Table OA38, Column 3). Among the unexplained elements, two factors contribute significantly: childbearing preferences at age 16 and whether their mothers worked at age 5. Interestingly, saying that having children is important at age 16 is only correlated negatively with childlessness among FiF graduates (Table OA38, Column 1). Thus, different returns to childbearing preferences have a significant negative contribution (-0.044) to the FiF gap in childlessness. In other words, the fact that childbearing preferences are more important for shaping the completed fertility of non-FiF graduate women partially compensates the FiF childlessness gap, even though their childbearing preferences did not differ at age 16 (Figure OA7), and we find no evidence of differential selection into graduation by preferences (Table OA8) or of a significant endowment contribution due to child-related preferences in the decomposition.

Differential returns on whether their mothers worked when they were aged 5 also works as a compensatory factor against the FiF gap in childlessness. The mothers of FiF and non-FiF graduate women had the same probability of working (Figure OA4), so, similarly to childbearing preferences, there are no endowment differences between the two groups in this respect. There is a difference in their fertility returns, however: the childlessness of non-FiF graduate women is higher if their mother worked (Table OA38, Column 2), but among FiF graduates, this relationship is negative and insignificant. Taken together with our results from Figure 4, which showed that the FiF gap is small among those with working mothers but positive among those with non-working mothers), this suggests that the relatively low childlessness rate of non-FiF graduates with non-working mothers is driving these results. Indeed, in this group, the childlessness rate is only 15% (Table OA39), while among non-FiF graduates with working mothers it is 26% (Table OA40), and among FiF graduates, it goes from 24% (those with working mothers, Table OA40) to 29% (those with non-working mothers, Table OA39).

We investigate the role of maternal employment in the female FiF childlessness gap further in Tables OA39-OA40. Among daughters of non-working mothers, non-FiF graduates are more likely to come for high-SES status, more likely to have siblings, have higher cognitive skills and self-esteem than FiF graduates (Table OA39); however, these differences are very similar among those with working mothers as well (Table OA40). Specific difference among those with non-working mothers is that their mothers were more likely to say that they intentionally gave up a regular job to take care of their child. This can indicate that mothers of FiF graduates might have been more likely to lose their jobs, although this information is not included in the database explicitly. Interestingly, non-working mothers of non-FiF graduates had the lowest Malaise score (a measure of poor mental health) among these four groups when cohort members were 5 years old. Mothers with lower Malaise scores might have been able to provide a more supportive environment for their daughters, which in turn could have contributed to their lower childlessness rates. Using BSC70, we are not able to pinpoint the role of maternal employment in the FiF fertility gap and leave this question open for further research.

5.3 Self-Reported Reasons of Childlessness among FiF and non-FiF Graduates

Lastly, the BCS70 offers the possibility to investigate and compare self-reported reasons for childlessness among FiF and non-FiF graduates aged 42, when a related survey was conducted. Table OA21 in the Online Appendix summarizes the answers given by women. There is no difference in the prevalence of health- or infertility-related reasons given regarding questions related topartners, work, or finances. FiF women were more likely to say that they 'Have not wanted children' than non-FiF women (42 vs 31%); this is a large difference, but it is not significant probably due to the small sample size. There are only two reasons given with statistically significant differences between the two groups. FiF women were substantially less likely to say that they 'Haven't met right person to have children' with than non-FiF women (22 vs. 41%). Furthermore, FIF-women were less likely to say that they 'Don't want to answer' the question compared to non-FIF women (1 vs 6%). The distribution of answers is very similar among men as well (Table OA22 in the Online Appendix). There are no significant differences between FiF and non-FiF graduates in the probability of any reasons given. There are two reasons in which there are some almost significant differences. FiF men are less likely to say that they did not want to have children than non-FiF men (31 vs 42%). Furthermore, FiF men are more likely to say that there is 'No particular reason' behind their childlessness than non-FiF men (13 vs 6%).

The observed 8pp difference in childlessness and 11pp difference in not wanting children between FiF and non-FiF women suggests a strong relationship between educational background and fertility preferences. Interestingly, this pattern is reversed for men, with FiF men being less likely to report not wanting children than non-FiF men. Additionally, neither men nor women reported specific barriers preventing them from having children, suggesting that these differences are primarily preference-driven rather than constraint-driven. This contrast may be explained by gendered socialisation and economic considerations. FiF women, who have broken educational barriers, may prioritize career stability and financial independence (although these differences are not statistically significant due to a small sample size), leading to a stronger preference for voluntary childlessness. In contrast, FiF men may view family formation as a marker of success, reinforcing traditional expectations of fatherhood. This aligns with prior research showing that highly educated women are more likely to opt out of parenthood (Tanturri and Mencarini, 2008; Kreyenfeld and Konietzka, 2018), whereas men from upwardly mobile backgrounds may place greater value on fatherhood (West and Zimmerman, 1987).

6 Discussion

Our analysis evaluates the fertility returns to graduation, and fertility gaps among FiF and non-FiF university graduates. We use nationally representative panel survey data of a cohort born in 1970 in Great Britain and observe fertility outcomes at age 46 that (at least for women) represent completed fertility fairly well. We are the first to document that FiF graduate women, whose parents did not go to university, have fewer children on average than both non-FiF graduate women who had at least one university graduate parent and non-graduate women. Importantly, we do not find significant fertility gaps between the latter two groups, suggesting that negative fertility returns are not general, but rather specific to women who are the first to attend university in their families.

While we cannot identify the causal effects of graduation, we look at the fertility returns to graduation in a similar fashion to the Mincerian wage literature. Controlling for a rich set of individual characteristics, we find that graduation has large, negative returns for FiF women in terms of their number of children. FiF graduate women have on average 0.27 fewer children compared to women who have at leat one non-graduate parent and did not graduate, and are about 8% more likely to be childless at age 46. When we look at graduates only, we find that FiF graduate women have 0.17 fewer children than non-FiF graduates and are 7.6% more likely to be childless. Interestingly, the FiF fertility gap comes from FiF graduate women being more likely to stay childless than non-FiF graduate women. Those who have children do not have a lower number of children by age 46. The difference in the number of children between FiF and non-FiF graduate women emerges between the ages of 35 and 40. While both men and women who attend university delay having children, men catch up in fertility outcomes after graduating, and non-FiF women catch up after the age of 35. However, FiF women do not increase their fertility at later ages, between ages 35 and 40, and therefore have lower completed fertility at age 46.

A comparison between FiF and non-FiF women reveals significant differences in earnings and employment after graduation, outstanding student loans, and mental and physical health; however, the heterogeneity analysis and decomposition of the FiF gap show that these do not seem to be driving the overall fertility gap. The FiF fertility gap is driven by the FiF gaps among women whose mothers did not work in childhood, those with lower self-esteem, and those without strong preferences for having children. It is possible that FiF women with these characteristics feel they cannot 'have it all'—successfully managing both a demanding career and family life—leading them to make different fertility choices. This might also point to the importance of role models in childhood—if young girls see their mothers working and having a family at the same time, they might handle the hurdles of intergenerational mobility better. Our findings underscore the interrelatedness of educational and fertility decisions and the importance of non-financial factors in shaping them. However, further data analysis with more detailed measures of childbearing preferences (at various ages) and aspirations, relying on a larger sample size, is needed to learn more about how these four mechanisms work in order to better inform policymaking.

Our results contribute to the policy discussion around higher education and fertility in several ways. First, we document the existence of a FiF gap in fertility, drawing attention to the role intergenerational mobility plays in the previously documented negative relationship between higher education and fertility. Policies therefore need to consider the particular challenges faced by women who are the first to attend higher education not just in terms of their university performance or labour market outcomes, but also in terms of family formation. Second, FiF women do not differ in their desired fertility from non-FiF graduates at age 16, and if they expressed high childbearing preferences, their completed fertility is also similar. Thus, our results do not suggest that intergenerational educational mobility requires women to give up childbearing if that is very important for them. However, if they don't have strong preferences for childbearing, it is associated with lower fertility compared to non-FiF graduates and non-graduates. This suggests that motherhood penalties could play a role here as they may disproportionately affect women with lower childbearing preferences. Third, it is also striking that lower self-esteem among FiF graduate women, compared to their non-FiF peers, contributes to the observed childlessness gap. Self-esteem is a malleable skill that can be developed in adolescence and beyond (Mendolia and Walker, 2014). Our results complement the evidence on the role of non-cognitive skills in shaping labour market outcomes and the gender wage gap (Blau and Kahn, 2017) by emphasizing the potential of further non-pecuniary impacts.

Forth, we find that being a FiF graduate is significantly associated with lower fertility for women, but not for men, suggesting that gender differences in childbearing-related costs play a role. Furthermore, we find that all graduate women (but not men) are more likely to stay childless if they have high cognitive skills, suggesting that childbearing has higher alternative costs for them. Thus, policies previously found to mitigate the motherhood penalty, such as increased childcare availability and well-paid parental leave for both parents, may help reconcile FiF women's higher education and career aspirations with having children. Lastly, the lack of reported barriers (Section 5.3) also raises important questions. While this may indicate a genuine absence of external constraints, it could also reflect an underreporting of structural obstacles which we cannot test in this paper. If unacknowledged barriers do exist, policies aimed at reducing the motherhood penalty may be even more effective for FiF women.

While our findings represent a meaningful contribution to the literature, they are not without caveats. First, we investigate one birth cohort from one particular country, and we do not know whether these findings generalize across countries and cohorts. Fertility outcomes are hard to predict, and institutional background is important. It is very likely that the same analysis would lead to different results in countries with different contexts. Future empirical research from further countries can shed light on the role of institutions in shaping the FiF fertility gap. Second, although we exploit a rich database and provide a series of robustness checks, we provide descriptive evidence and do not identify the causal effects of being a FiF graduate on fertility. Until recently, fertility seemed to be linearly related to educational attainment, but this trend seems to have reversed (Doepke et al., 2023; Sobotka, 2017). Thus, it would be very hard to guess the direction of omitted variable bias in our context. Third, as fertility decisions are made jointly with education and labour market decisions, pinpointing the potential mechanisms behind the FiF fertility gap is very challenging due to simultaneity bias. Since individuals make these choices in a dynamic and interdependent manner, it is challenging to disentangle whether differences in fertility outcomes are driven by educational attainment itself or by underlying preferences and constraints that shape both decisions simultaneously. While we do not claim causal identification, we acknowledge that without exogenous variation in graduation, drawing definitive conclusions about the direction of influence remains difficult.

Future research could address this issue by leveraging natural experiments, instrumental variables, or policy-induced shifts in educational timelines to better isolate the causal effect of intergenerational educational mobility on fertility (Currie and Moretti, 2003; Del Bono et al., 2012; Adda et al., 2017). However, identifying causal relationships in this setup is very challenging, because ideally, we would need a source of exogenous variation in both parental graduation and own graduation, with credible exclusions restrictions for each. Additionally, adopting a structural dynamic model (Hotz and Miller, 1993; Keane and Wolpin, 1997) would allow for a more rigorous estimation of these joint decisions while accounting for unobserved heterogeneity in preferences and constraints. Exploring such methodologies as a next step could provide a more comprehensive understanding of how educational pathways shape fertility choices over the life course. Our initial exploration based on heterogeneity analysis of fertility gaps therefore only opens doors for future research on this topic.

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Appendix

Appendix Table A1: The sample by own and parental graduation

Potential first graduate in family	Graduate, age 46					
	Non-graduate		Graduate		Total	
	%	No.	%	No.	%	No.
Children of graduate parents	43.9%	482	56.1%	615	100.0%	1097
Potential first in family	79.4%	5819	20.6%	1512	100.0%	7331
Total	74.8%	6301	25.2%	2127	100.0%	8428

Notes: Source: BCS70

Appendix Table A2: Descriptive statistics of graduate women: main variables

	FiF N	FiF Mean	NonFiF N	NonFiF Mean	Diff	p-value
No. of children, age 46	800	1.48	333	1.66	-0.18	0.01*
Childless, age 46	800	0.26	333	0.20	0.06	0.03*
No. of children, parents	589	2.01	265	2.09	-0.08	0.22
Age of parenthood	589	30.33	265	31.46	-1.13	0.00**
UK or European	800	0.94	333	0.98	-0.04	0.00**
Other ethnicity	800	0.04	333	0.02	0.02	0.18
Ethnicity is missing	800	0.03	333	0.00	0.03	0.00**
Region at birth	800	11.23	333	9.61	1.62	0.25
Low and medium SES parents	800	0.54	333	0.18	0.37	0.00***
High SES parents	800	0.42	333	0.80	-0.37	0.00***
SES missing	800	0.04	333	0.03	0.01	0.49
Not first-born child	800	0.55	333	0.57	-0.02	0.52
First-born child	800	0.41	333	0.40	0.01	0.73
Birth order missing	800	0.04	333	0.03	0.01	0.42
No siblings	800	0.11	333	0.05	0.06	0.00***
One sibling	800	0.48	333	0.53	-0.05	0.11
Two siblings	800	0.21	333	0.27	-0.06	0.03*
Three+ siblings	800	0.14	333	0.15	-0.01	0.58
Sibling data missing	800	0.06	333	0.00	0.06	0.00***
No math O/CSE	800	0.10	333	0.03	0.07	0.00***
Grade A/1	800	0.14	333	0.27	-0.14	0.00***
Grade B/2	800	0.19	333	0.24	-0.05	0.07
Grade C/3	800	0.22	333	0.14	0.08	0.00**
Grade D/4	800	0.08	333	0.08	0.00	0.83
No math info	800	0.28	333	0.25	0.03	0.24
Cognitive skills	800	0.66	333	1.10	-0.44	0.00***
Mother's year of birth	800	1,943.48	333	1,942.37	1.11	0.00***
Mother's year of birth missing	800	0.04	333	0.03	0.00	0.67

Source: BCS70. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Appendix Table A3: Descriptive statistics of graduate men: main variables

	FiF N	FiF Mean	NonFiF N	NonFiF Mean	Diff	p-value
No. of children, age 46	712	1.45	282	1.54	-0.09	0.24
Childless, age 46	712	0.29	282	0.24	0.04	0.16
No. of children, parents	506	2.03	213	2.04	-0.00	0.95
Age of parenthood	506	31.91	213	32.44	-0.52	0.16
UK or European	712	0.92	282	0.97	-0.05	0.00**
Other ethnicity	712	0.04	282	0.03	0.01	0.35
Ethnicity is missing	712	0.04	282	0.00	0.04	0.00***
Region at birth	712	11.75	282	12.37	-0.62	0.70
Low and medium SES parents	712	0.52	282	0.15	0.37	0.00***
High SES parents	712	0.44	282	0.81	-0.38	0.00***
SES missing	712	0.04	282	0.04	0.00	0.82
Not first-born child	712	0.56	282	0.59	-0.03	0.41
First-born child	712	0.39	282	0.38	0.01	0.70
Birth order missing	712	0.05	282	0.04	0.02	0.31
No siblings	712	0.08	282	0.08	0.00	0.95
One sibling	712	0.48	282	0.53	-0.05	0.15
Two siblings	712	0.26	282	0.26	0.00	0.92
Three+ siblings	712	0.12	282	0.11	0.00	0.89
Sibling data missing	712	0.06	282	0.02	0.04	0.00**
No math O/CSE	712	0.04	282	0.05	-0.00	0.86
Grade A/1	712	0.20	282	0.30	-0.09	0.00**
Grade B/2	712	0.20	282	0.21	-0.00	0.86
Grade C/3	712	0.15	282	0.12	0.03	0.25
Grade D/4	712	0.05	282	0.03	0.02	0.11
No math info	712	0.35	282	0.30	0.05	0.14
Cognitive skills	712	0.70	282	1.08	-0.38	0.00***
Mother's year of birth	712	1,943.53	282	1,942.52	1.01	0.00**
Mother's year of birth missing	712	0.05	282	0.04	0.01	0.61

Source: BCS70. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Appendix Table A4: Heterogeneity analysis: definition of variables - Labour market outcomes and financial constraints

Variable	Type	Definition
Employed, age 34	binary	Has a paid job.
Weekly hours worked, age 34 (std)	continuous	Usual hours worked per week, employed individuals only.
Weekly pay on avg, age 34 (std)	continuous	Weekly pay averaged across the whole sample, wages of non-employed individuals are coded as 0.
Weekly pay, employed only, age 34 (std)	continuous	Weekly pay among employed individuals.
Hourly pay, employed only, age 34 (std)	continuous	Weekly pay divided by weekly hours worked, employed individuals only.
Log hourly pay, employed only, age 34 (std)	continuous	Log of hourly pay.
Graduate job, age 34	binary	Whether works in a graduate occupation (binary variable, captures NS-SEC top two categories).
Work experience, age 34 (std)	continuous	Cumulative work experience in months between ages 16 and 34 based on activity history data.
Student debt, age 46	binary	Has outstanding student loan (this is available at age 46 only).
Financial difficulties, age 30	binary	Reported financial difficulties (this is available at age 30 only).

Source: BCS70.

Appendix Table A5: Heterogeneity analysis: definition of variables - Skills and Human Capital

Variable	Type	Definition
Cognitive abilities	continuous	Summary index of various cognitive ability tests at ages 5, 10 and 16.
Self-esteem, age 16	continuous	Measured via the Lawrence's Self-Esteem Questionnaire (LAWSEQ) (Lawrence, 1981), assessing children's self-esteem in terms of their view of themselves as well as their interactions with teachers, peers, and parents. It consists of 10 questions, such as 'Do you feel silly when you have to talk in front of a teacher?' or 'Are there lots of things that you would like to change about yourself?'.
STEM degree	binary	Degree in Science, Technology, Engineering and Mathematics .
LEM degree	binary	Degree in Law, Economics, and Management.
OSSAH degree	binary	Degree in Social Sciences, Arts, Humanities and Languages
Other degree	binary	Degree in other fields.
Elite university	binary	Degree earned at a Russell Group institution that are highly selective, research intensive universities and are supposed to provide higher wage returns than other universities.

Source: BCS70.

Appendix Table A6: Heterogeneity analysis: definition of variables - Family background and gender roles

Variable	Type	Definition
First-born	binary	First born child in the family.
Premarital conception	binary	Whether concieved before their mother got married or out-of-wedlock.
Mother married when born	binary	Whether their mother was married when they were born.
Mother employed, age 0	binary	Mother employed when cohort members were born.
Mother employed, age 5	binary	Mother employed when cohort members were 5 years old.
Mother employed, age 10	binary	Mother employed when cohort members were 10 years old.
Only child in HH, age 5	binary	Only child in the household at age 5.
Only child in HH, age 10	binary	Only child in the household at age 10.
Parental views on gender equality, age 5	continuous	"Summary index of parenal views on gender equality when cohort members a were aged 5. Relies on four questions that parents had to express their agreement with: ""Girls should accept the fact that they will marry and have children and not think about starting a career"", ""Women should have the same work opportunities as men"", ""Some equality in marriage is a good thing but by and large the husband ought to have the main say in family matters"" and ""Girls are just as capable as boys in learning to be engineers""."
Family suffers when the mother works FT, age 42	binary	Whether cohort members think the family suffers when the mother works full-time
Child suffers if mother works, age 42	binary	Whether cohort members think children suffer when the mother works.
Heterosexual, age 42	binary	Whether cohort members assess themselves as heterosexual.

Source: BCS70.

Appendix Table A7: Heterogeneity analysis: definition of variables - Mental and physical health

Mother's Malaise score, age 5	continuous	A summary mental illness indicator of mothers captured when the cohort members were 5 years old.
Mother's BMI	continuous	Individual's mother's Body Mass Index captured when the cohort members were 5 years old.
Health index, age 26	continuous	One question on self-assessed health (How is your health in general? Really poor, Poor, Fair, Good, Excellent)
Health index, age 30	continuous	One question on self-assessed health (How is your health in general? Really poor, Poor, Fair, Good, Excellent)
Health index, age 34	continuous	One question on self-assessed health (How is your health in general? Really poor, Poor, Fair, Good, Excellent)
Health index, age 38	continuous	One question on self-assessed health (How is your health in general? Really poor, Poor, Fair, Good, Excellent)
Health index, age 42	continuous	One question on self-assessed health (How is your health in general? Really poor, Poor, Fair, Good, Excellent)
Health index, age 46	continuous	An overall health score (0-100) included only in the age 46 wave, which is a composite measure of health based on a series of indicators.
BMI, age 26	continuous	Individual's Body Mass Index.
BMI, age 46	continuous	Individual's Body Mass Index.
Malaise score, age 26	continuous	Individuals own summary mental illness indicator.
Malaise score, age 30	continuous	Individuals own summary mental illness indicator.
Malaise score, age 34	continuous	Individuals own summary mental illness indicator.
Malaise score, age 42	continuous	Individuals own summary mental illness indicator.
Malaise score, age 46	continuous	Individuals own summary mental illness indicator.

Source: BCS70.

Appendix Table A8: Heterogeneity analysis: definition of variables - Measures of reproductive health

Heavy periods	binary	Whether cohort members experienced these symptoms at age 42.
Painful periods	binary	Whether cohort members experienced these symptoms at age 42.
Irregular bleeding	binary	Whether cohort members experienced these symptoms at age 42.
Bleeding between periods	binary	Whether cohort members experienced these symptoms at age 42.
Pre-menstrual tension	binary	Whether cohort members experienced these symptoms at age 42.
Endometriosis	binary	Whether cohort members experienced these symptoms at age 42.
Pelvic infection	binary	Whether cohort members experienced these symptoms at age 42.
Pelvic pain	binary	Whether cohort members experienced these symptoms at age 42.
Ovarian cysts	binary	Whether cohort members experienced these symptoms at age 42.
Vaginal discharge	binary	Whether cohort members experienced these symptoms at age 42.
Painful intercourse	binary	Whether cohort members experienced these symptoms at age 42.
Incontinence of urine	binary	Whether cohort members experienced these symptoms at age 42.
Prolapse	binary	Whether cohort members experienced these symptoms at age 42.
Fibroids	binary	Whether cohort members experienced these symptoms at age 42.
Some other kind of problem	binary	Whether cohort member experienced any other related symptoms at age 42.
None of these	binary	Whether cohort members did not experience any of these symptoms at age 42.
Removed ovaries or womb	binary	Whether cohort members ovaries or womb have been removed.
Having periods at age 42	binary	What they have periods at age 42.
Hormonal contraceptives at age 42	binary	Whether they are on hormonal contraceptives at age 42.
Having periods at age 46	binary	What they have periods at age 46.
Sterilized age 42	binary	Whether they have been sterilized.
Had fertility treatment, age 42	binary	Whether they have ever had fertility treatments.
Pregnancy after fertility treatment, age 42	binary	Whether they got pregnant if they had fertility treatments.
Live birth after fertility treatment, age 42	binary	Whether they gave birth after fertility treatments.
Had miscarriage or termination	binary	Whether they ever had miscarriages or terminations.
No. of miscarriages and terminations	binary	No. of miscarriages and terminations.

Source: BCS70.

Appendix Table A9: Heterogeneity analysis: definition of variables - Child-related preferences

Children are very important, age 16	binary	Cohort members were asked whether they thought having a child is important with potential answers: matters very much, matters somewhat, doesn't matter. We turn these into binary variables that equal 1 if the first possibility was stated and 0 otherwise.
Marriage is very important, age 16	binary	Cohort members were asked whether they thought marriage is important with potential answers: matters very much, matters somewhat, doesn't matter. We turn these into binary variables that equal 1 if the first possibility was stated and 0 otherwise.
Lonely in old age with no kids, age 30	binary	Cohort members were asked whether they would feel lonely in old age with no kids with potential answers: yes/no. We turn these into binary variables that equal 1 if the first possibility was stated and 0 otherwise.
Can have fulfilling life with no kids, age 30	binary	Cohort members were asked whether they can have fulfilling life with no kids with potential answers: yes/no. We turn these into binary variables that equal 1 if the first possibility was stated and 0 otherwise.
Having children interferes with parents freedom, age 30	binary	Cohort members were asked whether having children interferes with parents' freedom with potential answers: yes/no. We turn these into binary variables that equal 1 if the first possibility was stated and 0 otherwise.
Wants (more) kids, age 30	binary	Cohort members were asked whether they wanted to have (more) kids with potential answers: yes/no. We turn these into binary variables that equal 1 if the first possibility was stated and 0 otherwise.
People whithout children miss an important part of life, age 42	binary	Cohort members were asked whether they wanted to have (more) kids with potential answers: yes/no. We turn these into binary variables that equal 1 if the first possibility was stated and 0 otherwise.
Wants (more) kids, age 42	binary	Cohort members were asked whether they wanted to have (more) kids with potential answers: yes/no. We turn these into binary variables that equal 1 if the first possibility was stated and 0 otherwise.
Likely to have (more) kids, age 42	binary	Cohort members were asked whether they were likely to have (more) kids with potential answers: yes/no. We turn these into binary variables that equal 1 if the first possibility was stated and 0 otherwise.

Source: BCS70.

Appendix Table A10: Heterogeneity analysis: definition of variables - The role of partnerships and family structure

Variable	Type	Definition
Has partner, age 26	binary	Whether cohort members have a co-living partner.
Has partner, age 30	binary	Whether cohort members have a co-living partner.
Has partner, age 34	binary	Whether cohort members have a co-living partner.
Has partner, age 38	binary	Whether cohort members have a co-living partner.
Has partner, age 42	binary	Whether cohort members have a co-living partner.
Has partner, age 46	binary	Whether cohort members have a co-living partner.
Partner smokes, age 46	binary	Whether their partners smoke.
Partner works FT, age 34	binary	Whether their partner works full-time.
Partner works FT, age 46	binary	Whether their partner works full-time.
Partner's pay, age 30	continuous	Partner's pay at age 30.
Partner's pay, age 34	continuous	Partner's pay at age 34.
Partner's pay, age 42	continuous	Partner's pay at age 42.
Partner's NS SEC, age 30	categorical	Partners occupational social status (NS SEC), age 30.
Partner's NS SEC, age 34	continuous	Partners occupational social status (NS SEC), age 34.
Relationship happiness, age 46	continuous	A measure of relationship happiness at age 46.
Graduate partner, age 30	binary	Whether they have a graduate partner, age 30.
No. of partners	continuous	How many partners they had all together until age 42.

Source: BCS70.

Appendix Table A11: The Kitagawa-Oaxaca-Blinder decomposition of the FiF gap in childlessness: graduate women

	(1) Overall	(2) Explained	(3) Unexplained
Background		-0.002	-0.210
		(0.007)	(0.170)
Math		0.007	-0.037
		(0.007)	(0.122)
Cognitive skills		-0.022**	-0.023
		(0.009)	(0.039)
Children are very important		0.001	-0.043**
		(0.003)	(0.020)
Self-esteem		0.008**	0.003
		(0.004)	(0.007)
Mother worked		0.000	-0.062***
		(0.000)	(0.022)
Missing data		-0.003	-0.032
		(0.003)	(0.029)
FiF mean	0.264***		
	(0.016)		
Non-FiF mean	0.204***		
	(0.022)		
Difference	0.060**		
	(0.027)		
Explained by endowments	-0.010		
	(0.012)		
Unexplained	0.070**		
	(0.028)		
Constant			0.475**
			(0.215)
Observations	1,133	1,133	1,133

*Source: BCS70. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Background: region of birth, parental SES, ethnicity, mother's year of birth, being a firstborn child, No. of siblings. Missing data: missing flags for maternal employment, self-esteem and childbearing preferences. As maternal employment and childbearing preferences are binary variables, the missing flag is the third category. For self-esteem that is a continuous variable, we employ mean imputation and the missing flag captures the imputed observations. Estimating the same decomposition model on the complete case sample leads to similar coefficients in terms of sign and magnitude, but the standard errors are larger.*

ONLINE APPENDIX for Beyond the Degree: Fertility Outcomes of 'First in Family' Graduates

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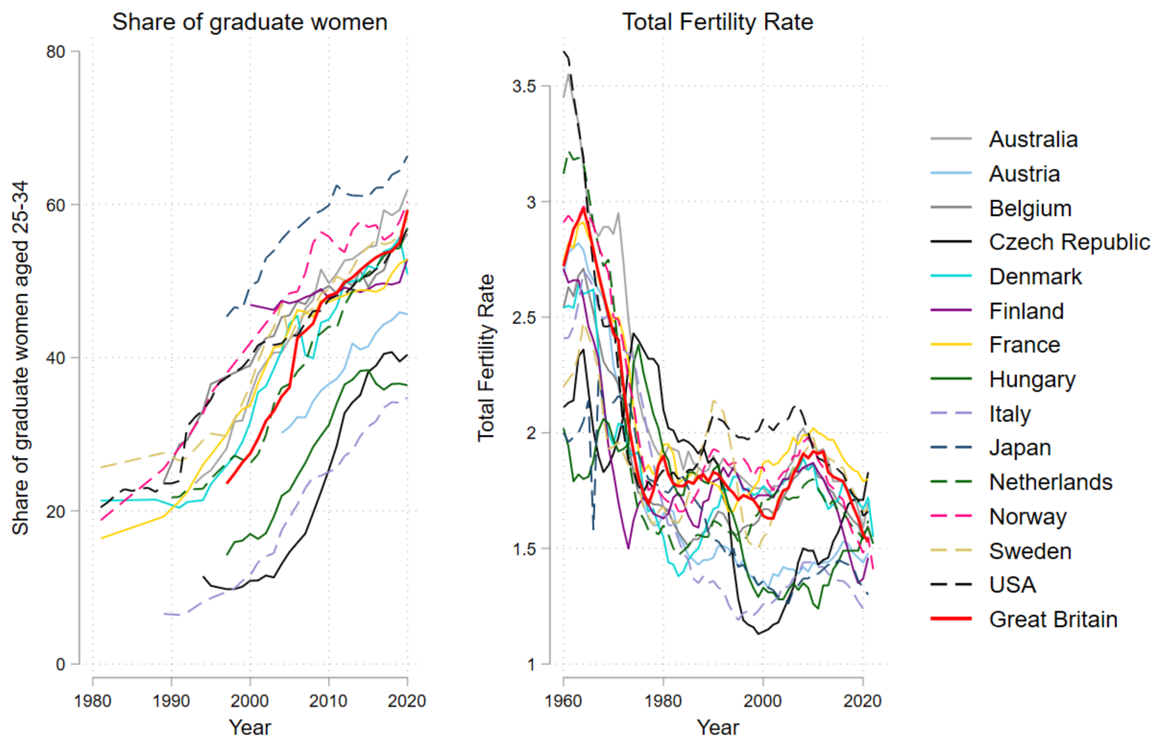
A. Detailed Results and Supporting Evidence

Figure OA1: Graduation and fertility rates over time in the OECD



Source: OECD

Table OA1: Returns to graduation: the number of children among women (age 46)

VARIABLES	(1) Model 1	(2) Model 2	(3) Model 3	(4) Model 3 potential FiF	(5) Model 3 children of grad. parents
Graduate, age 46	-0.313***	-0.213***	0.0717	-0.272***	0.0222
	(0.0404)	(0.0463)	(0.0969)	(0.0515)	(0.107)
Parents with no degree		-0.0518	0.130*		
		(0.0547)	(0.0787)		
FiF graduate			-0.348***		
			(0.107)		
Constant	1.849***	-35.06***	-35.17***	-34.78***	-41.27*
	(0.0220)	(7.730)	(7.725)	(8.173)	(24.48)
Observations	4,351	4,351	4,351	3,786	565
R-squared	0.012	0.040	0.042	0.043	0.071
Controls		Yes	Yes	Yes	Yes

*Source: BCS70. Regressions based on Equation 1. Additional control variables: region of birth, parental background (SES), being a first born child, No. of siblings, ethnicity, cognitive skills, math grades from age 16. Robust standard errors in parentheses (*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$).*

Table OA2: Returns to graduation: childlessness among women (age 46)

VARIABLES	(1) Model 1	(2) Model 2	(3) Model 3	(4) Model 3 potential FiF	(5) Model 3 children of grad. parents
Graduate, age 46	0.0735***	0.0566***	-0.0311	0.0803***	-0.0588
	(0.0144)	(0.0166)	(0.0355)	(0.0184)	(0.0395)
Parents with no degree		0.0158	-0.0402		
		(0.0200)	(0.0287)		
FiF graduate			0.107***		
			(0.0392)		
Constant	0.173***	12.12***	12.15***	12.03***	15.41*
	(0.00667)	(2.509)	(2.510)	(2.627)	(8.685)
Observations	4,351	4,351	4,351	3,786	565
R-squared	0.007	0.022	0.024	0.024	0.068
Controls		Yes	Yes	Yes	Yes

*Source: BCS70. Regressions based on Equation 1. Additional control variables: region of birth, parental background (SES), being a first born child, No. of siblings, ethnicity, cognitive skills, math grades from age 16. Robust standard errors in parentheses (*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$).*

Table OA3: Returns to graduation: the number of children among women who had children (age 46)

	(1)	(2)	(3)	(4)	(5)
				Model 3	Model 3
				potential	children of
VARIABLES	Model 1	Model 2	Model 3	FiF	grad. parents
Graduate, age 46	-0.197***	-0.116***	0.0125	-0.130***	-0.129
	(0.0348)	(0.0408)	(0.0808)	(0.0460)	(0.0902)
Parents with no degree		-0.0250	0.0579		
		(0.0456)	(0.0662)		
FiF graduate			-0.159*		
			(0.0898)		
Constant	2.235***	-10.95	-10.98	-10.66	-8.413
	(0.0196)	(6.854)	(6.849)	(7.211)	(20.93)
Observations	3,516	3,516	3,516	3,072	444
R-squared	0.008	0.033	0.033	0.036	0.071
Controls		Yes	Yes	Yes	Yes

*Source: BCS70. Regressions based on Equation 1. Subsample of women who had at least one child by age 46. Additional control variables: region of birth, parental background (SES), being a first born child, No. of siblings, ethnicity, cognitive skills, math grades from age 16. Robust standard errors in parentheses (*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$).*

Table OA4: Returns to graduation: the number of children among men (age 46)

VARIABLES	(1) Model 1	(2) Model 2	(3) Model 3	(4) Model 3 potential FiF	(5) Model 3 children of grad. parents
Graduate, age 46	-0.0903**	-0.0452	0.143	-0.0870	0.131
	(0.0428)	(0.0478)	(0.103)	(0.0530)	(0.113)
Parents with no degree		-0.00251	0.107		
		(0.0575)	(0.0790)		
FiF graduate			-0.232**		
			(0.113)		
Constant	1.562***	-47.73***	-47.76***	-52.11***	-12.12
	(0.0227)	(8.186)	(8.190)	(8.576)	(29.18)
Observations	4,077	4,077	4,077	3,545	532
R-squared	0.001	0.021	0.022	0.025	0.048
Controls		Yes	Yes	Yes	Yes

*Source: BCS70. Regressions based on Equation 1. Additional control variables: region of birth, parental background (SES), being a first born child, No. of siblings, ethnicity, cognitive skills, math grades from age 16. Robust standard errors in parentheses (*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$).*

Table OA5: Returns to graduation: childlessness among men (age 46)

VARIABLES	(1) Model 1	(2) Model 2	(3) Model 3	(4) Model 3 potential FiF	(5) Model 3 children of grad. parents
Graduate, age 46	0.0146	0.00501	-0.0793**	0.0236	-0.0757*
	(0.0163)	(0.0185)	(0.0397)	(0.0205)	(0.0447)
Parents with no degree		-0.00327	-0.0523*		
		(0.0223)	(0.0310)		
FiF graduate			0.104**		
			(0.0436)		
Constant	0.262***	16.96***	16.97***	17.93***	10.86
	(0.00792)	(2.904)	(2.905)	(3.055)	(10.40)
Observations	4,077	4,077	4,077	3,545	532
R-squared	0.000	0.014	0.016	0.018	0.058
Controls		Yes	Yes	Yes	Yes

*Source: BCS70. Regressions based on Equation 1. Additional control variables: region of birth, parental background (SES), being a first born child, No. of siblings, ethnicity, cognitive skills, math grades from age 16. Robust standard errors in parentheses (*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$).*

Table OA6: Returns to graduation: the number of children among men who had children (age 46)

VARIABLES	(1) Model 1	(2) Model 2	(3) Model 3	(4) Model 3 potential FiF	(5) Model 3 children of grad. parents
Graduate, age 46	-0.0822**	-0.0484	-0.0337	-0.0503	-0.0346
	(0.0367)	(0.0407)	(0.0872)	(0.0448)	(0.0992)
Parents with no degree		-0.0152	-0.00625		
		(0.0485)	(0.0663)		
FiF graduate			-0.0182		
			(0.0947)		
Constant	2.117***	-17.81**	-17.80**	-21.27***	12.48
	(0.0207)	(7.635)	(7.637)	(8.007)	(26.13)
Observations	2,994	2,994	2,994	2,609	385
R-squared	0.001	0.026	0.026	0.030	0.060
Controls		Yes	Yes	Yes	Yes

*Source: BCS70. Regressions based on Equation 1. Subsample of men who had at least one child by age 46. Additional control variables: region of birth, parental background (SES), being a first born child, No. of siblings, ethnicity, cognitive skills, math grades from age 16. Robust standard errors in parentheses (*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$).*

Table OA7: Selection to graduation: the role of being potential FiF

VARIABLES	(1) Women with graduate parents	(2) Men with graduate parents	(3) Women potential FiF	(4) Men potential FiF
First-born child	0.0839*	-0.0227	0.0281*	0.0220
	(0.0471)	(0.0493)	(0.0157)	(0.0163)
One sibling	0.181**	-0.0216	-0.00581	0.0348
	(0.0779)	(0.0750)	(0.0242)	(0.0257)
Two siblings	0.197**	-0.0378	-0.0165	0.0292
	(0.0850)	(0.0847)	(0.0259)	(0.0280)
Three+ siblings	0.292***	-0.0411	0.00867	0.0103
	(0.0923)	(0.0974)	(0.0274)	(0.0285)
Constant	21.62**	15.76	7.179***	6.682***
	(9.280)	(9.832)	(2.548)	(2.476)
Observations	565	532	3,786	3,545
R-squared	0.221	0.228	0.167	0.168

*Source: BCS70. Further control variables: region of birth, parental background (SES), ethnicity, cognitive skills, math grades from age 16, mother's year of birth. Robust standard errors in parentheses (*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$).*

Table OA8: Selection to graduation: the role of childbearing preferences at age 16

VARIABLES	(1) Women with graduate parents	(2) Men with graduate parents	(3) Women potential FiF	(4) Men potential FiF
Having children is very important	0.0368	-0.131*	-0.00447	0.0164
	(0.0599)	(0.0739)	(0.0225)	(0.0264)
Child preferences are missing	0.130	0.0879	-0.0678	0.0133
	(0.245)	(0.261)	(0.0509)	(0.0903)
Getting married is very important	0.0333	0.0786	0.00707	0.0370
	(0.0611)	(0.0748)	(0.0246)	(0.0289)
Marriage preferences are missing	-0.213	-0.191	0.0329	-0.0327
	(0.243)	(0.262)	(0.0508)	(0.0902)
Constant	19.75**	14.62	6.985***	6.420***
	(9.331)	(9.768)	(2.550)	(2.473)
Observations	565	532	3,786	3,545
R-squared	0.232	0.240	0.169	0.171

*Source: BCS70. Further control variables: region of birth, parental background (SES), being a first born child, No. of siblings, ethnicity, cognitive skills, math grades from age 16, mother's year of birth. Robust standard errors in parentheses (*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$).*

B. Robustness Checks

First, we re-estimate our main models using fewer control variables. In particular, controlling for parental SES could be problematic as it might be highly correlated with parental education. Furthermore, age 16 math grades are missing for a substantial share of the sample. In the main models we use missing flags to account for missing grades, but in this robustness check we leave them out. Table OA9 shows that these results are very similar to our previous results and allow to draw the same conclusions.

Table OA9: Robustness test 1: The FiF fertility gap among graduates, fewer control variables

VARIABLES	(1) No. of children Women	(2) No. of children Men	(3) Childless-ness Women	(4) Childless-ness Men	(5) No. of children Mothers	(6) No. of children Fathers
FiF graduate	-0.180**	-0.0717	0.0791***	0.0484	-0.0226	0.0355
	(0.0756)	(0.0843)	(0.0281)	(0.0317)	(0.0629)	(0.0717)
Constant	-6.797	-25.25	6.518	11.33*	9.226	-3.849
	(14.39)	(15.59)	(5.408)	(6.415)	(12.08)	(13.48)
Observations	1,133	994	1,133	994	854	719
R-squared	0.031	0.024	0.029	0.019	0.039	0.028

*Source: BCS70. Additional control variables: region of birth, mother's year of birth, being a first-born child, No. of siblings, ethnicity, cognitive skills. Robust standard errors in parentheses (*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$).*

Second, as the number of children is a count variable while childlessness is binary, we re-estimate our main results using Poisson-regressions for the number of children and probit for childlessness. Table OA10 shows that the results are similar to our main results.

Table OA10: Robustness test 2: The FiF fertility gap among graduates, Poisson and probit models

VARIABLES	(1) No. of children Women Poisson	(2) No. of children Men Poisson	(3) Childless-ness Women Probit	(4) Childless-ness Men Probit	(5) No. of children Mothers Poisson	(6) No. of children Fathers Poisson
FiF graduate	-0.107**	-0.0547	0.269***	0.148	-0.0100	0.00766
	(0.0475)	(0.0556)	(0.0968)	(0.0994)	(0.0302)	(0.0348)
Constant	-5.553	-16.75	21.97	30.70	4.266	-1.261
	(9.515)	(10.94)	(17.07)	(18.76)	(5.907)	(6.644)
Observations	1,133	994	1,132	994	854	719

*Source: BCS70. Additional control variables: region of birth, mother's year of birth, being a first-born child, No. of siblings, ethnicity, cognitive skills. Robust standard errors in parentheses (*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$).*

Third, we re-estimate our main results, Table OA11, re-weighted by attrition weights constructed with three methods: via probit and random forest selection models and entropy balancing. These results are very similar to our main specifications. They confirm that for women, the previously shown significant statistical relationships are robust to taken selection to our analytical sample into account. The association between the number of children and being a FiF graduate is between -0.214 and -0.294 while the association between childlessness and being a FiF graduate is between 0.079 and 0.094 among women, all significant on a 5% level. Among men, however, none of these associations stay significant.

Table OA11: Robustness test 3: The FiF fertility gap among graduates, weighted estimates

	(1) No. of children Women	(2) No. of children Men	(3) Childless-ness Women	(4) Childless-ness Men	(5) No. of children Mothers	(6) No. of children Fathers
Probit weights						
FiF graduate	-0.175**	-0.0520	0.0749**	0.0390	-0.0241	0.0287
	(0.0873)	(0.0999)	(0.0333)	(0.0380)	(0.0708)	(0.0840)
Constant	-19.68	-35.71**	9.743	14.72**	0.172	-10.00
	(16.07)	(17.93)	(6.181)	(7.383)	(13.55)	(15.79)
Observations	925	805	925	805	696	574
R-squared	0.052	0.048	0.038	0.034	0.056	0.070
Random forest weights						
FiF graduate	-0.184**	-0.0870	0.0820***	0.0555*	-0.0252	0.0333
	(0.0773)	(0.0876)	(0.0291)	(0.0327)	(0.0657)	(0.0748)
Constant	-9.334	-23.68	9.011	10.92*	11.92	-2.642
	(14.74)	(16.70)	(5.645)	(6.614)	(12.13)	(15.04)
Observations	1,133	994	1,133	994	854	719
R-squared	0.034	0.039	0.041	0.030	0.041	0.062
Entropy balancing						
FiF graduate	-0.195**	-0.0664	0.0835**	0.0481	-0.0264	0.0382
	(0.0901)	(0.103)	(0.0345)	(0.0394)	(0.0732)	(0.0890)
Constant	-26.89	-34.13*	11.53*	12.73*	-5.725	-14.04
	(16.56)	(18.86)	(6.570)	(7.718)	(14.02)	(16.70)
Observations	925	805	925	805	696	574
R-squared	0.060	0.055	0.045	0.035	0.065	0.088

*Source: BCS70. Additional control variables: region of birth, parental background (SES), mother's year of birth, being a firstborn child, No. of siblings, ethnicity, cognitive skills, math grades from age 16. Robust standard errors in parentheses (*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$).*

Fourth, we re-estimate our main results using IPW weighting in Table OA12. As mentioned above, while this method cannot take care of unobserved selection, it uses observed information in a more systemic way, thus it makes FiF and non-FiF graduates more comparable (conditional on their observed characteristics). Our main result are similar: FiF graduate women have 0.19 fewer children and are 9.1 percentage points more likely to stay childless at age 46 than graduate women whose parents are graduates. Interestingly, the estimated coefficient for male childlessness is also significant on a 10% significance level.

Table OA12: Robustness test 4: The FiF fertility gap among graduates, IPW estimates

	(1) No. of children women	(2) No. of children men	(3) Childlessness women	(4) No. of Childlessness men	(5) No. of children mothers	(6) children fathers
FiF graduate	-0.192***	-0.0528	0.0907***	0.0611*	0.000613	0.0815
	(0.0733)	(0.0905)	(0.0275)	(0.0333)	(0.0610)	(0.0806)
Observations	1,082	958	1,082	958	812	694

*Source: BCS70. Additional control variables: region of birth, parental background (SES), being a firstborn child, No. of siblings, ethnicity, cognitive skills, math grades from age 16, mother's year of birth. Robust standard errors in parentheses (*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$).*

Lastly, we investigate how these results would look like in the presence of such unobserved characteristic that is correlated with both fertility outcomes and being a FiF graduate, i.e. omitted variable bias. As mentioned in the main text, we follow the procedure of Masten et al. (2024) using the `tesensitivity` package of Stata. As Table OA13 shows, five out of our six main results are fairly sensitive to the potential existence of omitted variable bias, except for the FiF gap in childlessness among graduate women. In this case, the estimated coefficient on FiF graduate seems to be fairly robust to omitted variable bias.

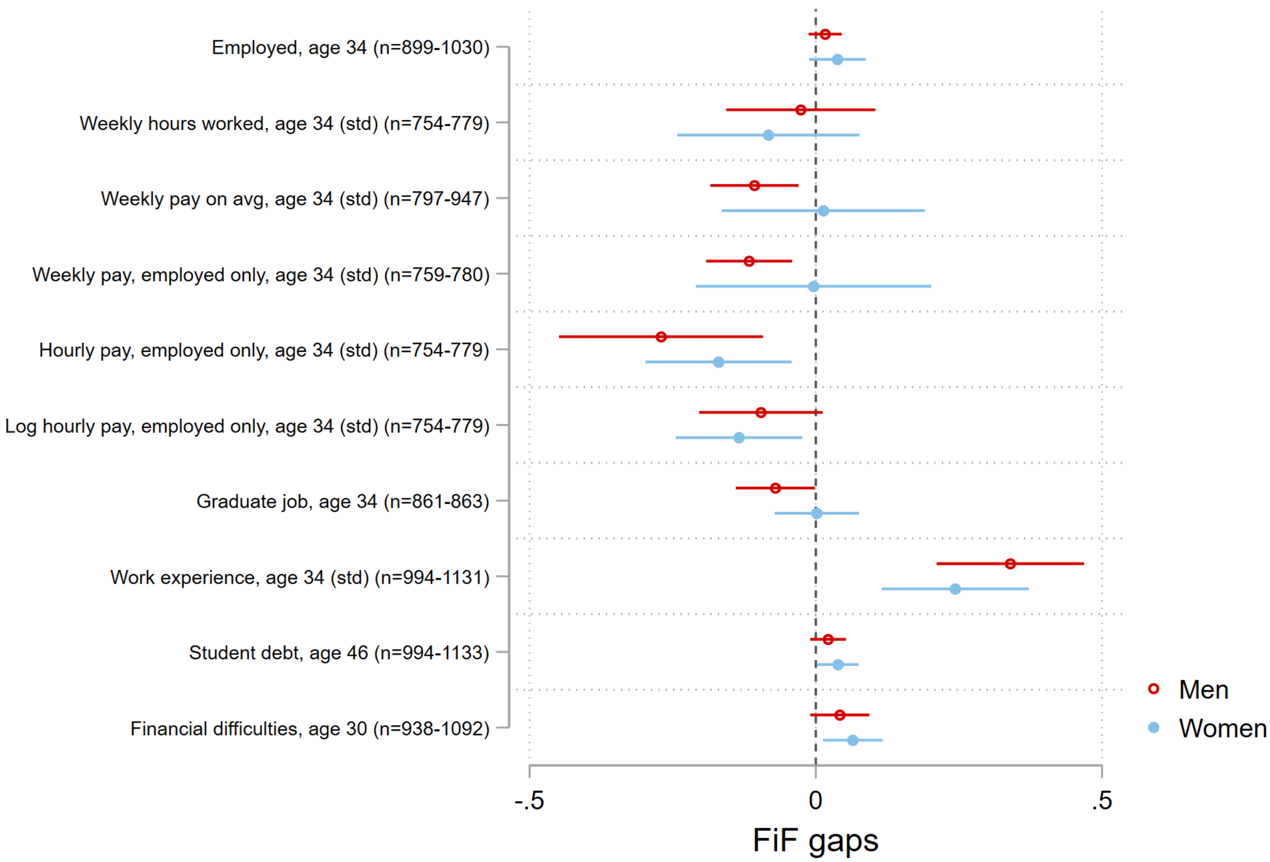
Table OA13: Robustness test 5: The sensitivity of the estimated FiF fertility gaps to omitted variable bias (breakdown c-values according to Masten et al. (2024)

	(1) Women	(2) Men
Number of chidren	0.018	0.001
Childlessness	0.042	0.011
Number of chidren among parents	0.002	0.002

Source: BCS70. Estimated using tesensitivity in Stata.

C. Heterogeneity Analysis

Figure OA2: The FiF gap in labour market outcomes



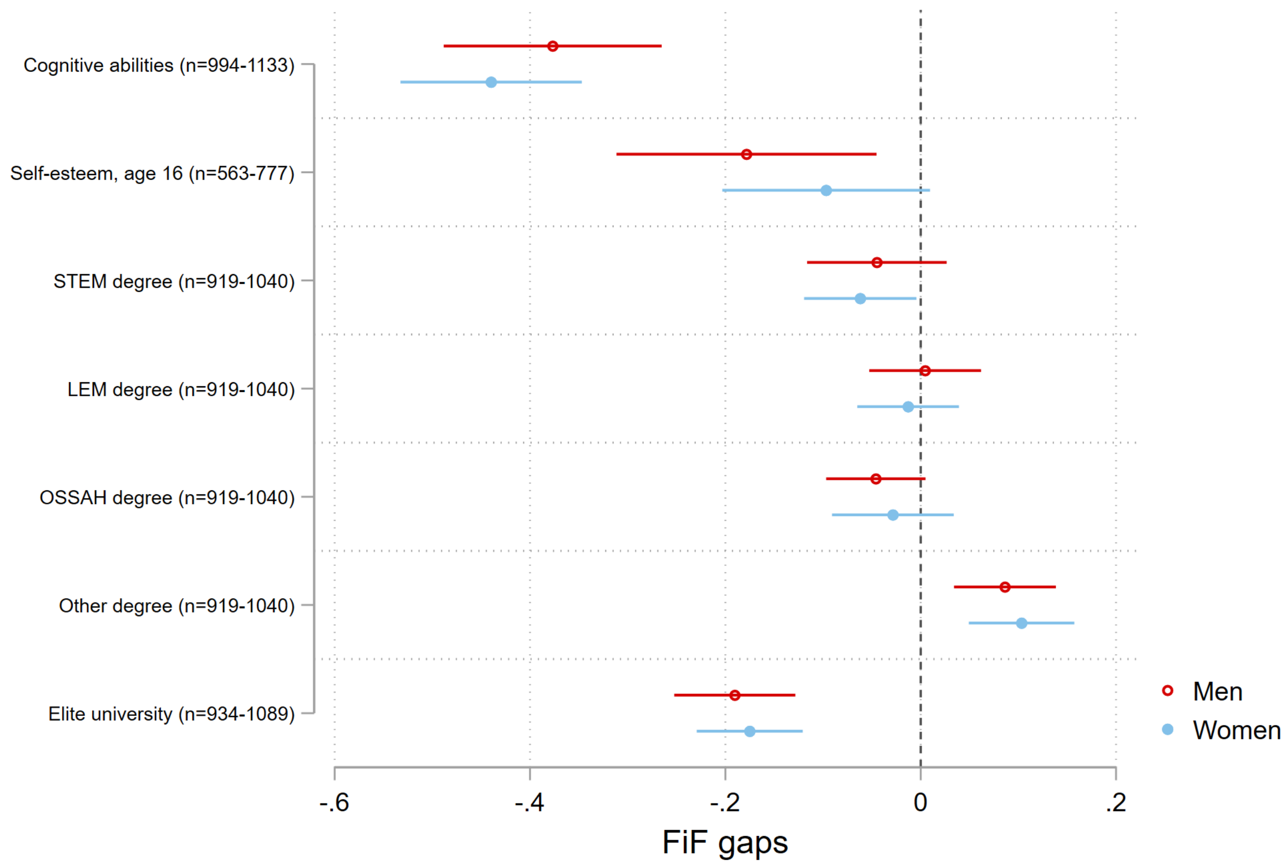
Source: BCS70. Sample of university graduates. Each data point captures the raw difference in these variables between FiF and non-FiF graduates, separately for men and women. All differences are plotted with their 95% confidence intervals. As all variables come from different waves of BCS70, the number of observations differ for each and indicated on the y-axis for men and women, respectively. Employment: has a paid job (binary variable); Weekly hours worked: usual hours worked per week; Weekly pay on average: weekly pay average across the whole sample, wages of non-employed women are coded as 0; Weekly pay, employed only: weekly pay among the employed only; Hourly pay: weekly pay divided by weekly hours worked, employed individuals only; Log hourly pay: log of hourly pay; Graduate job: whether works in a graduate occupation (binary variable, captures NS-SEC top two categories); Work experience: cumulated work experience in months between ages 16 and 34 based on activity history data; Student debt: has outstanding student loans (binary variable, this is available at age 46 only); Financial difficulties: reported financial difficulties (binary variable, this is available at age 30 only).

Table OA14: The role of labour market outcomes and financial constraints in the FiF fertility gap

	(1)	(2)	(3)	(4)	(5)	(6)
	No. of children Women	No. of children Men	Childless-ness Women	Childless-ness Men	No. of children Mothers	No. of children Fathers
I. Low pay at age 34	–0.302**	0.178	0.078	0.044	–0.244**	0.341**
	(0.136)	(0.170)	(0.054)	(0.072)	(0.113)	(0.158)
Observations	405	282	405	282	287	191
II. High pay at age 34	–0.150	–0.034	0.055	0.013	–0.023	0.006
	(0.133)	(0.119)	(0.055)	(0.042)	(0.105)	(0.097)
Observations	374	472	374	472	278	378
III. Financial difficulties at age 30	–0.234	0.207	0.026	–0.091	–0.269	–0.017
	(0.252)	(0.302)	(0.080)	(0.122)	(0.240)	(0.253)
Observations	217	150	217	150	157	94.
IV. No financial difficulties at age 30	–0.163*	–0.074	0.083***	0.046	0.015	0.027
	(0.083)	(0.094)	(0.031)	(0.035)	(0.068)	(0.080)
Observations	875	788	875	788	664	587
V. Student debt at age 46	–0.157**	–0.083	0.071**	0.047	–0.012	0.014
	(0.078)	(0.087)	(0.030)	(0.033)	(0.064)	(0.074)
Observations	103	940	103	940	778	684
VI. No student debt at age 46	–0.799	0.002	0.150	0.065	–0.594	–0.020
	(0.571)	(0.652)	(0.146)	(0.221)	(0.555)	(0.377)
Observations	99.	54.	99.	54.	76.	35.
VII. Low LM experience at age 34	–0.151	–0.241*	0.071*	0.116**	0.008	0.001
	(0.107)	(0.132)	(0.036)	(0.049)	(0.090)	(0.122)
Observations	642	412	642	412	516	280
VIII. High LM experience at age 34	–0.136	0.023	0.077	–0.001	–0.002	0.028
	(0.108)	(0.115)	(0.049)	(0.045)	(0.087)	(0.099)
Observations	489	582	489	582	338	439

*Source: BCS70. Equation 2 estimated on specific subsamples of graduates as indicated in each block. The estimated coefficients on "FiF graduate" are reported in the table. All coefficients are estimated in separate models. Additional control variables: region of birth, parental background (SES), mother's year of birth, being a firstborn child, No. of siblings, ethnicity, cognitive skills, math grades from age 16. Robust standard errors in parentheses (*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$).*

Figure OA3: The FiF gap in skills and human capital



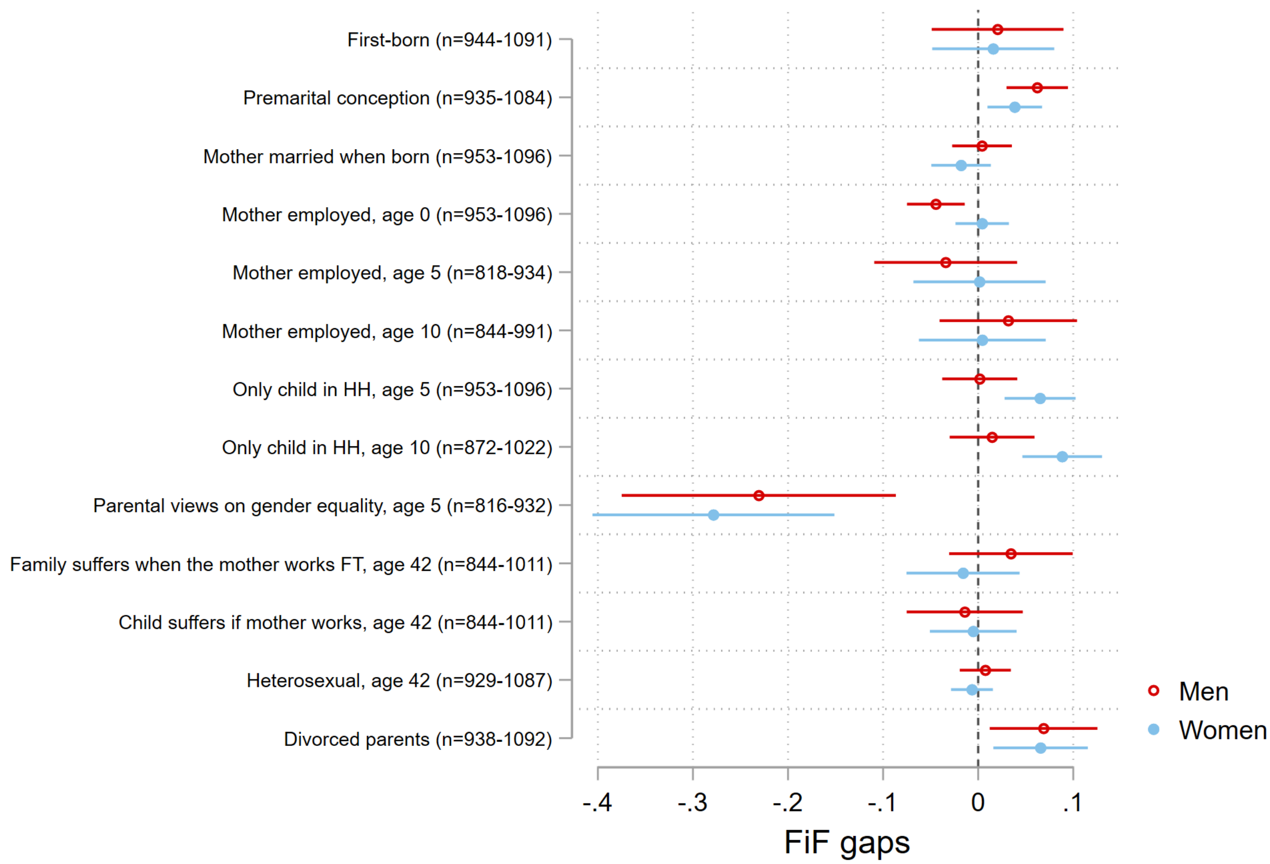
Source: BCS70. Sample of university graduates. Each data point captures the raw difference in these variables between FiF and non-FiF graduates, separately for men and women. All differences are plotted with their 95% confidence intervals. As all variables come from different waves of BCS70, the number of observations differ for each and indicated on the y-axis for men and women, respectively. Cognitive skills: summary index of various cognitive ability test scores between age 5-16; Self-esteem: measured via the Lawrence's Self-Esteem Questionnaire (LAWSEQ) (?), assessing children's self-esteem in terms of their view of themselves as well as their interactions with teachers, peers, and parents. It consists of 10 questions, such as 'Do you feel silly when you have to talk in front of a teacher?' or 'Are there lots of things that you would like to change about yourself?'; Degree course (field) is reported in the age 42 waves. We categorize degrees into four categories: Science, Technology, Engineering and Mathematics (STEM); Law, Economics, and Management (LEM); Social Sciences, Arts, Humanities and Languages (OSSAH) and other degrees (OTHER); Elite university: Russell Group institutions that are highly selective, research intensive institutions.

Table OA15: The role of skills and human capital in the FiF fertility gap

	(1) No. of children Women	(2) No. of children Men	(3) Childless-ness Women	(4) Childless-ness Men	(5) No. of children Mothers	(6) No. of children Fathers
I. Low cognitive skills	–0.237*	–0.219	0.108**	0.122**	–0.023	0.021
	(0.124)	(0.142)	(0.046)	(0.050)	(0.101)	(0.131)
Observations	535	442	535	442	407	322
II. High cognitive skills	–0.144	0.063	0.063*	–0.025	–0.008	0.011
	(0.100)	(0.116)	(0.038)	(0.044)	(0.082)	(0.097)
Observations	598	552	598	552	447	397
III. Low self-esteem	–0.245	–0.063	0.111*	0.054	–0.016	0.031
	(0.156)	(0.183)	(0.058)	(0.072)	(0.134)	(0.148)
Observations	360	248	360	248	257	172
IV. High self-esteem	–0.042	0.092	0.026	–0.029	0.019	0.033
	(0.127)	(0.169)	(0.046)	(0.066)	(0.100)	(0.155)
Observations	417	315	417	315	323	220
V. STEM degree	0.059	0.075	0.027	–0.013	0.125	0.058
	(0.168)	(0.121)	(0.059)	(0.048)	(0.143)	(0.100)
Observations	266	451	266	451	205	336
VI. LEM degree	–0.285	–0.354	0.051	0.077	–0.231	–0.262
	(0.203)	(0.240)	(0.083)	(0.082)	(0.169)	(0.216)
Observations	200	184	200	184	140	136
VII. OSSAH degree	–0.400**	–0.345*	0.136**	0.114	–0.143	–0.166
	(0.159)	(0.207)	(0.059)	(0.088)	(0.139)	(0.173)
Observations	349	137	349	137	265	98.
VIII. Other degree	–0.006	0.160	0.133*	0.051	0.332**	0.370
	(0.181)	(0.245)	(0.073)	(0.097)	(0.152)	(0.226)
Observations	225	147	225	147	167	107
IX. Elite uni	0.005	–0.171	0.036	0.047	0.071	–0.065
	(0.166)	(0.172)	(0.060)	(0.061)	(0.145)	(0.137)
Observations	257	251	257	251	201	185
X. Not elite uni	–0.196**	–0.024	0.084**	0.032	–0.026	0.040
	(0.088)	(0.106)	(0.034)	(0.041)	(0.071)	(0.089)
Observations	832	683	832	683	619	502

*Source: BCS70. Equation 2 estimated on specific subsamples of graduates as indicated in each block. The estimated coefficients on "FiF graduate" are reported in the table. All coefficients are estimated in separate models. Additional control variables: region of birth, parental background (SES), mother's year of birth, being a firstborn child, No. of siblings, ethnicity. Robust standard errors in parentheses (*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$).*

Figure OA4: The FiF gap in family background and gender roles



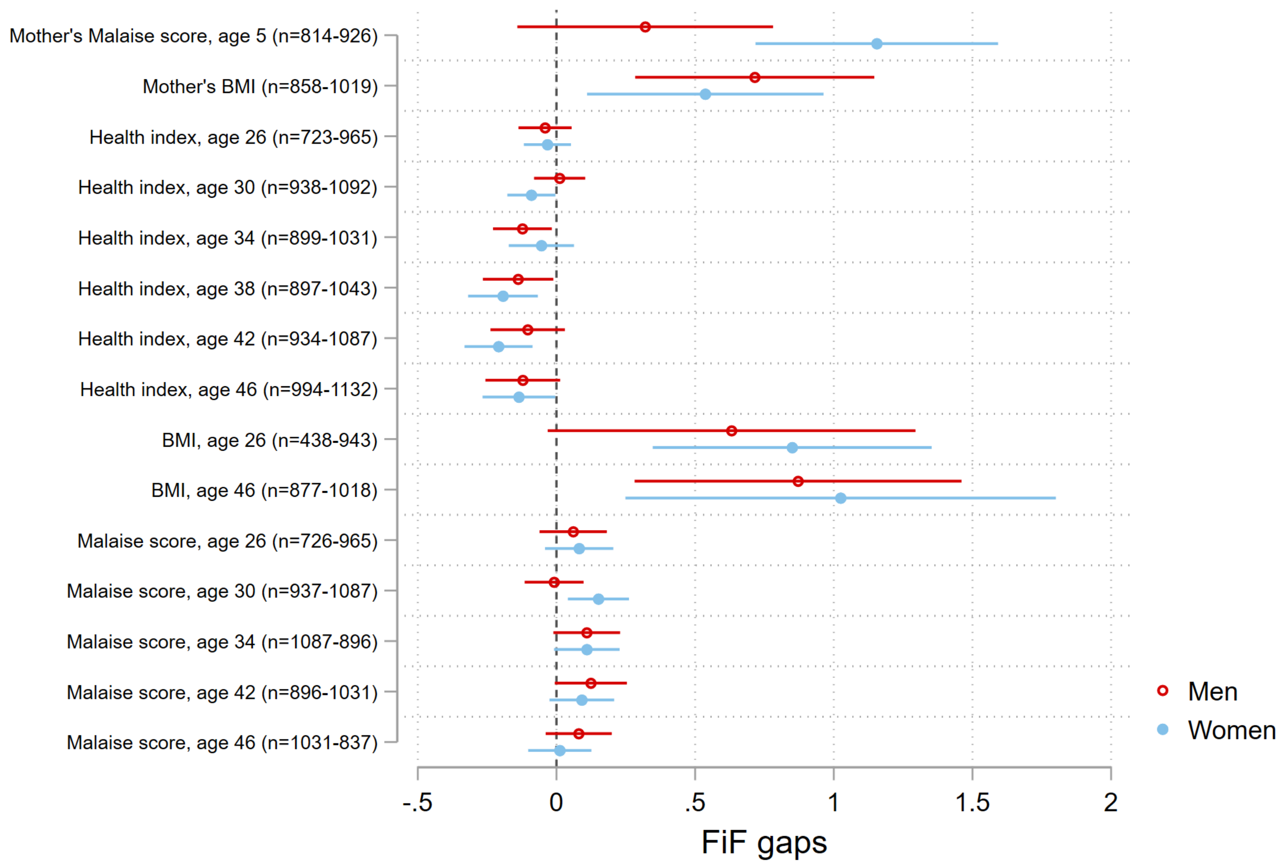
Source: BCS70. Sample of university graduates. Each data point captures the raw difference in these variables between FiF and non-FiF graduates, separately for men and women. All differences are plotted with their 95% confidence intervals. As all variables come from different waves of BCS70, the number of observations differ for each and indicated on the y-axis for men and women, respectively. First-born: First born child in the family; Premarital conception: Whether conceived before their mother got married or out-of-wedlock; Mother married when born: Whether their mother was married when they were born; Mother employed, age 0: Mother employed when cohort members were born; Mother employed, age 5: Mother employed when cohort members were 5 years old; Mother employed, age 10: Mother employed when cohort members were 10 years old; Only child in HH, age 5: Only child in the household at age 5; Only child in HH, age 10: Only child in the household at age 10; Parental views on gender equality, age 5: Summary index of parental views on gender equality when cohort members a were aged 5. Relies on four questions that parents had to express their agreement with: "Girls should accept the fact that they will marry and have children and not think about starting a career", "Women should have the same work opportunities as men", "Some equality in marriage is a good thing but by and large the husband ought to have the main say in family matters" and "Girls are just as capable as boys in learning to be engineers"; Family suffers when the mother works FT, age 42: Whether cohort members think the family suffers when the mother works full-time; Child suffers if mother works, age 42: Whether cohort members think children suffer when the mother works; Heterosexual, age 42: Whether cohort members assess themselves as heterosexual.

Table OA16: The role of family background in the FiF fertility gap

	(1) No. of children Women	(2) No. of children Men	(3) Childless-ness Women	(4) Childless-ness Men	(5) No. of children Mothers	(6) No. of children Fathers
I. Marital conception	–0.183**	0.003	0.079**	0.008	–0.026	0.023
	(0.085)	(0.092)	(0.032)	(0.035)	(0.070)	(0.078)
Observations	102	883	102	883	771	637
II. Premarital_conception	–0.131	–0.749	–0.101	0.161	–0.493*	–0.146
	(0.474)	(1.462)	(0.181)	(0.401)	(0.269)	(0.752)
Observations	56.	52.	56.	52.	45.	37.
III. Only child in HH	0.179	–0.198	–0.066	0.030	–0.012	–0.112
	(0.405)	(0.359)	(0.164)	(0.145)	(0.308)	(0.324)
Observations	101	82.	101	82.	68.	59.
IV. Not only child in HH	–0.210**	0.024	0.090***	0.009	–0.034	0.052
	(0.085)	(0.096)	(0.031)	(0.036)	(0.070)	(0.082)
Observations	995	871	995	871	757	630
V. High gender equality	–0.162	0.069	0.072	0.017	–0.009	0.138
	(0.116)	(0.131)	(0.044)	(0.050)	(0.099)	(0.109)
Observations	541	441	541	441	401	315
VI.Low gender equality	–0.329**	–0.154	0.119**	0.046	–0.134	–0.088
	(0.136)	(0.151)	(0.050)	(0.057)	(0.107)	(0.123)
Observations	391	375	391	375	301	266
VII. Heterosexual	–0.175**	–0.113	0.077***	0.050	–0.025	–0.013
	(0.078)	(0.088)	(0.028)	(0.032)	(0.065)	(0.074)
Observations	105	895	105	895	809	681
VIII. Divorced parents	–0.306	–0.057	0.114	0.015	–0.103	0.049
	(0.256)	(0.204)	(0.086)	(0.079)	(0.253)	(0.210)
Observations	194	189	194	189	149	137
IX. Not divorced parent	–0.181**	–0.029	0.074**	0.028	–0.035	0.037
	(0.084)	(0.095)	(0.032)	(0.036)	(0.069)	(0.079)
Observations	898	749	898	749	672	544
X. Mother employed at age 5	0.103	0.120	–0.039	–0.017	0.024	0.110
	(0.134)	(0.148)	(0.055)	(0.058)	(0.108)	(0.118)
Observations	406	356	406	356	305	257
XI. Mother not employed at age 5	–0.372***	–0.146	0.158***	0.058	–0.039	–0.049
	(0.115)	(0.138)	(0.041)	(0.050)	(0.095)	(0.117)
Observations	528	462	528	462	397	327

*Source: BCS70. Equation 2 estimated on specific subsamples of graduates as indicated in each block. The estimated coefficients on "FiF graduate" are reported in the table. All coefficients are estimated in separate models. Additional control variables: region of birth, parental background (SES), mother's year of birth, ethnicity, cognitive skills, math grades from age 16. Robust standard errors in parentheses (*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$).*

Figure OA5: The FiF gap in general health



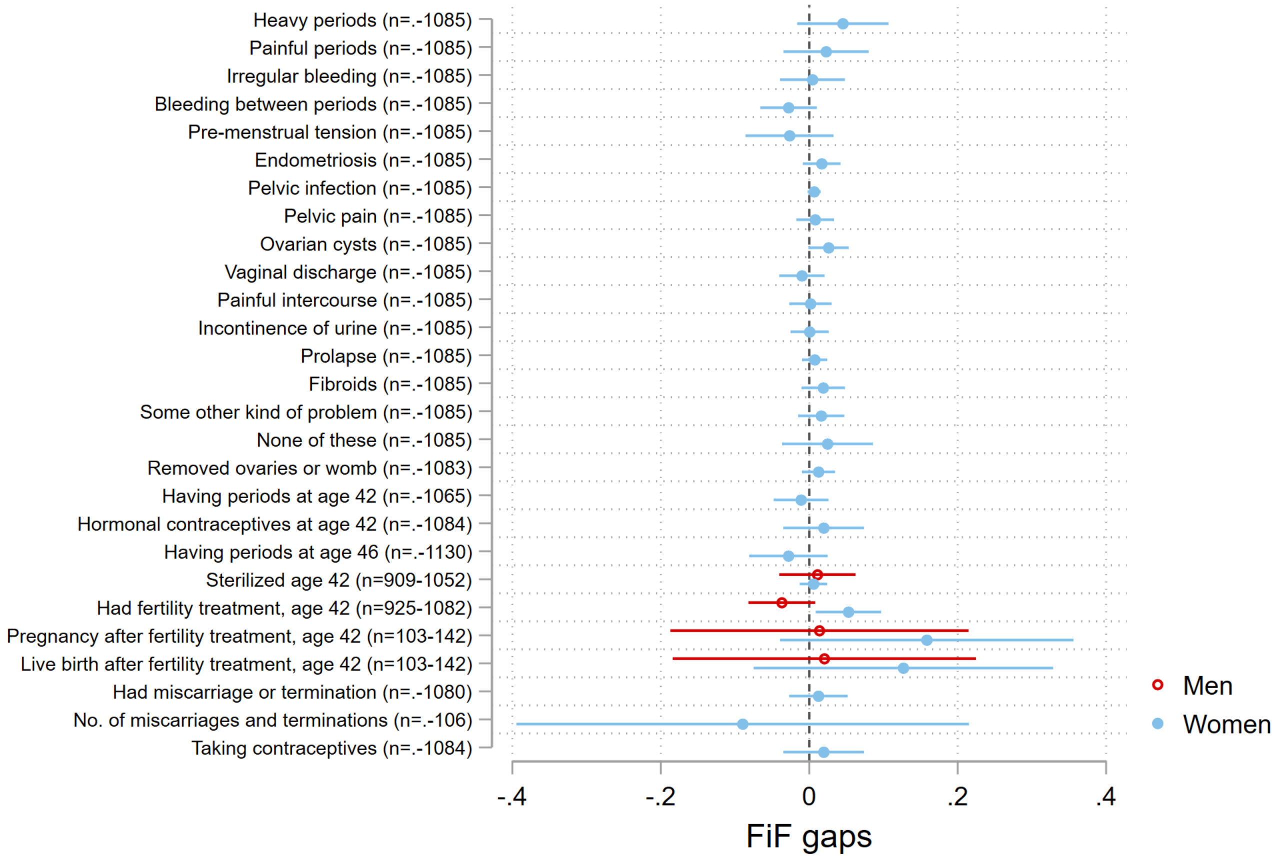
Source: BCS70. Sample of university graduates. Each data point captures the raw difference in these variables between FiF and non-FiF graduates, separately for men and women. All differences are plotted with their 95% confidence intervals. As all variables come from different waves of BCS70, the number of observations differ for each and indicated on the y-axis for men and women, respectively.Mother's Malaise score, age 5: A summary mental illness indicator of mothers captured when the cohort members were 5 years old; Mother's BMI: Individual's mother's Body Mass Index captured when the cohort members were 5 years old; Health index, ages 26-42: One question on self-assessed health (How is your health in general? Really poor, Poor, Fair, Good, Excellent); Health index, age 46: An overall health score (0-100) included only in the age 46 wave, which is a composite measure of health based on a series of indicators; BMI, age 26: Individual's Body Mass Index; BMI, age 46: Individual's Body Mass Index; Malaise score, age 26: Individuals own summary mental illness indicator; Malaise score, age 30: Individuals own summary mental illness indicator; Malaise score, age 34: Individuals own summary mental illness indicator; Malaise score, age 42: Individuals own summary mental illness indicator; Malaise score, age 46: Individuals own summary mental illness indicator.

Table OA17: The role of health in the FiF fertility gap

	(1) No. of children Women	(2) No. of children Men	(3) Childless-ness Women	(4) Childless-ness Men	(5) No. of children Mothers	(6) No. of children Fathers
I. High maternal BMI	–0.145	0.076	0.047	–0.024	–0.079	0.084
	(0.144)	(0.158)	(0.050)	(0.057)	(0.122)	(0.147)
Observations	410	357	410	357	304	263
II. Low maternal BMI	–0.221**	–0.142	0.102***	0.061	–0.031	–0.031
	(0.104)	(0.112)	(0.040)	(0.043)	(0.087)	(0.095)
Observations	609	501	609	501	458	364
III. High maternal Malaise	–0.118	–0.178	0.045	0.093*	–0.030	0.032
	(0.157)	(0.150)	(0.063)	(0.056)	(0.144)	(0.138)
Observations	372	326	372	326	275	236
IV. Low maternal Malaise	–0.159	0.109	0.066*	–0.024	–0.029	0.063
	(0.109)	(0.132)	(0.040)	(0.051)	(0.086)	(0.109)
Observations	554	488	554	488	422	344
V. High own BMI	–0.268*	–0.215	0.110*	0.109	–0.086	0.010
	(0.158)	(0.191)	(0.059)	(0.068)	(0.136)	(0.165)
Observations	330	247	330	247	238	184
VI.Low own BMI	–0.101	–0.127	0.058	–0.045	0.030	–0.468**
	(0.104)	(0.222)	(0.039)	(0.086)	(0.083)	(0.205)
Observations	613	191	613	191	477	119
VII. High health index	–0.137	–0.125	0.074**	0.065*	0.031	0.007
	(0.089)	(0.101)	(0.032)	(0.038)	(0.073)	(0.083)
Observations	759	651	759	651	601	479
VIII. Low health index	–0.153	0.052	0.094	–0.048	0.014	0.043
	(0.176)	(0.199)	(0.073)	(0.073)	(0.157)	(0.179)
Observations	284	246	284	246	195	175
IX. High own Malaise	0.048	–0.133	0.079*	0.028	0.244**	–0.084
	(0.118)	(0.151)	(0.045)	(0.057)	(0.098)	(0.132)
Observations	530	347	530	347	398	253
X. Low own Malaise	–0.334***	–0.021	0.071*	0.056	–0.221***	0.140
	(0.104)	(0.108)	(0.040)	(0.041)	(0.085)	(0.094)
Observations	557	590	557	590	419	428

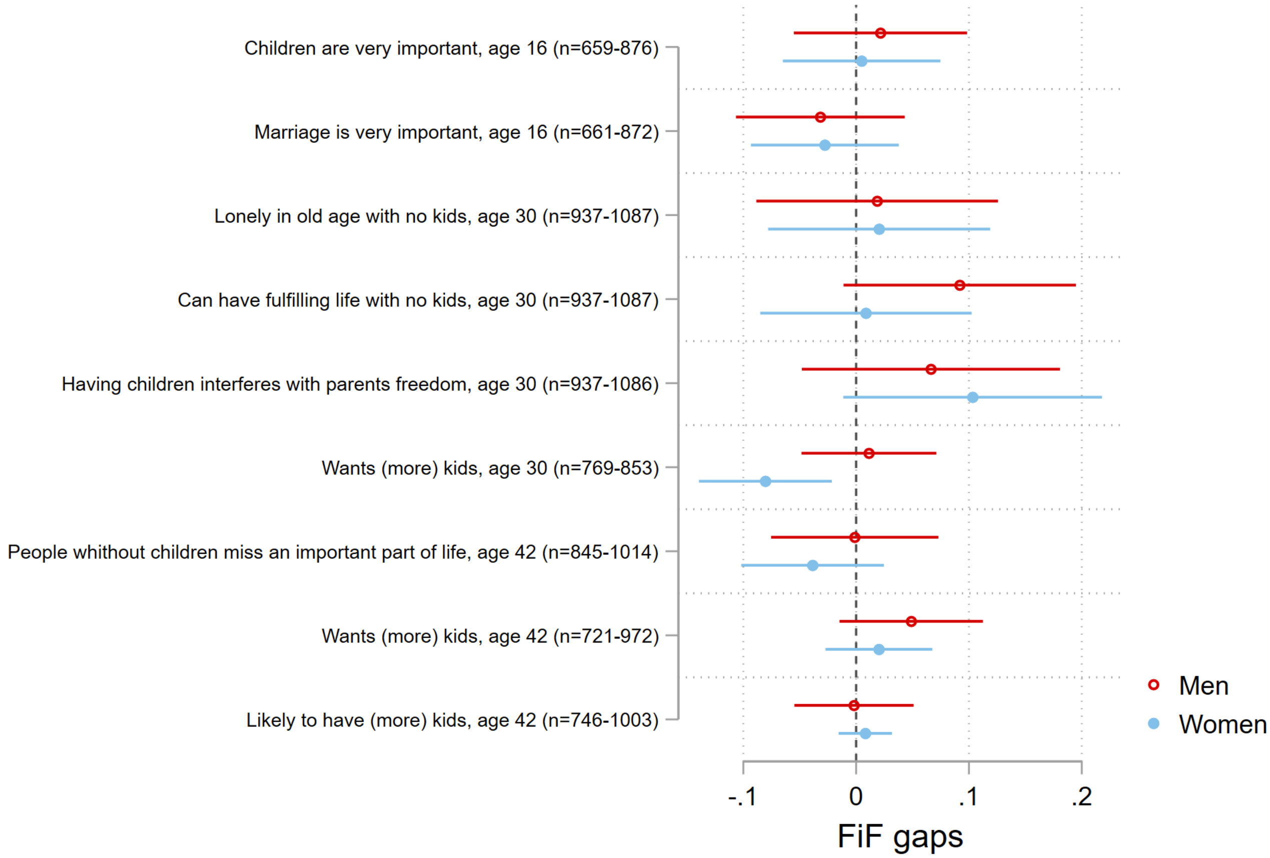
*Source: BCS70. Equation 2 estimated on specific subsamples of graduates as indicated in each block. The estimated coefficients on "FiF graduate" are reported in the table. All coefficients are estimated in separate models. Additional control variables: region of birth, parental background (SES), mother's year of birth, being a firstborn child, No. of siblings, ethnicity, cognitive skills, math grades from age 16. Robust standard errors in parentheses (*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$).*

Figure OA6: The FiF gap in reproductive health



Source: BCS70. Sample of university graduates. Each data point captures the raw difference in these variables between FiF and non-FiF graduates, separately for men and women. All differences are plotted with their 95% confidence intervals. As all variables come from different waves of BCS70, the number of observations differ for each and indicated on the y-axis for men and women, respectively.

Figure OA7: The FiF gap in child-related preferences



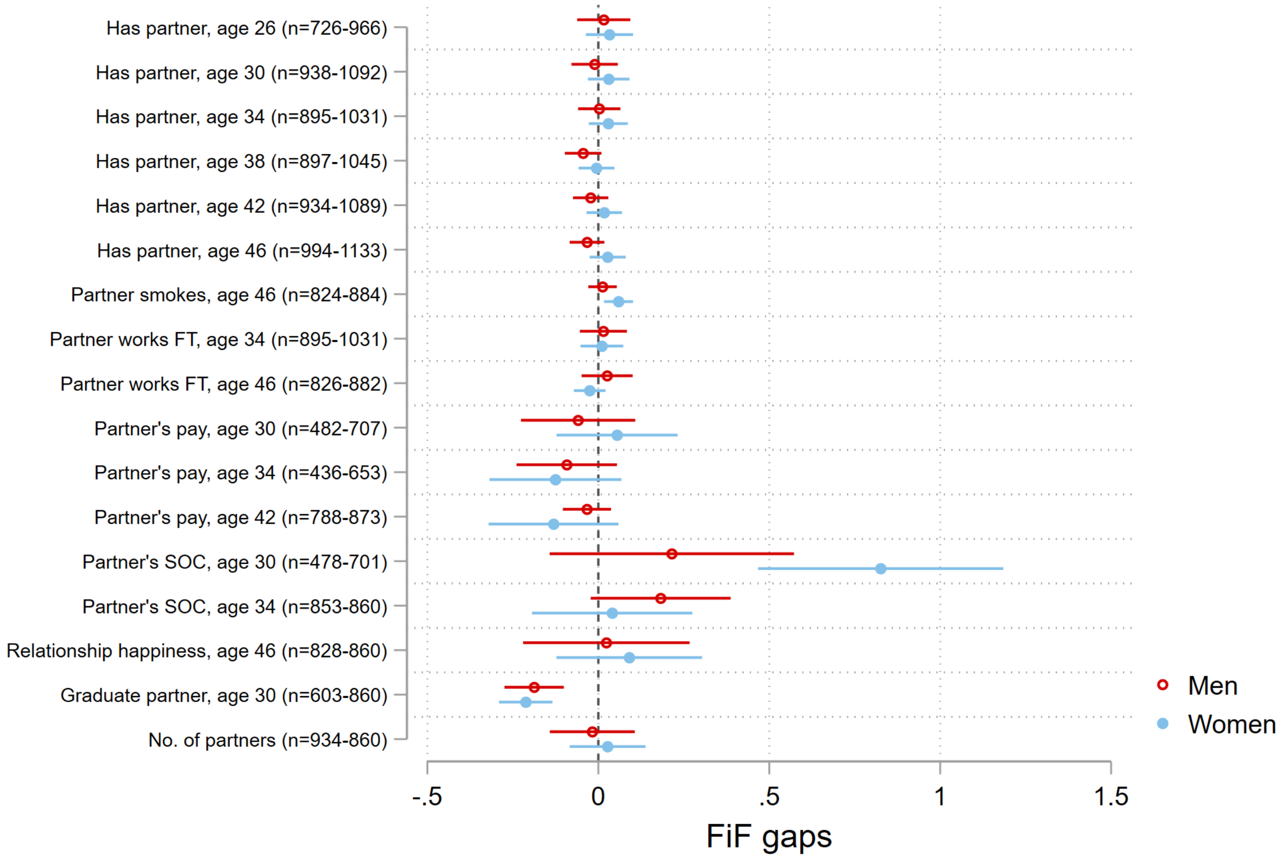
Source: BCS70. Sample of university graduates. Each data point captures the raw difference in these variables between FiF and non-FiF graduates, separately for men and women. All differences are plotted with their 95% confidence intervals. As all variables come from different waves of BCS70, the number of observations differ for each and indicated on the y-axis for men and women, respectively. Children are very important, age 16: Cohort members were asked whether they thought having a child is important with potential answers: matters very much, matters somewhat, doesn't matter. We turn these into binary variables that equal 1 if the first possibility was stated and 0 otherwise. Marriage is very important, age 16: Cohort members were asked whether they thought marriage is important with potential answers: matters very much, matters somewhat, doesn't matter. We turn these into binary variables that equal 1 if the first possibility was stated and 0 otherwise. Lonely in old age with no kids, age 30/Can have fulfilling life with no kids, age 30/Having children interferes with parents freedom, age 30/Wants (more) kids, age 30/People without children miss an important part of life, age 42/Wants (more) kids, age 42/Likely to have (more) kids, age 42: Cohort members were asked these questions with potential answers: yes/no. We turn these into binary variables that equal 1 if the first possibility was stated and 0 otherwise.

Table OA18: The role of child-related preferences in the FiF fertility gap

	(1) No. of children Women	(2) No. of children Men	(3) Childless-ness Women	(4) Childless-ness Men	(5) No. of children Mothers	(6) No. of children Fathers
I. Children are very	0.143	–0.172	–0.040	0.062	0.054	–0.037
important age 16	0.156	0.236	0.057	0.081	0.117	0.209
Observations	329	202	329	202	266	153
II. Children are not very	–0.219**	–0.034	0.111**	0.035	–0.003	0.046
important, age 16	0.107	0.129	0.044	0.049	0.088	0.123
Observations	547	457	547	457	386	315
III. Wants (more)	–0.025	–0.069	0.017	0.041	0.023	0.010
children, age 30	0.094	0.105	0.033	0.035	0.079	0.088
Observations	680	631	680	631	547	502
IV. Doesn't want	–0.586**	0.553**	0.174*	–0.235**	–0.368	0.000
IV. children, age 30	0.261	0.260	0.095	0.116	0.222	0.312
Observations	173	138	173	138	111	81.
V. Childless,	–0.244***	–0.120	0.114***	0.064	–0.065	–0.010
age 30	0.087	0.095	0.040	0.042	0.070	0.082
Observations	747	724	747	724	468	449
VI. Children limit	–0.186	–0.144	0.086*	0.050	–0.027	–0.040
freedom, age 30	0.118	0.122	0.050	0.046	0.095	0.107
Observations	466	513	466	513	341	367
VII. Children doesn't	–0.255**	0.023	0.080**	–0.002	–0.111	0.016
limit freedom, age 30	0.109	0.130	0.039	0.050	0.093	0.109
Observations	620	424	620	424	476	314

*Source: BCS70. Equation 2 estimated on specific subsamples of graduates as indicated in each block. The estimated coefficients on "FiF graduate" are reported in the table. All coefficients are estimated in separate models. Additional control variables: region of birth, parental background (SES), mother's year of birth, being a firstborn child, No. of siblings, ethnicity, cognitive skills, math grades from age 16. Robust standard errors in parentheses (*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$).*

Figure OA8: The FiF gap in partnerships



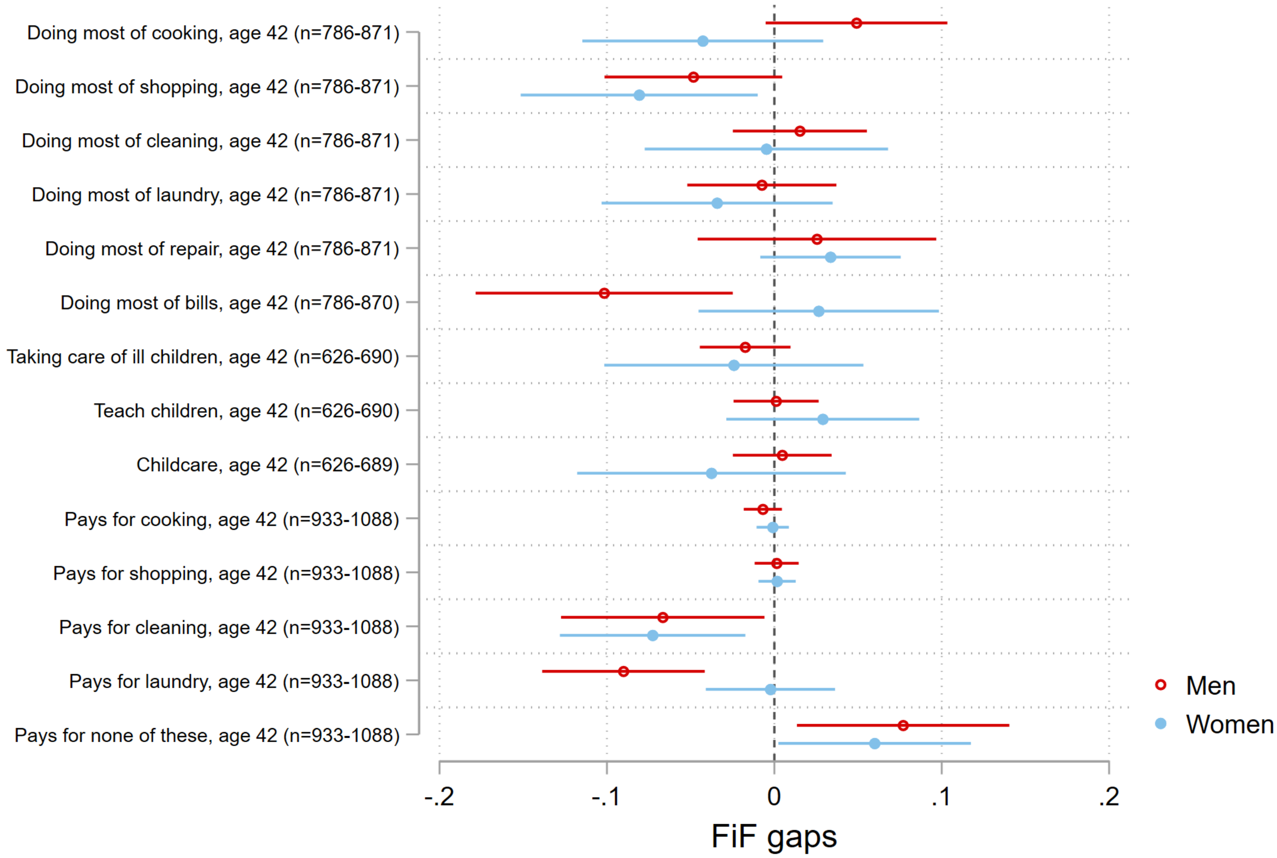
Source: BCS70. Sample of university graduates. Each data point captures the raw difference in these variables between FiF and non-FiF graduates, separately for men and women. All differences are plotted with their 95% confidence intervals. As all variables come from different waves of BCS70, the number of observations differ for each and indicated on the y-axis for men and women, respectively. Has partner, ages 26-46: Whether cohort members have a co-living partner. Partner smokes, age 46: Whether their partners smoke. Partner works FT, ages 34 and 46: Whether their partner works full-time. Partner's pay, ages 30, 34, and 42: Partner's pay at ages 30, 34 and 42. Partner's NS SEC, ages 30 and 34: Partners occupational social status (NS SEC), ages 30 and 34. Relationship happiness, age 46: A measure of relationship happiness at age 46. Graduate partner, age 30: Whether they have a graduate partner, age 30. No. of partners: How many partners they had all together until age 42.

Table OA19: The role of partnerships in the FiF fertility gap

	(1) No. of children Women	(2) No. of children Men	(3) Childless-ness Women	(4) Childless-ness Men	(5) No. of children Mothers	(6) No. of children Fathers
I. Has partner,	–0.149	0.053	0.077***	–0.008	0.019	0.040
age 30	0.091	0.103	0.029	0.033	0.076	0.089
Observations	740	603	740	603	628	518
II. No partner,	–0.234	–0.234	0.077	0.103	–0.239	–0.161
age 30	0.145	0.142	0.064	0.065	0.146	0.150
Observations	352	335	352	335	193	163
III. Low-SOC partner,	–0.152	0.093	0.091**	–0.059	0.054	–0.045
age 30	0.114	0.145	0.038	0.050	0.096	0.115
Observations	457	303	457	303	384	257
IV. High-SOC partner,	–0.155	–0.004	0.089*	0.035	0.043	0.066
age 30	0.163	0.202	0.053	0.073	0.129	0.152
Observations	244	175	244	175	208	144
V. Graduate partner,	–0.148	0.113	0.073*	–0.050	0.028	0.001
age 30	0.128	0.137	0.040	0.042	0.112	0.120
Observations	335	309	335	309	285	273
VI. Non-graduate partner,	–0.103	0.064	0.080*	0.037	0.065	0.169
age 30	0.143	0.166	0.048	0.059	0.115	0.146
Observations	405	294	405	294	343	245
VI. Does not pay for HH help,	–0.209**	–0.128	0.109***	0.024	0.008	–0.114
age 42	0.097	0.107	0.037	0.041	0.082	0.092
Observations	797	677	797	677	583	475
VI. Pays for HH help	–0.125	0.039	0.035	0.044	–0.061	0.155
age 42	0.148	0.159	0.053	0.055	0.116	0.134
Observations	291	256	291	256	236	211

*Source: BCS70. Equation 2 estimated on specific subsamples of graduates as indicated in each block. The estimated coefficients on "FiF graduate" are reported in the table. All coefficients are estimated in separate models. Additional control variables: region of birth, parental background (SES), mother's year of birth, being a firstborn child, No. of siblings, ethnicity, cognitive skills, math grades from age 16. Robust standard errors in parentheses (*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$).*

Figure OA9: The FiF gap in household chores, age 42



Source: BCS70. Sample of university graduates. Each data point captures the raw difference in these variables between FiF and non-FiF graduates, separately for men and women. All differences are plotted with their 95% confidence intervals. As all variables come from different waves of BCS70, the number of observations differ for each and indicated on the y-axis for men and women, respectively.

Table OA20: The FiF gap among graduates in the number of children in the household (age 46)

VARIABLES	(1) No. of children in the HH women	(2) No. of children in the HH men	(3) Childless HH women	(4) Childless HH men	(5) No. of children in the HH mothers	(6) No. of children in the HH fathers
FiF graduate	-0.193***	-0.0248	0.0738**	0.0166	-0.0694	0.00631
	(0.0743)	(0.0846)	(0.0288)	(0.0323)	(0.0610)	(0.0751)
Constant	14.24	-16.49	-2.780	5.948	11.27	-5.689
	(13.33)	(15.95)	(5.625)	(6.555)	(10.50)	(14.27)
Observations	1,133	994	1,133	994	844	718
R-squared	0.031	0.036	0.021	0.031	0.057	0.039

*Source: BCS70. Additional control variables: region of birth, parental background (SES), mother's year of birth, being a firstborn child, No. of siblings, ethnicity, cognitive skills, math grades from age 16. Robust standard errors in parentheses (*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$).*

Table OA21: Reasons of childlessness (age 42, women)

	FiF N	FiF Mean	NonFiF N	NonFiF Mean	Diff	p-value
Infertility problem (personal)	185	0.11	58	0.14	-0.03	0.54
Infertility problem (partner)	185	0.03	58	0.07	-0.04	0.22
Partner sterilised/had vasectomy/hysteret	185	0.04	58	0.02	0.02	0.45
Other health reason	185	0.08	58	0.10	-0.02	0.60
I have not wanted to have children	185	0.42	58	0.31	0.11	0.13
Wanted children but not got round to it	185	0.09	58	0.19	-0.10	0.04*
My partner not wanted	185	0.11	58	0.17	-0.06	0.20
Partner already has	185	0.03	58	0.05	-0.02	0.50
Haven't met right person to have children	185	0.23	58	0.41	-0.19	0.01**
Financial situation wd make it difficult	185	0.05	58	0.03	0.01	0.65
Housing situation difficult	185	0.01	58	0.02	-0.01	0.70
Don't want to compromise relationship	185	0.01	58	0.02	-0.01	0.39
I have been focused on my career	185	0.12	58	0.14	-0.01	0.79
In a homosexual relationship	185	0.01	58	0.02	-0.01	0.39
No particular reason	185	0.06	58	0.03	0.02	0.46
Other reason	185	0.04	58	0.02	0.02	0.45
Don't know	185	0.00	58	0.00	0.00	.
Don't want to answer	185	0.01	58	0.07	-0.06	0.01*

*Source: BCS70. 'Diff' refers to the difference of means between FiF and non-FiF graduates. Two-sided t-test p-values are reported. (*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$).*

Table OA22: Reasons of childlessness (age 42, men)

	FiF N	FiF Mean	NonFiF N	NonFiF Mean	Diff	p-value
Infertility problem (personal)	157	0.03	59	0.03	-0.00	0.94
Infertility problem (partner)	157	0.07	59	0.05	0.02	0.61
Partner sterilised/had vasectomy/hysteret	157	0.00	59	0.02	-0.02	0.10
Other health reason	157	0.02	59	0.03	-0.01	0.52
I have not wanted to have children	157	0.31	59	0.44	-0.13	0.08
Wanted children but not got round to it	157	0.05	59	0.07	-0.02	0.63
My partner not wanted	157	0.12	59	0.10	0.02	0.69
Partner already has	157	0.03	59	0.02	0.01	0.55
Haven't met right person to have children	157	0.33	59	0.31	0.03	0.72
Financial situation wd make it difficult	157	0.04	59	0.03	0.00	0.88
Housing situation difficult	157	0.01	59	0.02	-0.01	0.47
Don't want to compromise relationship	157	0.01	59	0.02	-0.00	0.81
I have been focused on my career	157	0.06	59	0.08	-0.02	0.59
In a homosexual relationship	157	0.01	59	0.02	-0.00	0.81
No particular reason	157	0.13	59	0.07	0.06	0.22
Other reason	157	0.03	59	0.05	-0.03	0.35
Don't know	157	0.01	59	0.00	0.01	0.39
Don't want to answer	157	0.00	59	0.00	0.00	.

*Source: BCS70. 'Diff' refers to the difference of means between FiF and non-FiF graduates. Two-sided t-test p-values are reported. (*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$).*

D. Further details and supporting evidence

Table OA23: Descriptive statistics of women: main variables by potential FiF status

	Potential FiF N	Mean	Children of grad. N	Mean	Diff	p-value
No. of children, age 46	3,786	1.78	565	1.65	0.13	0.02*
Childless, age 46	3,786	0.19	565	0.21	-0.03	0.15
No. of children, parents	3,072	2.20	444	2.10	0.10	0.05
Age of parenthood	3,072	26.96	444	30.23	-3.27	0.00***
UK or European	3,786	0.94	565	0.98	-0.05	0.00***
Other ethnicity	3,786	0.03	565	0.02	0.02	0.03*
Ethnicity is missing	3,786	0.03	565	0.00	0.03	0.00***
Region at birth	3,786	10.42	565	11.83	-1.41	0.14
Low and medium SES parents	3,786	0.69	565	0.21	0.48	0.00***
High SES parents	3,786	0.28	565	0.75	-0.47	0.00***
SES missing	3,786	0.03	565	0.04	-0.01	0.06
Not first-born child	3,786	0.61	565	0.56	0.05	0.03*
First-born child	3,786	0.36	565	0.39	-0.03	0.12
Birth order missing	3,786	0.03	565	0.05	-0.01	0.07
No siblings	3,786	0.09	565	0.07	0.02	0.06
One sibling	3,786	0.43	565	0.53	-0.09	0.00***
Two siblings	3,786	0.25	565	0.27	-0.02	0.32
Three+ siblings	3,786	0.18	565	0.13	0.04	0.01*
Sibling data missing	3,786	0.05	565	0.00	0.05	0.00***
No math O/CSE	3,786	0.14	565	0.05	0.09	0.00***
Grade A/1	3,786	0.06	565	0.21	-0.15	0.00***
Grade B/2	3,786	0.10	565	0.19	-0.09	0.00***
Grade C/3	3,786	0.14	565	0.16	-0.02	0.28
Grade D/4	3,786	0.13	565	0.10	0.03	0.03*
No math info	3,786	0.43	565	0.30	0.13	0.00***
Cognitive skills	3,786	0.06	565	0.86	-0.79	0.00***
Mother's year of birth	3,786	1,944.32	565	1,942.89	1.44	0.00***
Mother's year of birth missing	3,786	0.03	565	0.05	-0.02	0.06

*Source: BCS70. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. "Potential FiF" refers to cohort members whose parents are not graduates. "Children of graduate parents" refers to those who have at least one parent with a degree. In table, we do not differentiate between cohort members based on their own graduation, only by their parents' graduation.*

Table OA24: Descriptive statistics of men: main variables by potential FiF status

	Potential FiF N	Mean	Children of grad. N	Mean	Diff	p-value
No. of children, age 46	3,545	1.55	532	1.49	0.06	0.28
Childless, age 46	3,545	0.26	532	0.28	-0.01	0.55
No. of children, parents	2,609	2.10	385	2.05	0.05	0.34
Age of parenthood	2,609	28.96	385	31.85	-2.89	0.00***
UK or European	3,545	0.93	532	0.98	-0.04	0.00***
Other ethnicity	3,545	0.03	532	0.02	0.01	0.23
Ethnicity is missing	3,545	0.03	532	0.00	0.03	0.00***
Region at birth	3,545	11.50	532	13.74	-2.24	0.04*
Low and medium SES parents	3,545	0.67	532	0.17	0.50	0.00***
High SES parents	3,545	0.29	532	0.77	-0.49	0.00***
SES missing	3,545	0.04	532	0.05	-0.01	0.14
Not first-born child	3,545	0.60	532	0.55	0.05	0.03*
First-born child	3,545	0.35	532	0.39	-0.04	0.10
Birth order missing	3,545	0.05	532	0.06	-0.01	0.23
No siblings	3,545	0.08	532	0.09	-0.01	0.55
One sibling	3,545	0.43	532	0.53	-0.09	0.00***
Two siblings	3,545	0.26	532	0.26	0.00	0.98
Three+ siblings	3,545	0.18	532	0.12	0.06	0.00***
Sibling data missing	3,545	0.05	532	0.01	0.04	0.00***
No math O/CSE	3,545	0.12	532	0.05	0.06	0.00***
Grade A/1	3,545	0.08	532	0.21	-0.13	0.00***
Grade B/2	3,545	0.10	532	0.17	-0.06	0.00***
Grade C/3	3,545	0.11	532	0.13	-0.03	0.07
Grade D/4	3,545	0.08	532	0.06	0.02	0.05*
No math info	3,545	0.51	532	0.38	0.13	0.00***
Cognitive skills	3,545	0.09	532	0.79	-0.70	0.00***
Mother's year of birth	3,545	1,944.28	532	1,943.08	1.19	0.00***
Mother's year of birth missing	3,545	0.04	532	0.05	-0.01	0.28

*Source: BCS70. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. "Potential FiF" refers to cohort members whose parents are not graduates. "Children of graduate parents" refers to those who have at least one parent with a degree. In table, we do not differentiate between cohort members based on their own graduation, only by their parents' graduation.*

Table OA25: Descriptive statistics of potential FiF women: main variables by graduation

	Graduate N	Mean	Non-graduate N	Mean	Diff	p-value
No. of children, age 46	800	1.48	2,986	1.87	-0.38	0.00***
Childless, age 46	800	0.26	2,986	0.17	0.10	0.00***
No. of children, parents	589	2.01	2,483	2.24	-0.23	0.00***
Age of parenthood	589	30.33	2,483	26.16	4.17	0.00***
UK or European	800	0.94	2,986	0.94	-0.00	0.93
Other ethnicity	800	0.04	2,986	0.03	0.00	0.53
Ethnicity is missing	800	0.03	2,986	0.03	-0.00	0.59
Region at birth	800	11.23	2,986	10.20	1.03	0.22
Low and medium SES parents	800	0.54	2,986	0.73	-0.18	0.00***
High SES parents	800	0.42	2,986	0.25	0.18	0.00***
SES missing	800	0.04	2,986	0.03	0.01	0.31
Not first-born child	800	0.55	2,986	0.62	-0.07	0.00***
First-born child	800	0.41	2,986	0.35	0.06	0.00**
Birth order missing	800	0.04	2,986	0.03	0.01	0.21
No siblings	800	0.11	2,986	0.09	0.02	0.08
One sibling	800	0.48	2,986	0.42	0.06	0.00**
Two siblings	800	0.21	2,986	0.26	-0.05	0.01**
Three+ siblings	800	0.14	2,986	0.19	-0.05	0.00***
Sibling data missing	800	0.06	2,986	0.04	0.02	0.05
No math O/CSE	800	0.10	2,986	0.15	-0.06	0.00***
Grade A/1	800	0.14	2,986	0.04	0.10	0.00***
Grade B/2	800	0.19	2,986	0.08	0.11	0.00***
Grade C/3	800	0.22	2,986	0.12	0.10	0.00***
Grade D/4	800	0.08	2,986	0.15	-0.07	0.00***
No math info	800	0.28	2,986	0.47	-0.19	0.00***
Cognitive skills	800	0.66	2,986	-0.10	0.75	0.00***
Mother's year of birth	800	1,943.48	2,986	1,944.55	-1.07	0.00***
Mother's year of birth missing	800	0.04	2,986	0.03	0.01	0.45

*Source: BCS70. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. "Potential FiF" refers to cohort members whose parents are not graduates.*

Table OA26: Descriptive statistics of potential FiF men: main variables by graduation

	Graduate N	Mean	Non-graduate N	Mean	Diff	p-value
No. of children, age 46	712	1.45	2,833	1.57	-0.13	0.01*
Childless, age 46	712	0.29	2,833	0.26	0.03	0.09
No. of children, parents	506	2.03	2,103	2.12	-0.09	0.07
Age of parenthood	506	31.91	2,103	28.25	3.66	0.00***
UK or European	712	0.92	2,833	0.94	-0.02	0.06
Other ethnicity	712	0.04	2,833	0.03	0.01	0.08
Ethnicity is missing	712	0.04	2,833	0.03	0.01	0.38
Region at birth	712	11.75	2,833	11.44	0.31	0.75
Low and medium SES parents	712	0.52	2,833	0.71	-0.19	0.00***
High SES parents	712	0.44	2,833	0.25	0.19	0.00***
SES missing	712	0.04	2,833	0.04	0.01	0.47
Not first-born child	712	0.56	2,833	0.62	-0.06	0.00**
First-born child	712	0.39	2,833	0.34	0.05	0.02*
Birth order missing	712	0.05	2,833	0.04	0.01	0.23
No siblings	712	0.08	2,833	0.08	0.00	0.67
One sibling	712	0.48	2,833	0.42	0.06	0.00**
Two siblings	712	0.26	2,833	0.26	-0.00	0.82
Three+ siblings	712	0.12	2,833	0.19	-0.08	0.00***
Sibling data missing	712	0.06	2,833	0.04	0.02	0.06
No math O/CSE	712	0.04	2,833	0.14	-0.09	0.00***
Grade A/1	712	0.20	2,833	0.05	0.16	0.00***
Grade B/2	712	0.20	2,833	0.08	0.12	0.00***
Grade C/3	712	0.15	2,833	0.10	0.05	0.00***
Grade D/4	712	0.05	2,833	0.09	-0.04	0.00**
No math info	712	0.35	2,833	0.55	-0.20	0.00***
Cognitive skills	712	0.70	2,833	-0.06	0.76	0.00***
Mother's year of birth	712	1,943.53	2,833	1,944.46	-0.94	0.00***
Mother's year of birth missing	712	0.05	2,833	0.04	0.01	0.39

*Source: BCS70. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. "Potential FiF" refers to cohort members whose parents are not graduates.*

Table OA27: Descriptive statistics of women: children of graduate parents by graduation

	Graduate N	Mean	Non-graduate N	Mean	Diff	p-value
No. of children, age 46	333	1.66	232	1.64	0.03	0.79
Childless, age 46	333	0.20	232	0.23	-0.02	0.49
No. of children, parents	265	2.09	179	2.12	-0.03	0.68
Age of parenthood	265	31.46	179	28.41	3.06	0.00***
UK or European	333	0.98	232	0.99	-0.01	0.25
Other ethnicity	333	0.02	232	0.01	0.01	0.25
Ethnicity is missing	333	0.00	232	0.00	0.00	.
Region at birth	333	9.61	232	15.01	-5.40	0.01**
Low and medium SES parents	333	0.18	232	0.25	-0.07	0.05*
High SES parents	333	0.80	232	0.69	0.11	0.00**
SES missing	333	0.03	232	0.07	-0.04	0.02*
Not first-born child	333	0.57	232	0.54	0.03	0.41
First-born child	333	0.40	232	0.39	0.01	0.84
Birth order missing	333	0.03	232	0.07	-0.04	0.02*
No siblings	333	0.05	232	0.10	-0.05	0.01*
One sibling	333	0.53	232	0.52	0.01	0.82
Two siblings	333	0.27	232	0.27	0.01	0.87
Three+ siblings	333	0.15	232	0.11	0.04	0.19
Sibling data missing	333	0.00	232	0.00	0.00	.
No math O/CSE	333	0.03	232	0.09	-0.06	0.00**
Grade A/1	333	0.27	232	0.11	0.17	0.00***
Grade B/2	333	0.24	232	0.12	0.12	0.00***
Grade C/3	333	0.14	232	0.18	-0.04	0.17
Grade D/4	333	0.08	232	0.14	-0.06	0.01*
No math info	333	0.25	232	0.37	-0.12	0.00**
Cognitive skills	333	1.10	232	0.51	0.58	0.00***
Mother's year of birth	333	1,942.37	232	1,943.63	-1.26	0.00**
Mother's year of birth missing	333	0.03	232	0.07	-0.04	0.03*

*Source: BCS70. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. "Children of graduate parents" refers to those who have at least one parent with a degree.*

Table OA28: Descriptive statistics of men: children of graduate parents by graduation

	Graduate N	Mean	Non-graduate N	Mean	Diff	p-value
No. of children, age 46	282	1.54	250	1.43	0.11	0.27
Childless, age 46	282	0.24	250	0.31	-0.07	0.08
No. of children, parents	213	2.04	172	2.08	-0.04	0.65
Age of parenthood	213	32.44	172	31.12	1.32	0.01**
UK or European	282	0.97	250	0.98	-0.02	0.24
Other ethnicity	282	0.03	250	0.02	0.02	0.24
Ethnicity is missing	282	0.00	250	0.00	0.00	.
Region at birth	282	12.37	250	15.29	-2.93	0.20
Low and medium SES parents	282	0.15	250	0.20	-0.06	0.10
High SES parents	282	0.81	250	0.73	0.08	0.03*
SES missing	282	0.04	250	0.06	-0.02	0.19
Not first-born child	282	0.59	250	0.52	0.07	0.13
First-born child	282	0.38	250	0.40	-0.02	0.57
Birth order missing	282	0.04	250	0.08	-0.04	0.04*
No siblings	282	0.08	250	0.09	-0.01	0.67
One sibling	282	0.53	250	0.52	0.01	0.78
Two siblings	282	0.26	250	0.27	-0.01	0.74
Three+ siblings	282	0.11	250	0.12	-0.01	0.82
Sibling data missing	282	0.02	250	0.00	0.02	0.03*
No math O/CSE	282	0.05	250	0.06	-0.02	0.36
Grade A/1	282	0.30	250	0.10	0.19	0.00***
Grade B/2	282	0.21	250	0.12	0.09	0.01**
Grade C/3	282	0.12	250	0.15	-0.03	0.35
Grade D/4	282	0.03	250	0.09	-0.06	0.00**
No math info	282	0.30	250	0.48	-0.17	0.00***
Cognitive skills	282	1.08	250	0.47	0.60	0.00***
Mother's year of birth	282	1,942.52	250	1,943.71	-1.19	0.00**
Mother's year of birth missing	282	0.04	250	0.06	-0.02	0.19

*Source: BCS70. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. "Children of graduate parents" refers to those who have at least one parent with a degree.*

Table OA29: The FiF fertility gap among graduates - detailed results for Column 1 in Table 3. Outcome variable: No. of children at age 46. Sample: women.

	(1)	(2)	(3)	(4)
VARIABLES	Model 1	Model 2	Model 3	Model 4
FiF graduate	-0.181**	-0.181**	-0.167**	-0.167**
	(0.0726)	(0.0729)	(0.0737)	(0.0763)
Constant	1.664***	1.696***	1.529***	1.505***
	(0.0600)	(0.142)	(0.191)	(0.232)
Observations	1,133	1,133	1,133	1,133
R-squared	0.005	0.022	0.030	0.033
Background	no	yes	yes	yes
Siblings	no	no	yes	yes
Abilities	no	no	no	yes

*Source: BCS70. Robust standard errors in parentheses (*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$). Control variables: Background: region of birth, parental SES, mother's year of birth, ethnicity. Siblings: being a first-born child, No. of siblings. Abilities: cognitive skills, math grades from age 16.*

Table OA30: The FiF fertility gap among graduates - detailed results for Column 2 in Table 3. Outcome variable: No. of children at age 46. Sample: men.

VARIABLES	(1) Model 1	(2) Model 2	(3) Model 3	(4) Model 4
FiF graduate	-0.0938	-0.0649	-0.0695	-0.0707
	(0.0799)	(0.0824)	(0.0826)	(0.0851)
Constant	1.539***	1.274***	1.302***	1.119***
	(0.0674)	(0.161)	(0.217)	(0.266)
Observations	994	994	994	994
R-squared	0.001	0.019	0.021	0.024
Background	no	yes	yes	yes
Siblings	no	no	yes	yes
Abilities	no	no	no	yes

*Source: BCS70. Robust standard errors in parentheses (*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$). Control variables: Background: region of birth, parental SES, mother's year of birth, ethnicity. Siblings: being a first-born child, No. of siblings. Abilities: cognitive skills, math grades from age 16.*

Table OA31: The FiF fertility gap among graduates - detailed results for Column 3 in Table 3. Outcome variable: Childlessness at age 46. Sample: women.

VARIABLES	(1) Model 1	(2) Model 2	(3) Model 3	(4) Model 4
FiF graduate	0.0595**	0.0620**	0.0599**	0.0726**
	(0.0271)	(0.0271)	(0.0275)	(0.0283)
Constant	0.204***	0.159***	0.224***	0.204**
	(0.0221)	(0.0483)	(0.0762)	(0.0907)
Observations	1,133	1,133	1,133	1,133
R-squared	0.004	0.016	0.023	0.032
Background	no	yes	yes	yes
Siblings	no	no	yes	yes
Abilities	no	no	no	yes

*Source: BCS70. Robust standard errors in parentheses (*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$). Control variables: Background: region of birth, parental SES, mother's year of birth, ethnicity. Siblings: being a first-born child, No. of siblings. Abilities: cognitive skills, math grades from age 16.*

Table OA32: The FiF fertility gap among graduates - detailed results for Column 4 in Table 3. Outcome variable: Childlessness at age 46. Sample: men.

VARIABLES	(1) Model 1	(2) Model 2	(3) Model 3	(4) Model 4
FiF graduate	0.0446	0.0400	0.0392	0.0438
	(0.0308)	(0.0314)	(0.0316)	(0.0320)
Constant	0.245***	0.318***	0.344***	0.319***
	(0.0256)	(0.0722)	(0.0904)	(0.112)
Observations	994	994	994	994
R-squared	0.002	0.011	0.015	0.019
Background	no	yes	yes	yes
Siblings	no	no	yes	yes
Abilities	no	no	no	yes

*Source: BCS70. Robust standard errors in parentheses (*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$). Control variables: Background: region of birth, parental SES, mother's year of birth, ethnicity. Siblings: being a first-born child, No. of siblings. Abilities: cognitive skills, math grades from age 16.*

Table OA33: The FiF fertility gap among graduates - detailed results for Column 4 in Table 3. Outcome variable: No. of children at age 46 among mothers. Sample: women who had children.

VARIABLES	(1) Model 1	(2) Model 2	(3) Model 3
FiF graduate	-0.0770	-0.0698	-0.0563
	(0.0599)	(0.0603)	(0.0614)
Constant	2.091***	2.012***	1.950***
	(0.0481)	(0.129)	(0.161)
Observations	854	854	854
R-squared	0.002	0.024	0.035
Background	no	yes	yes
Siblings	no	no	yes
Abilities	no	no	no

*Source: BCS70. Robust standard errors in parentheses (*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$). Control variables: Background: region of birth, parental SES, mother's year of birth, ethnicity. Siblings: being a firstborn child, No. of siblings. Abilities: cognitive skills, math grades from age 16.*

Table OA34: The FiF fertility gap among graduates - detailed results for Column 5 in Table 3. Outcome variable: No. of children at age 46 amomg fathers. Sample: men who had children.

	(1)	(2)	(3)	(4)
VARIABLES	Model 1	Model 2	Model 3	Model 4
FiF graduate	-0.00396	0.0218	0.0137	0.0205
	(0.0669)	(0.0692)	(0.0697)	(0.0723)
Constant	2.038***	1.862***	1.983***	1.690***
	(0.0564)	(0.125)	(0.175)	(0.222)
Observations	719	719	719	719
R-squared	0.000	0.020	0.025	0.040
Background	no	yes	yes	yes
Siblings	no	no	yes	yes
Abilities	no	no	no	yes

*Source: BCS70. Robust standard errors in parentheses (*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$). Control variables: Background: region of birth, parental SES, mother's year of birth, ethnicity. Siblings: being a first-born child, No. of siblings. Abilities: cognitive skills, math grades from age 16.*

Table OA35: Returns to graduation: the number of children among mothers and fathers (age 46): the role of cognitive skills.

	(1)	(2)	(3)	(4)	(5)	(6)
			Model 3			Model 3
			Parents			Parents
		Model 3 in	no degree*		Model 3 in	no degree*
	Model 1	Table OA3	cog. skills	Model 1	Table OA6	cog. skills
VARIABLES	Women	Women	Women	Men	Men	Men
Graduate, age 46	-0.0323	0.0125	-0.0948	-0.0380	-0.0337	-0.0609
	(0.0789)	(0.0808)	(0.0871)	(0.0830)	(0.0872)	(0.0935)
Parents with no degree	0.120*	0.0579	0.145**	0.0447	-0.00625	0.0190
	(0.0658)	(0.0662)	(0.0678)	(0.0648)	(0.0663)	(0.0709)
FiF graduate	-0.197**	-0.159*	-0.0366	-0.0487	-0.0182	0.0143
	(0.0890)	(0.0898)	(0.0980)	(0.0931)	(0.0947)	(0.102)
Cognitive skills		-0.0595**	0.126**		-0.0208	0.0309
		(0.0236)	(0.0569)		(0.0216)	(0.0534)
Parents no degree*cog skills			-0.206***			-0.0583
			(0.0612)			(0.0575)
Constant	2.123***	-10.98	-10.70	2.076***	-17.80**	-17.85**
	(0.0626)	(6.849)	(6.839)	(0.0610)	(7.637)	(7.631)
Observations	3,516	3,516	3,516	2,994	2,994	2,994
R-squared	0.009	0.033	0.036	0.001	0.026	0.026
Controls	No	Yes	Yes	No	Yes	Yes

*Source: BCS70. Robust standard errors in parentheses (*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$). Further control variables: region of birth, parental SES, mother's year of birth, ethnicity, being a firstborn child, No. of siblings, math grades from age 16. 'Parents no degree*cog skills' refers to the interaction term of 'Parents with no degree' and 'Cognitive skills'.*

Table OA36: Returns to graduation: childlessness among women and men (age 46): the role of cognitive skills

VARIABLES	(1) Model 1 Women	(2) Model 3 in Table OA2 Women	(3) Model 3 Parents no degree* cog. skills Women	(4) Model 1 Men	(5) Model 3 in Table OA5 Men	(6) Model 3 Parents no degree* cog. skills Men
Graduate, age 46	-0.0242	-0.0311	-0.0564	-0.0673*	-0.0793**	-0.0895**
	(0.0353)	(0.0355)	(0.0378)	(0.0389)	(0.0397)	(0.0409)
Parents with no degree	-0.0600**	-0.0402	-0.0176	-0.0543*	-0.0523*	-0.0439
	(0.0284)	(0.0287)	(0.0297)	(0.0304)	(0.0310)	(0.0330)
FiF graduate	0.120***	0.107***	0.136***	0.0990**	0.104**	0.116**
	(0.0392)	(0.0392)	(0.0419)	(0.0433)	(0.0436)	(0.0452)
Cognitive skills		0.0174**	0.0619***		-0.00642	0.0111
		(0.00818)	(0.0239)		(0.00864)	(0.0238)
Parents no degree*cog skills			-0.0493*			-0.0197
			(0.0252)			(0.0250)
Constant	0.228***	12.15***	12.22***	0.312***	16.97***	16.97***
	(0.0276)	(2.510)	(2.511)	(0.0293)	(2.905)	(2.906)
Observations	4,351	4,351	4,351	4,077	4,077	4,077
R-squared	0.009	0.024	0.025	0.002	0.016	0.016
Controls	No	Yes	Yes	No	Yes	Yes

*Source: BCS70. Robust standard errors in parentheses (*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$). Further control variables: region of birth, parental SES, mother's year of birth, ethnicity, being a firstborn child, No. of siblings, math grades from age 16. 'Parents no degree*cog skills' refers to the interaction term of 'Parents with no degree' and 'Cognitive skills'.*

Table OA37: The FiF gap in childlessness among graduates (age 46): the role of childbearing preferences at age 16

VARIABLES	(1) Model 1 Women	(2) Model 2 Women	(3) Model 3 Women	(4) Model 1 Men	(5) Model 2 Men	(6) Model 3 Men
FiF graduate	0.0757***	0.0751***	0.117***	0.0470	0.0539*	0.0921**
	(0.0283)	(0.0282)	(0.0444)	(0.0320)	(0.0317)	(0.0429)
Having children is very important		-0.0714**	0.0423		-0.0995**	-0.0946
		(0.0345)	(0.0588)		(0.0462)	(0.0814)
Having children is not important		0.147***	0.177*		0.0688	0.0626
		(0.0503)	(0.0914)		(0.0620)	(0.106)
Child preferences are missing		-0.0232	-0.0111		-0.0918**	-0.142**
		(0.0382)	(0.0575)		(0.0411)	(0.0684)
Very important*FiF graduate			-0.145**			-0.0754
			(0.0658)			(0.0805)
Somewhat important*FiF graduate			0.0173			-0.0717
			(0.0694)			(0.0835)
Not important*FiF graduate			-0.0263			-0.0618
			(0.105)			(0.117)
Constant	6.922	7.884	7.677	10.89*	11.80*	12.09*
	(5.411)	(5.343)	(5.330)	(6.521)	(6.524)	(6.577)
Observations	1,133	1,133	1,133	994	994	994
R-squared	0.034	0.056	0.061	0.022	0.036	0.037

*Source: BCS70. Robust standard errors in parentheses (*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$). Further control variables: region of birth, parental SES, mother's year of birth, ethnicity, being a firstborn child, No. of siblings, math grades from age 16, cognitive skills.*

Table OA38: The Kitagawa-Oaxaca-Blinder decomposition of the female FiF gap in childlessness: underlying regressions for Table A4 in the Appendix of the main text

	(1)	(2)	(3)
VARIABLES	FiF graduates	Non-FiF graduates	Graduates
FiF			0.070**
			(0.028)
Cognitive skills	0.049**	0.070**	0.050***
	(0.023)	(0.034)	(0.019)
Self-esteem (LAWSEQ, age 16)	-0.075***	-0.091**	-0.078***
	(0.028)	(0.041)	(0.023)
Mother worked	-0.061*	0.112**	-0.009
	(0.036)	(0.049)	(0.029)
Children are very important	-0.154***	-0.007	-0.112***
	(0.037)	(0.059)	(0.031)
Constant	0.447***	-0.027	0.281***
	(0.109)	(0.196)	(0.096)
Observations	800	333	1,133
R-squared	0.060	0.130	0.055

*Source: BCS70. Sample: graduate women. Robust standard errors in parentheses (*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$). Further control variables: region of birth, parental SES, mother's year of birth, ethnicity, being a firstborn child, No. of siblings, math grades from age 16.*

Table OA39: Descriptive statistics: comparison of FiF and non-FiF female graduates whose mothers did not work at age 5

	FiF N	FiF Mean	NonFiF N	NonFiF Mean	Diff	p-value
No. of children, age 46	370	1.45	158	1.84	-0.39	0.00***
Childless, age 46	370	0.29	158	0.15	0.14	0.00***
No. of children, parents	263	2.04	134	2.17	-0.13	0.18
Age of parenthood	263	30.07	134	30.96	-0.89	0.10
UK or European	370	0.98	158	0.99	-0.01	0.28
Other ethnicity	370	0.02	158	0.01	0.01	0.28
Region at birth	370	8.90	158	7.43	1.47	0.34
Low and medium SES parents	370	0.56	158	0.17	0.39	0.00***
High SES parents	370	0.44	158	0.83	-0.39	0.00***
Not first-born child	370	0.54	158	0.54	-0.00	1.00
First-born child	370	0.46	158	0.46	0.00	1.00
No siblings	370	0.09	158	0.02	0.07	0.00**
One sibling	370	0.59	158	0.61	-0.02	0.65
Two siblings	370	0.22	158	0.25	-0.03	0.39
Three+ siblings	370	0.11	158	0.12	-0.01	0.62
No math O/CSE	370	0.09	158	0.02	0.07	0.00**
Grade A/1	370	0.16	158	0.26	-0.10	0.01**
Grade B/2	370	0.19	158	0.30	-0.11	0.00**
Grade C/3	370	0.22	158	0.15	0.08	0.04*
Grade D/4	370	0.07	158	0.04	0.03	0.22
Cognitive skills	370	0.73	158	1.15	-0.42	0.00***
Mother's year of birth	370	1,943.63	158	1,942.72	0.91	0.07
Self-esteem (LAWSEQ, age 16)	370	0.05	158	0.17	-0.12	0.04*
Regular job given up	331	3.52	139	3.71	-0.18	0.04*
Persons Per Room Ratio	365	0.81	154	0.73	0.08	0.00***
Owned home	370	0.73	158	0.93	-0.20	0.00***
Ownership of Van or Car	369	0.80	157	0.92	-0.12	0.00***
Mother's Malaise score, age 5	364	3.71	155	2.55	1.16	0.00***
Parent's attitudes on gender equality, age 5	365	0.28	157	0.50	-0.22	0.01**
Zscore: Attitude To Maternal Employment	159	0.67	73	0.70	-0.02	0.71

Source: BCS70. Sample: graduate women whose mothers did not work when they were aged 5. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table OA40: Descriptive statistics: comparison of FiF and non-FiF female graduates whose mothers worked at age 5

	FiF N	FiF Mean	NonFiF N	NonFiF Mean	Diff	p-value
No. of children, age 46	285	1.51	121	1.50	0.00	0.97
Childless, age 46	285	0.24	121	0.26	-0.02	0.63
No. of children, parents	216	1.99	89	2.04	-0.05	0.59
Age of parenthood	216	30.25	89	32.11	-1.86	0.00**
UK or European	285	0.98	121	0.98	-0.00	0.76
Other ethnicity	285	0.01	121	0.02	-0.00	0.85
Region at birth	285	7.94	121	7.31	0.63	0.68
Low and medium SES parents	285	0.61	121	0.18	0.43	0.00***
High SES parents	285	0.39	121	0.82	-0.43	0.00***
Not first-born child	285	0.58	121	0.63	-0.05	0.39
First-born child	285	0.40	121	0.37	0.03	0.55
No siblings	285	0.18	121	0.10	0.08	0.04*
One sibling	285	0.55	121	0.60	-0.05	0.36
Two siblings	285	0.17	121	0.22	-0.05	0.19
Three+ siblings	285	0.09	121	0.07	0.02	0.51
No math O/CSE	285	0.11	121	0.02	0.08	0.01**
Grade A/1	285	0.14	121	0.33	-0.19	0.00***
Grade B/2	285	0.21	121	0.21	0.01	0.87
Grade C/3	285	0.23	121	0.12	0.12	0.01**
Grade D/4	285	0.08	121	0.08	-0.00	0.95
Cognitive skills	285	0.69	121	1.09	-0.40	0.00***
Mother's year of birth	285	1,943.36	121	1,941.89	1.47	0.01**
Self-esteem (LAWSEQ, age 16)	285	0.09	121	0.18	-0.09	0.13
Regular job given up	255	3.32	103	3.36	-0.04	0.74
Persons Per Room Ratio	281	0.80	119	0.71	0.09	0.00***
Owned home	285	0.71	121	0.93	-0.22	0.00***
Ownership of Van or Car	284	0.82	121	0.97	-0.14	0.00***
Mother's Malaise score, age 5	282	3.87	120	2.71	1.16	0.00***
Parent's attitudes on gender equality, age 5	284	0.15	120	0.52	-0.37	0.00***
Zscore: Attitude To Maternal Employment	177	0.83	72	0.83	-0.00	0.95

*Source: BCS70. Sample: graduate women whose mothers worked when they were aged 5. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$*