Chapter 1

Is 40 the New 30? Increasing Reproductive Intentions and Fertility Rates beyond Age 40

Éva Beaujouan and Tomáš Sobotka

Introduction

Across the highly developed countries, reproduction trends of the last half a century are characterised by a continuous shift of parenthood towards more advanced reproductive ages [1–3]. The trend to later childbearing has been fuelled by a broad array of cultural and social changes such as higher education expansion, rise in gender equality and in women's employment, changes in partnership behaviour, rising economic uncertainty and shifts in family-related values and attitudes (e.g., [4]). Late reproduction has progressed hand in hand with a trend to a smaller family size, with two-child families becoming most prominent with respect to both fertility ideals and actual family size [5,6].

Initially, among women and men born in the 1950s and 1960s, later parenthood typically implied having children in their late 20s and early 30s rather than in their early- to mid-20s or in late teenage years. This trend was compatible with their desire to complete education and achieve relatively stable employment before starting a family, but also with their smaller family size preferences. Indeed, Habbema et al. [7] show that 90% of women intending to have two children and starting their pregnancy attempts around age 30 will eventually be able to reach their desired family size. Thus, for European women born between 1952 and 1972, later reproduction was not necessarily associated with lower fertility at a country level [8].

However, among the generations born in the 1970s and 1980s, many women were still childless in their mid-to-late 30s or even early 40s, and a substantial share still intended to have children [2,3]. This trend has potentially serious implications for women's and couples' fertility and well-being, and also for the future fertility rates across highly developed countries. Women planning pregnancies in later reproductive ages experience a rising risk of pregnancy complications, miscarriages and infertility [9,10]. Therefore, many women postponing parenthood will not be able to realise their reproductive plans.

Highly educated women are at the forefront of delayed reproduction: level of education is closely related to later employment entry and parenthood postponement [11,12]. They also experience higher childlessness, although not everywhere: the Nordic countries saw the educational gradient in childlessness reverse, with lower-educated women now staying most often childless [13,14]. Highly educated women, who have invested in their career, face steeper opportunity costs of having children in terms of their potential loss of income and career interruption, especially in uncertain times or in countries where career is less compatible with parenthood. This may motivate them to postpone having children to minimise career disruption. On the other hand, findings from Finland and Sweden show that lower-educated women often have larger families, also because they are more likely to experience union disruption and 're-partnering' than the higher-educated women [15]. Union instability may thus motivate them to have another child at a more advanced age.

This chapter partly builds upon our earlier contributions on fertility and reproduction at more advanced reproductive ages, especially the study of Sobotka and Beaujouan (2018) [2]. We draw on vital statistics, register and survey data for European countries to outline the main trends in late reproduction, focussing on fertility plans and actual fertility rates among women past age 40. We pay special attention to education differences in late fertility and to trends in late reproduction among highly educated women. As data on late reproductive intentions and late fertility by education are not available for most countries, we illustrate the education stratification from survey and register data

https://doi.org/10.1017/9781009025270.002 Published online by Cambridge University Press

using examples from France, Norway and Great Britain. Given this limitation, our analysis of education differentials in late fertility may not be fully representative of other European countries.

Our chapter is structured as follows. First, we outline the key driving forces of the shift to delayed reproduction. Next, we highlight a rapid increase in late childbearing across Europe. We show that a rising share of women remaining childless or having only one child when reaching age 40 plan to have a child and, in turn, first and second birth rates past age 40 have been rising rapidly as well. We then discuss the role of medically assisted reproduction (MAR), which accounts for a rising share of late births. In conclusion, we argue that trends in childbearing past age 40 will become one of the critical factors determining the future of fertility and reproduction across the highly developed countries.

Background: How Do Current Social and Economic Trends Drive the Shift to Late Reproduction?

Historically, childbearing at late reproductive ages was widespread and associated with large families; many women continued having children until they became infertile [16,17]. An adoption of fertility-limiting behaviours in Europe, North America and Australia since the second half of the nineteenth century brought about a long-term decline in fertility rates among women aged 40 and older. In the 1980s, late fertility rates reached record low levels across the highly developed countries. As a result, late childbearing became relatively rare and irrelevant for the overall fertility levels [16].

The 'return' of late reproduction is linked to diverse social, economic, cultural and technological forces that made childbearing at more advanced reproductive ages both preferred and achievable (through widespread adoption of modern contraception and access to abortion) in most countries [4,18]. The 'gender revolution' – characterised by a broad rise in women's career aspirations, employment and non-family roles as well as the spread of gender egalitarian attitudes since the late 1960s (e.g., [19]) – was particularly important in that respect. In addition, major life course transitions closely linked to timing of parenthood, such as completion of education, residential independence, transition to employment and union formation, shifted to later ages during the last half a century, contributing to delayed births (e.g., [20]). However, the key driver of delayed parenthood was the massive rise in higher education, which progressed fastest among women [21]. In contemporary societies participation in education is perceived as being incompatible with parenthood [22], with most people moving to live with a partner and having children only after completing education and establishing themselves in the labour market. Today, many young adults are enrolled in tertiary education into their late 20s; among the highly developed Organisation for Economic Co-operation and Development (OECD) countries, 16% of people aged 25–29 were still enrolled in education in 2018, and this share surpassed 25% in Denmark, Finland and Sweden [23].

Also, the interval between completing education and first birth has expanded considerably in the past decades [21]. This is partly explained by a changing labour market and, overall, a more precarious economic situation of young adults, especially since the global financial crisis around 2008–12. After completing their education, women and men often experience spells of unstable employment characterised by low pay, irregular work hours and time-limited contracts. Globalisation and skill-biased technological change have dampened wages and job opportunities, especially for male workers with middle and lower qualifications [24]. However, broader evidence suggests that young adults face economic headwinds across the board: in most economically developed countries, people in their 20s experienced deteriorating economic position and lower relative income in the 2000s and 2010s compared with previous generations [25]. Lower relative wages, student debts and skyrocketing housing prices, especially in bigger cities, contributed to this trend. Clark [26] demonstrated that age at first birth in the United States metropolitan areas is closely linked to housing costs for all education groups and race categories. In Europe, young adults face the most precarious economic situation in Southern Europe and in parts of Central and Eastern Europe: in these regions, many people aged 20–34 are 'NEETs', not in employment, education or training [27]. Prolonged education, unstable jobs and expensive housing translate into ever higher shares of young

https://doi.org/10.1017/9781009025270.002 Published online by Cambridge University Press

adults living with parents, a trend which also contributes to the ongoing delay in partnership formation and parenthood.

Later parenthood is also driven by long-term cultural and value changes typical of the 'second demographic transition' [28]. These include a decline in normative pressure related to having children, a stronger emphasis on individual autonomy and self-realisation, lower stability of partnerships and marriages, and higher standards and expectations placed on potential long-term partners. More women and men experience multiple partnerships before settling down and having children; women remaining childless at age 35 have often experienced relatively complex partnership trajectories [29]. Especially for the highly educated, parenthood becomes a carefully planned project and many experience difficulties in finding a partner when planning children. Having no partner clearly appears as a major obstacle in the realisation of fertility intentions later in life [29,30]. In East Asian societies, where marriage remains a precondition for childbearing, women increasingly postpone or avoid marriage due to the normative expectations about their parenthood and care responsibilities within marriage [31,32]. Delayed parenthood also results from subtle changes in the attitudes towards parenthood. Rotkirch [33], drawing from an example from Finland, argues that young adults have become more conflicted and ambiguous about parenthood, increasingly viewing it as a 'sacrifice' and stressing its potentially negative consequences, especially for climate change.

Although many explanations outlined above pertain especially to young adults, in combination they also explain why many women and men postpone childbearing into their late 30s or early 40s. Whether these presumably postponed births eventually take place or not is then closely related to the circumstances women encounter at these ages. Having a partner and feeling ready for parenthood play a central role [34]. The perception of the societal norms pertaining to childlessness and late childbearing also impacts the decision to have a child at a more advanced age [35,36]. Policies supporting combination of work and family life are of key importance for facilitating the decisions to have children at later ages, especially among higher-educated women [37,38]. Finally, cultural settings and norms influence availability of MAR and of alternative methods of conception as well as their actual use [39].

Increase in Childbearing Past Age 40 in All Countries and Across Education Groups

Fertility levels after age 40[1] have risen quickly across the highly developed countries during the last four decades [3]. In the 1980s, when late fertility rates were at record low levels across Europe, the share of the total fertility rate attributed to women aged 40+ ranged from 0.5% to 2% in most countries (Figure 1.1). The lowest values were reported in parts of Central and Eastern Europe (e.g., 0.4% in Czechia and 0.5% in Bulgaria) and the highest in Spain (3.2%) and Ireland (4.3%), where larger families were still common. Since then, late childbearing has become much more common: in 2018, births at age 40 and older accounted for 3% to 6% of the total fertility in most countries, with the highest values, around 7%, reported in Ireland, Italy and Spain. In the European Union as a whole, this share almost tripled from 1.6% in 1985 to 4.6% in 2018. Relative increase was fastest in countries with initially a very marginal share of late births, especially in Central and Eastern Europe. Increases in births taking place after age 45 were even faster, although starting from very low levels. For instance, the number of births in the European Union countries at extreme late reproductive ages of 50 and older jumped from 287 in 2002 to 1,554 in 2018 [40].

Generally, women with a degree are at the forefront of fertility postponement [41]. Late childbearing is also most common among them, as the example for Norway shows (Figure 1.2). Nonetheless, in Norway during the last 10 years, fertility at ages 40 and older has become more widespread among women across the whole education spectrum. In relative terms, late fertility in Norway increased fastest among lower-educated women, doubling from 2% to almost 4% from 2008 to 2018. This rise is likely linked to a rising selectivity of lower-educated women.

The profile of late fertility has transformed during the last half a century, from the dominance of larger families, where a majority of births at

[1] In this chapter, we refer to births and fertility rates among women aged 40 and older as 'late births', 'births at late reproductive ages', 'late childbearing' and 'late fertility'. These terms are used in a descriptive way, without implying normative judgement about preferred, optimal or appropriate age at motherhood.

https://doi.org/10.1017/9781009025270.002 Published online by Cambridge University Press

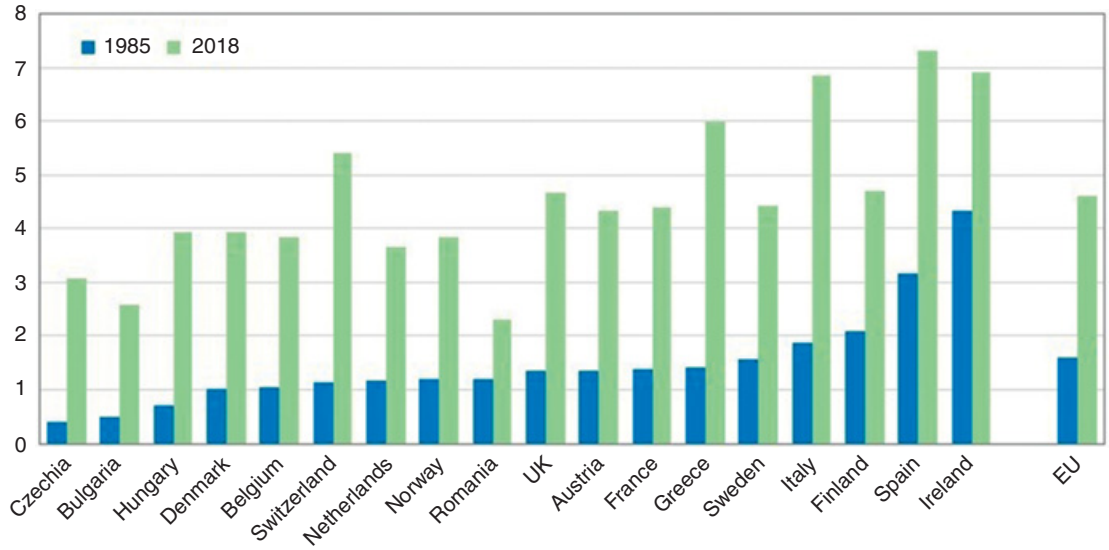

Figure 1.1 Share of fertility rates at ages 40+ on total fertility (in %) in selected European countries, 1985 and 2018 (countries ranked by late fertility rates in 1985).
Source: Own computations from Eurostat [40] database (Fertility rates by age [table demo_frate]).
Notes: EU data cover European Union in its 2018 boundaries, including the United Kingdom. Data for the EU in 1985 cover the EU in its boundary prior to 2005 and exclude Bulgaria, Croatia and Romania.

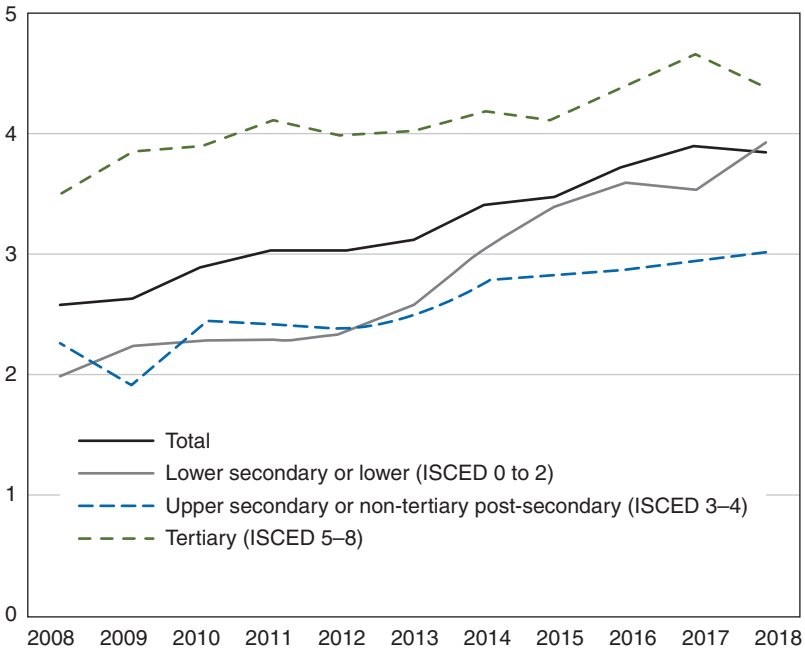

Figure 1.2 Share of fertility rates (%) at ages 40+ on total fertility rate by level of education in Norway, 2008–18.
Source: Own computation from Eurostat [40] database (live births by mother's age and educational attainment level [demo_faeduc] and population by age, sex and educational attainment [demo_pjanedu]).

ages 40+ were third or later births, to a dominance of first and second births among late mothers in most countries (Figure A1.1 in Appendix A). For instance, only 25% of births to mothers in the Netherlands aged 40 and older were first or second births in 1980, whereas fourth or later births accounted for 60% of all births. Almost four decades later the situation has reversed: in 2018, 62% of late births were first or second births and only 19% were fourth or higher-order births.

https://doi.org/10.1017/9781009025270.002 Published online by Cambridge University Press

Fertility Intentions and Actual Fertility at Later Reproductive Ages: Sharpest Rise among Childless Women

In European countries, where most people favour having two children, trends in the share of women who do not have two children at age 40, in conjunction with their fertility intentions, give an important signal on the prospective 'demand' for late childbearing. The data reveal large cross-country diversity among European women in the evolution of childlessness and of having one child when reaching age 40 (Figure 1.3). Austria, the Netherlands and Sweden show only a modest rise in the share of women with fewer than two children, while Czechia and Spain depict a sharp and continuous increase in having no or one child among women born in the 1960s and 1970s. Southern European countries have high shares of childless women as well as of one-child mothers: for instance, in Spain, a majority (56%) of women born in 1978 had fewer than two children when reaching age 40, up from 38% among those born in 1960. The rise in the share of women with fewer than two children in late reproductive age is set to increase further among the women born past 1978: data for younger women aged 35 show a continuation of this trend, with 7 out of 10 Spanish women born in 1982 having fewer than two children by age 35. In most countries of Eastern and South-eastern Europe, including Romania, Russia and Ukraine, the share of women with fewer than two children at age 40 is also high, but in these countries one-child mothers clearly dominate this group and childlessness is less widespread.

As more women are having fewer than two children in their late 30s and early 40s, they often plan their first or second child later in life – often at ages when having children is becoming very uncertain or even unrealistic. Repeated surveys conducted in Great Britain show a sharp increase in reproductive intentions among women at more advanced reproductive ages: between 1979–84 and 2003–9, the share of childless women aged 35–39 intending to have a child jumped from 5% to 37% (Figure 1.4). A strong increase in parenthood intentions, although from a much lower level, is observed among women aged 40–42, many of whom are likely to experience infertility. A strong increase in fertility intentions is observed also among women with one child. Late fertility intentions have remained much less frequent among the mothers with two or more children. This pattern conforms to the widely shared two-child family norm across the highly developed countries [5]. Overall, planning children in late reproductive ages in Great Britain shifted from being a relatively

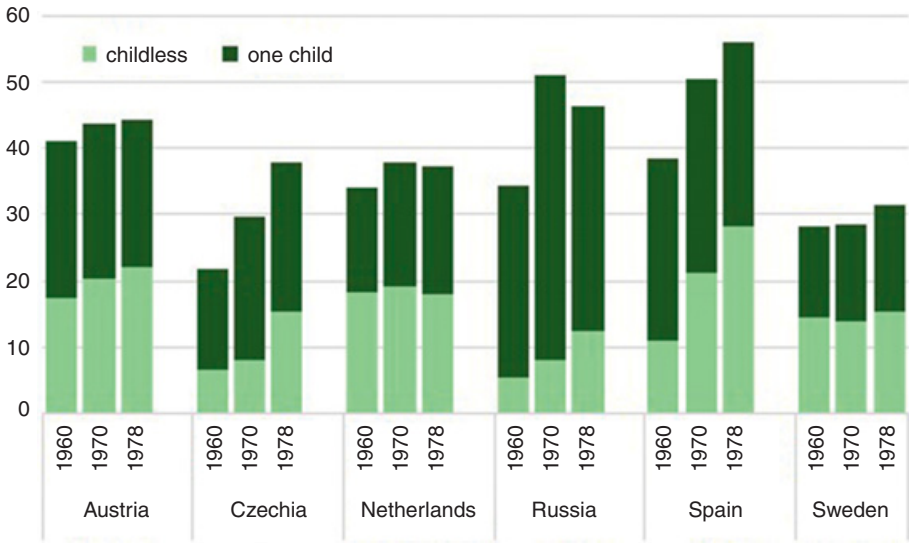

Figure 1.3 Share of women childless or with one child at age 40 (%) in selected European countries; women born in 1960, 1970 and 1978.
Source: Own computations from the Human Fertility Database (2021) [42].

https://doi.org/10.1017/9781009025270.002 Published online by Cambridge University Press

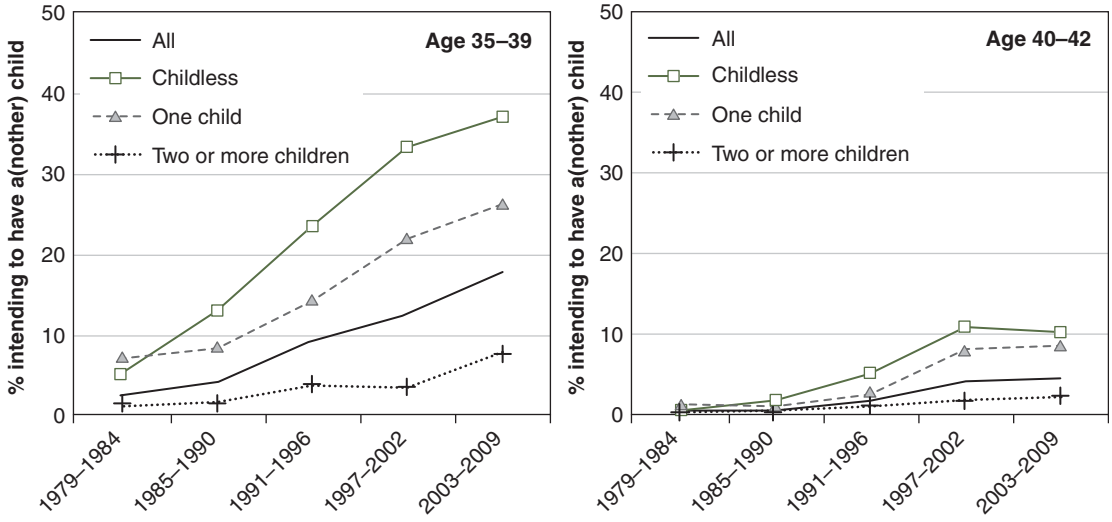

Figure 1.4 Share of women aged 35–39 and 40–42 who intend to have a child, by year and parity, Great Britain, 1979–2009.
Source: Own computations from the Centre for Population Change General Household Survey database [43].
Note: We use the question: 'Do you think that you will have any (more) children at all (after the one you are expecting)?'. Before 1991, possible answers were 'Yes', 'No' or 'Don't know'; from 1991, possible answers were 'Yes', 'Probably yes', 'Probably not', 'No', 'Don't know' (we group 'Yes' and 'Probably yes', which results in a series break in 1991). Proportions are calculated using survey weights [44]. Note that the total number of women observed over 30 surveys for this table is 12,729, and each proportion displayed is based on observations for more than 200 women.

marginal phenomenon to a rather common trend between the 1980s and 2000s.

The pattern observed in Great Britain is typical across the highly developed countries: reproductive plans at late childbearing ages have become strongly stratified by parity, with childless women planning to have a child most frequently, followed by those with one child, whereas a large majority of women with two or more children do not plan to have another child past age 40 [2]. However, considerable cross-country differences in the share of women planning a child after age 40 also illustrate many other factors influencing late fertility decisions: for instance, late childbearing intentions are most common among childless women in Western, Southern and Northern Europe, including Austria, Italy and France (Figure A1.2 in Appendix A). They remain less frequent across all parities in countries in Central and Eastern Europe, including Czechia and Poland, where the trend to delayed parenthood has started later than in other parts of Europe, during the 1990s [18,45].

Data for Great Britain illustrate the educational stratification in late childbearing intentions, which are most common among highly educated women (Table 1.1). Across all education groups few women aged 40–42 planned to have a(nother) child in the 1980s. However, their share increased steadily over time, and among highly educated women it reached almost 10% in 2003–9. This rising stratification was even more marked when selecting only women without a child or with one child (results not shown). More generally, in the late 2000s, highly educated women with no or one child were most likely to still wish a child at age 35–39 in Austria, France and Italy, countries where fertility postponement has been observed since the 1970s (Figure A1.3 in Appendix A). By contrast, there was no clear education differential in Czechia and Poland, where fertility postponement started about two decades later.

Because trends in fertility intentions are rarely available, it is difficult to generalise the upward trend in childbearing intentions among women with fewer than two children in late reproductive ages observed in Great Britain to other European countries. However, age-specific fertility trends by parity can be computed for a wider set of countries. They tend to mirror fertility intentions, although at a lower level, as many women who plan to have a child will not

https://doi.org/10.1017/9781009025270.002 Published online by Cambridge University Press

Table 1.1 Share of women aged 40–42 who intend to have a(nother) child, by year and level of education, Great Britain, 1979–2009

	1979–84	1985–90	1991–6	1997–2002	2003–9
Low educated	0.5	0.5	1.5	2.9	3.3
Medium educated	0.8	0.4	2.1	3.8	4.0
High educated	–	2.8	2.8	8.5	9.5
All education levels	**0.5**	**0.6**	**1.7**	**4.1**	**4.6**

Source: see Figure 1.4.
Note: see Figure 1.4. The total number of women observed over 30 surveys for this table is 12,685, and each value in the table is based on observations for more than 200 women. Low education corresponds to ISCED 0–2, medium to ISCED 3–4 and high to ISCED 5–6 in the International Standard Classification of Education 1997.

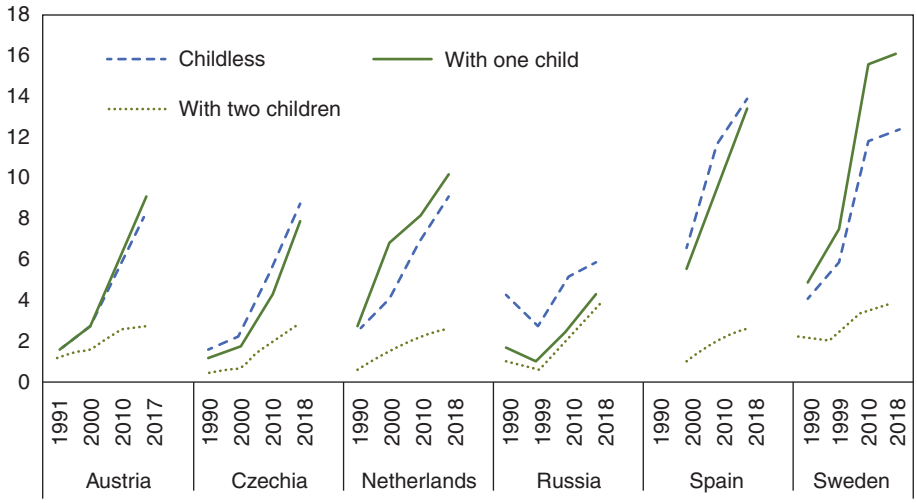

Figure 1.5 Share of women having a(nother) child past age 40 by parity status at age 40 (per 100 women of a given parity), selected European countries, 1990–2018.
Source: Own computations from the period fertility tables in the Human Fertility Database (2021).

realise their plans. Between 1990 and 2018, the likelihood of having (a)nother child past age 40 increased steeply among both childless women and women with one child (Figure 1.5). In both parity groups, late birth trends often moved in tandem, displaying almost identical levels in Austria, Czechia and Spain. Women with one child in the Netherlands and Sweden have a higher likelihood of having another child past age 40 compared with childless women, whereas the opposite pattern persists in Russia, where childlessness is less accepted, but women often have only one child. Except in Russia, there is a wide gap in the likelihood of having another child past age 40 between women with one and two children. In most countries, this gap has further widened over time, illustrating the continuing salience of a two-child family model and, generally, less frequent transition to a third birth across all ages.

Looking at late fertility by education gives additional insights on the mechanisms behind the rise in late first and second births. We use survey data for French women born in 1940–64, for whom we could reconstruct late birth trends by both parity and education (Table 1.2). Because the shift to delayed childbearing progressed relatively slowly in France, these women display only a gradual increase in childlessness at age 40. However, the data reveal a clear trend towards a higher share of women having their first or second child past age 40 and an emerging

https://doi.org/10.1017/9781009025270.002 Published online by Cambridge University Press

Table 1.2 Share of women with no or one child at age 40, and share among them who have a child after age 40 (%), by level of education and year of birth, France (women born 1940–64)

	Education level	Share of women by number of children at age 40			Among them: share having a(nother) child past age 40		
		Year of birth			Year of birth		
		1940–4	1950–4	1960–4	1940–4	1950–4	1960–4
Childless	Lower	10.7	10.9	13.4	5.9	8.2	7.2
	Intermediate	11.9	12.9	13.4	4.5	7.4	8.3
	Higher	19.1	19.2	17.7	3.9	9.4	13.3
	All	**12.2**	**13.4**	**14.6**	**5.1**	**8.3**	**9.7**
With one child	Lower	17.4	18.6	17.4	2.7	3.8	7.4
	Intermediate	20.7	22.5	20.1	3.3	3.4	6.7
	Higher	19.6	19.1	17.7	7.2	7.7	11.9
	All	**18.7**	**20.2**	**18.7**	**3.5**	**4.4**	**8.2**

Source: Own computations from the French Survey on Family and Housing [46].
Notes: The total number of women observed for this table is 53,269, and each proportion displayed is based on observations for more than 300 women. Low education corresponds to ISCED 0–2, medium to ISCED 3–4 and high to ISCED 5–6 in the International Standard Classification of Education 1997.

education differentiation in this trend. Among women born in 1960–4, highly educated women with a degree stand out by displaying much higher likelihood of first birth past age 40 when compared with the women with both low and medium education.

Realising Fertility Intentions past Age 40: Impact of Infertility and of Age-Related Decline in Live Birth Rate Following IVF Treatments

As an ever higher number of women and couples are shifting their childbearing plans to late reproductive ages, the realisation of their fertility plans will increasingly rely on their access to MAR, its cost and on success rate of MAR at later ages. In vitro fertilisation using women's own fresh oocytes shows sharply declining success rates past age 40, with the majority of women not achieving live birth even after multiple treatment cycles [47,48]. In contrast to IVF with fresh oocytes, IVF using donor eggs or women's eggs cryopreserved at younger ages results in much higher live birth rates per treatment after age 40. However, many issues, including costs, legal regulations, ethical concerns, or – in the case of donor eggs – preference for own genetic offspring may limit the appeal of these methods for many women [49,50].

Despite these limitations, the use of MAR at later reproductive ages has been rising fast and MAR has contributed to a relatively high share of births and fertility rates above age 40 [51]. Many countries do not publish detailed and comparable data on MAR use and success rates by age. We therefore provide an illustration of the rising relevance of in vitro fertilisation for late fertility using detailed data for the United Kingdom, where the Human Fertilisation and Embryology Authority (HFEA) collects and publishes detailed data on assisted reproduction by age. Overall, the United Kingdom represents well broader European trends and has a similar share of IVF infants (2.7% in 2016) to the European average of 2.9% (table III in [52]).

In 2018 there were 13,617 IVF cycles in the UK among women aged 40 and older. This number compares with over 20,000 births among women aged 41 and older[2] and illustrates well the scope of unfulfilled 'demand' for children at later reproductive ages as well as the massive impact of infertility on limiting the realisation of late reproductive plans. Only one in six IVF cycles at ages 40+ resulted in live birth delivery. Despite this limited success rate, IVF contributed to a significant share of births and

[2] We relate IVF cycles at ages 40 and older to fertility rates lagged by 1 year, that is, among women aged 41 and older, to account crudely for the duration of pregnancy.

https://doi.org/10.1017/9781009025270.002 Published online by Cambridge University Press

fertility rates at later reproductive ages. Our computations show that IVF accounted for 10.8% of live-born children among UK mothers at ages 41–43, 13.8% of children at ages 44–45 and over a quarter (25.3%) of children at ages 46 and older. This high share of IVF births at very late reproductive ages was achieved chiefly by use of donor oocytes. Our earlier analysis [53] showed that in the United States IVF – mostly using donor oocytes – contributed yet a higher share, 37.7%, of all live-born children among women aged 45 and older. As we illustrate in Figure A1.4 (Appendix A), the dominant role of IVF with donor eggs at very advanced reproductive ages is closely linked to the diverging trend with age in live birth rates between IVF treatments using women's own eggs and treatments using donor eggs. The former falls continuously to a low level of 6% at ages 43–44 and 4% thereafter, whereas live birth rates per IVF with donor eggs show a stable trend with age and remain at 30% even among women aged 45 and older.

Despite the rise in the number of IVF births at later reproductive ages and a gradual increase in the use of donor eggs and egg freezing, age remains a strong barrier to realising reproductive intentions. The analysis of reproductive intentions in Austria revealed that among women (but not among men) there was a steep decline in the share realising their fertility plans within 4 years past age 34 and a corresponding rise in the share of women giving up their fertility intentions: at ages 38–41, only 24% of women strongly intending a child realised their plans compared with 52% of men aged 38–45 and around 70% of women below age 35 [54]. The observed decline in the likelihood of realising fertility intentions with age among women follows the curve of declining physiological capacity to have a child (i.e., getting pregnant and carrying pregnancy to term) as estimated by Leridon [55]. However, the fall in the realisation of reproductive plans with age is steeper and the gap between the capacity to reproduce and the actual realisation of certain short-term fertility intentions widens among women past age 34, also on the new example of Austria (Figure 1.6). This might be due to a combination

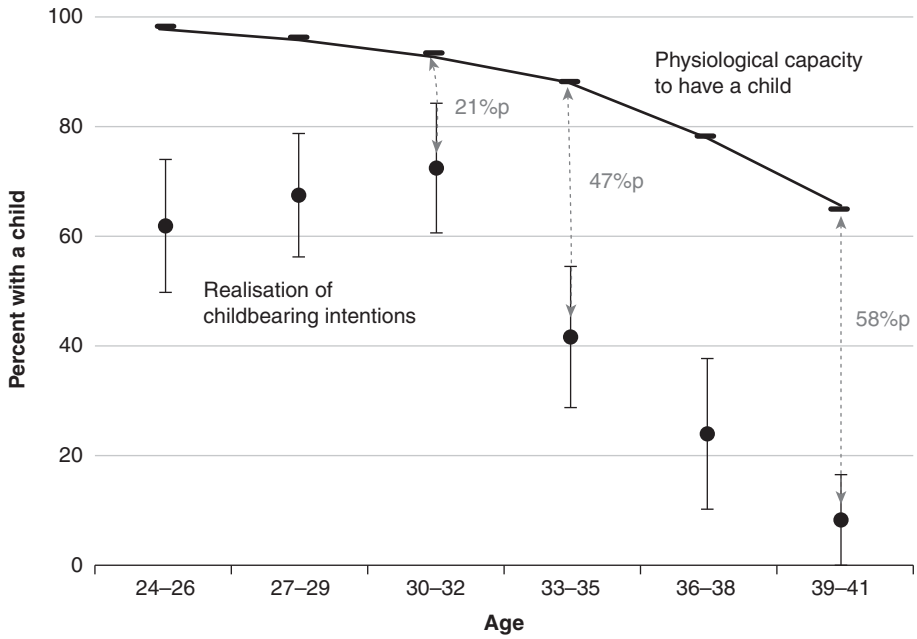

Figure 1.6 Probability of realising a certain short-term positive intention to have a child within the next 3 years among women in Austria and estimated curve of physiological capacity to have a child by age.
Sources and notes: Austrian Generations and Gender Survey [59] waves 2008–9 and follow-up 2012–13. Women were asked about their fertility intentions in the first wave and for the number of children they had between the waves in the second wave. See Beaujouan [60] for details on reconstructing the data on intentions realisation. The figure displays 95% confidence intervals, results are weighted with survey weights. The curve of physiological capacity to have a child is based on Leridon's estimates (table I, [61]).

https://doi.org/10.1017/9781009025270.002 Published online by Cambridge University Press

of age-related biological and health factors (including longer waiting time to conception and more pregnancy complications), health limitations, less frequent sexual intercourse with union duration [56], but also personal circumstances (not having a partner, feeling too old for parenthood) that negatively impact the capacity realisation of fertility intentions at later reproductive ages [30,57,58].

Discussion: Is 40 the New 30? The Growing Importance of Late Fertility for the Realisation of Individual Reproductive Plans and for Future Fertility Rates

Age-related rise in infertility and the onset of menopause continue to impose a strong barrier to reproduction past age 40. In addition, as recently as in 2006–7 a majority of respondents in Europe perceived age 40 as a normative age deadline, after which women were considered too old for having children [61]. Our study of trends in late reproduction suggests that this barrier is being eroded by multiple forces. Reproduction is increasingly shifted to a 'grey zone', towards late 30s and early 40s, when most women can still achieve a pregnancy, but also face rising infertility, rising chance of miscarriage and pregnancy complications and overall declining chances of realising their reproductive plans [7].

Decades of a continuing trend to delayed parenthood have resulted in a growing share of women aged 35 and older who remain childless or have one child. In conjunction, surveys of reproductive intentions reveal that a rising number of these women plan to have a child at a more advanced reproductive age, often seemingly oblivious to the risk of infertility and the limited success rates of in vitro fertilisation above age 40 (e.g., [62]). Fertility rates past age 40 have been rising rapidly in most parts of Europe since the 1980s–90s. In the past decade, when overall fertility rates fell in most countries in Europe, women around age 40 and older were often the only group with increasing fertility; this was the case, for instance, in Sweden and Denmark [63]. The profile of late fertility has shifted, with a typical 'late mother' now having her first or second child rather than adding one last birth to a larger family, as was typical in the past.

Biological age limits to motherhood are gradually being redrawn as more women use donor eggs to get pregnant in their mid- or late 40s and a rising number of women have been freezing their eggs. Those might later be thawed and used at ages which were in the past considered to be 'post-reproductive'. Correspondingly, the number of births to women in their late 40s and even 50s has been rising fast across Europe, although from a very low initial base. Continuous childbearing postponement is also eroding the normative age deadlines to parenthood. Verweij et al. [64] show that in the Netherlands the desired age of becoming a parent has increased over time, and this increase is partly driven by many people not having children by their initially desired age and, subsequently, updating their desired age for parenthood upwards.

Women with a degree lead the trend toward late reproduction. They take longer to establish themselves in the labour market and find a partner and they have most to lose in terms of their career, wages and employment if they start a family earlier in life [65,66]. Selected data on education-specific patterns in late reproduction in Europe, which we presented in this chapter, indeed show that highly educated women are more likely to plan having their first or second child at around age 40 and to actually realise these plans when compared with their lower-educated counterparts. By contrast, women with a lower education attainment more often follow the 'traditional' pathway of late reproduction, having their third or later child at ages 40 and older. More of them have a larger family, but they also experience more frequent partnership dissolution and complex partnership trajectories, with some having another child with a new partner at late reproductive age [15].

There is considerable diversity in this broad-brush picture across Europe, with Southern European countries displaying the most pronounced pattern of delayed reproduction and countries in Central and Eastern Europe generally showing fewer women having children past age 40. Nonetheless, the basic contours of the trends in late reproduction sketched out here hold across different parts of Europe. The shifts we have discussed are set to continue, or even accelerate in the future. Late reproduction may become one of the defining social trends in the highly developed countries. In

https://doi.org/10.1017/9781009025270.002 Published online by Cambridge University Press

most countries, the Millennials born in the 1980s–early 1990s had fewer children in their 20s and 30s than any of the previous generations. All the social and cultural forces that have driven the shift to delayed parenthood – from the massive spread of university education and the 'gender revolution' in women's roles through the rise of employment uncertainty and the shortage of affordable housing up to the changes in partnerships and more ambiguous attitudes towards parenthood – continue affecting the lives of Millennials and also of the younger members of Generation Z born past 1995. The COVID-19 pandemic and its repercussions, including limits to social contacts, family stress and the looming economic and labour market costs, is likely to further speed up the trend to delayed reproduction. The clash between the social and cultural 'motivation' to postpone reproduction to ever later ages and the biological rationale for having children earlier in life [67] will further intensify.

What are the likely long-term consequences of the future rise in late reproduction? We can foresee significant individual costs and repercussions, especially in the form of more pregnancy complications, miscarriages and higher psychological and monetary costs of infertility treatments in later reproductive ages. Fertility plans of many women and couples will not be realised, and more of them will remain involuntary childless. In addition, postponement of parenthood to late reproductive ages narrows the space couples have to flexibly respond to changing life events and circumstances: they may not have extra time left for additional postponement of childbearing if they encounter health problems, partnership breakup or if they lose their job. In contrast, some positive consequences include lower income loss, higher family stability and more engaged and mature parenting practices [2]. At a societal level, late reproduction will be responsible for a higher share of total fertility, likely to increase from the current range of 2–7% to well above 10% during the next two decades. Medically assisted reproduction will take an ever more important role in helping women and couples to achieve their fertility plans later in life and will also increasingly contribute to future fertility trends. Egg freezing technology may take off on a grander scale, but this might also create new inequalities between women who can afford it and the others, who will be left out.

Societal costs of late reproduction will include smaller families due to later start of parenthood and rising infertility due to unfulfilled fertility plans among the 'intended' late parents. The societal-level fertility postponement is likely to become an important factor depressing fertility rates in Europe and other highly developed regions as more of the postponed births will turn into births foregone. The confluence of societal conditions favouring late reproduction and individual obstacles to realising these fertility plans may become a powerful drag on future fertility rates especially among highly educated women and in less family-friendly societies.

Acknowledgements

Eva Beaujouan's contribution was funded by the Austrian Science Fund (FWF), project 'Later Fertility in Europe' (Grant agreement no. P31171-G29); The Office for National Statistics provided access to the British General Household Survey series (originally constructed by the ESRC Centre for Population Change).

https://doi.org/10.1017/9781009025270.002 Published online by Cambridge University Press

Appendix A

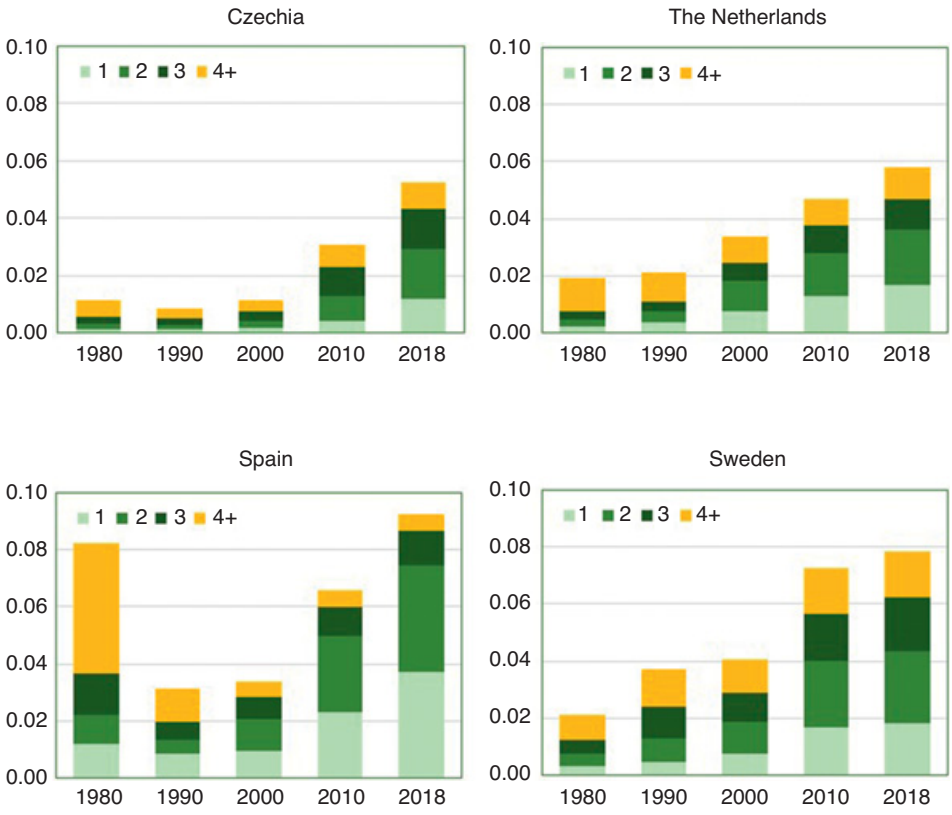

Figure A1.1 Cumulative fertility rates at ages 40+ by birth order, selected European countries, 1980–2018.
Source: Computations based on Human Fertility Database [42]: data on period and cohort fertility rates by age and birth order, period fertility tables by age and parity.

https://doi.org/10.1017/9781009025270.002 Published online by Cambridge University Press

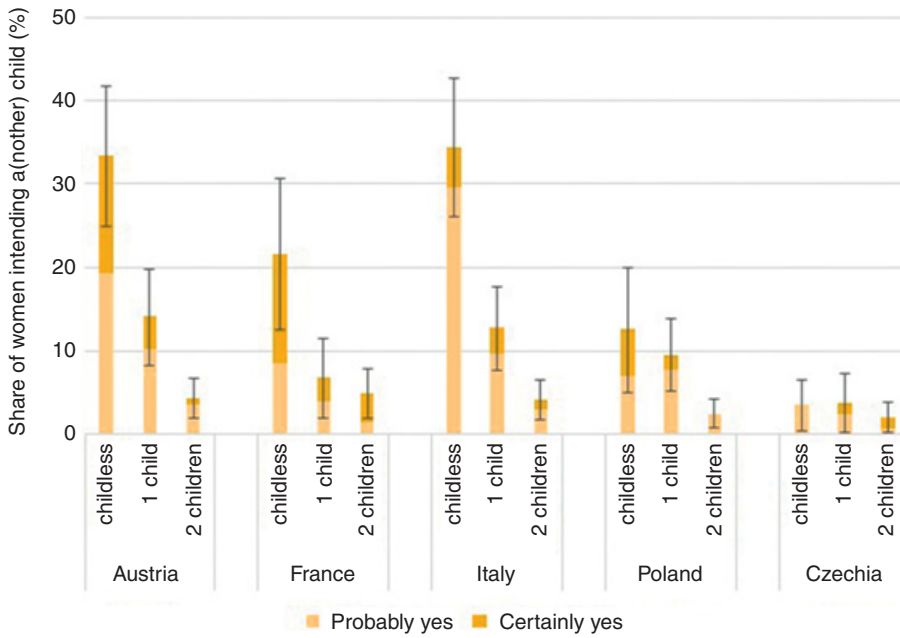

Figure A1.2 Share of women aged 40–44 who intend to have a child, by year and parity, selected European countries, 2005–11.
Source: Generations and Gender Surveys [58], first wave collected between 2005 and 2011 depending on the country.
Note: Figure displays 95% confidence intervals, results are weighted with survey weights.

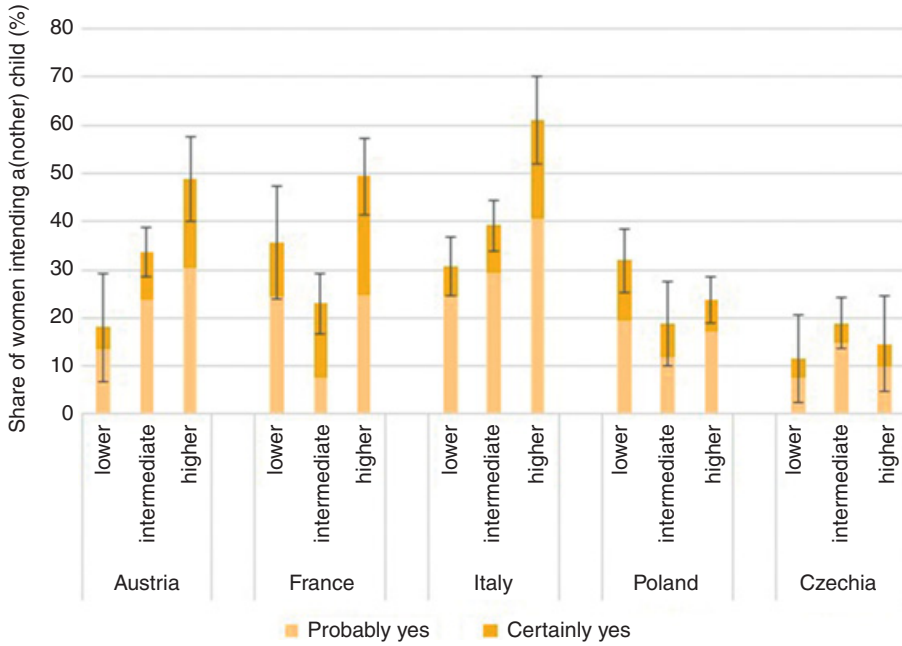

Figure A1.3 Share of women aged 35–44 with no or one child who intend to have a child, by level of education; selected countries in Europe.
Source and notes: see Figure A1.2. Low education corresponds to ISCED 0–2, medium education to ISCED 3–4, and high education to ISCED 5–6 in the International Standard Classification of Education 1997.

https://doi.org/10.1017/9781009025270.002 Published online by Cambridge University Press

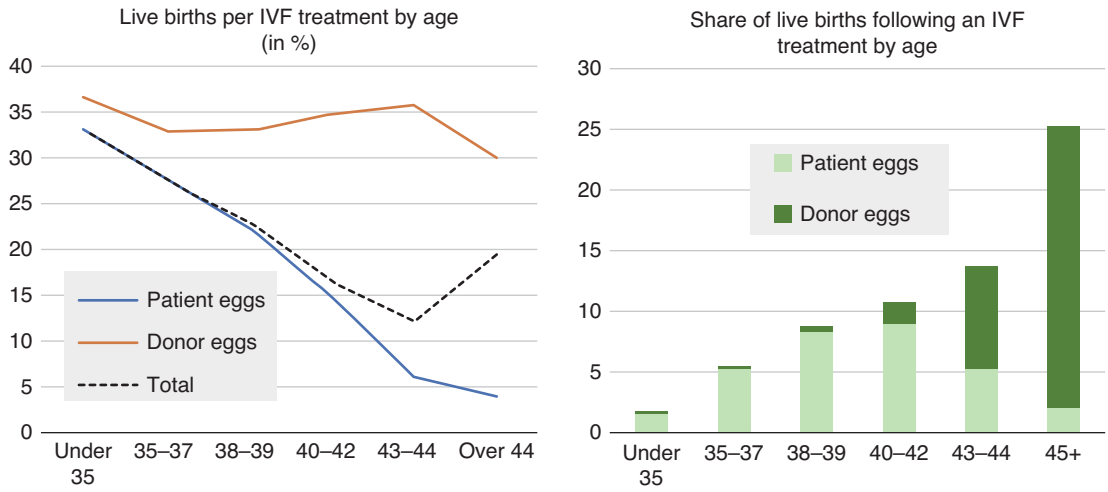

Figure A1.4 Live births per IVF treatment by age and share of live births following in vitro fertilisation by age, United Kingdom, 2018.
Source: Computations based on IVF data published by HFEA [68] and data on live births by age in the Human Fertility database (2021).

References

1. Kohler H-P, Billari FC, Ortega JA. The emergence of lowest-low fertility in Europe during the 1990s. Popul Dev Rev 2002;**28**(4):641–80. DOI http://dx.doi.org/10.1111/j.1728-4457.2002.00641.x
2. Sobotka T, Beaujouan É. Late motherhood in low-fertility countries: reproductive intentions, trends and consequences. In: Stoop D, ed., *Preventing age related fertility loss* (Switzerland: Springer International Publishing, 2018) pp. 11–29.
3. Beaujouan É. Latest-late fertility? Decline and resurgence of late parenthood across the low-fertility countries. Popul Dev Rev 2020;**46**(2):219–47. DOI https://onlinelibrary.wiley.com/doi/10.1111/padr.12334
4. Mills MC, Rindfuss RR, Mcdonald P, Velde ET, Force ERST. Why do people postpone parenthood? Reasons and social policy incentives. Hum Reprod Update 2011;**17**(6):848–60.
5. Sobotka T, Beaujouan É. Two is best? The persistence of a two-child family ideal in Europe. Popul Dev Rev 2014;**40**(3):391–419. DOI http://onlinelibrary.wiley.com/doi/10.1111/j.1728-4457.2014.00691.x/abstract
6. Frejka T. Parity distribution and completed family size in Europe: Incipient decline of the two-child family model? Demogr Res (Special Collect 7) 2008;**19**(4):47–72.
7. Habbema JDF, Eijkemans MJC, Leridon H, te Velde ER. Realizing a desired family size: When should couples start? Hum Reprod 2015;**30**(9):2215–21. DOI http://doi.org/10.1093/humrep/dev148
8. Beaujouan É, Toulemon L. European countries with delayed childbearing are not those with lower fertility. Genus 2021;**77**(2).
9. Menken JA, Trussell J, Larsen U. Age and infertility. Science 1986;**233**(4771):1389–93.
10. Schmidt L, Sobotka T, Bentzen JG, Nyboe Andersen A-M. Demographic and medical consequences of the postponement of parenthood. Hum Reprod Update 2012;**18**(1):29–43. DOI http://doi.org/10.1093/humupd/dmr040
11. Ní Bhrolcháin M, Beaujouan É. Fertility postponement is largely due to rising educational enrolment. Popul Stud (NY) 2012;**66**(3):311–27. DOI http://dx.doi.org/10.1080/00324728.2012.697569
12. Nicoletti C, Tanturri ML. Differences in delaying motherhood across European countries: Empirical evidence from the ECHP. Eur J Popul / Rev Eur Démographie 2008;**24**(2):157–83.
13. Beaujouan É, Brzozowska Z, Zeman K. The limited effect of increasing educational attainment on childlessness trends in twentieth-century Europe, women born 1916–65. Popul Stud (NY) 2016;**70**(3):275–91. DOI https://www.tandfonline.com/doi/full/10.1080/00324728.2016.1206210
14. Jalovaara M, Neyer G, Andersson G, Dahlberg J, Dommermuth L, Fallesen P, et al. Education, gender, and cohort fertility in the Nordic countries. Eur J Popul 2019;**35**:563–86. DOI https://doi.org/10.1007/s10680-018-9492-2

https://doi.org/10.1017/9781009025270.002 Published online by Cambridge University Press

15. Jalovaara M, Andersson L, Miettinen A. Parity disparity: Educational differences in Nordic fertility across parities and number of reproductive partners. Popul Stud (Camb) 2021; DOI http://doi.org/10.1080/00324728.2021.1887506
16. Prioux F. Late fertility in Europe: some comparative and historical data. Rev Epidemiol Sante Publique 2005;**53 Spec No 2**:3–12.
17. Billari FC, Kohler H-P, Andersson G, Lundström H. Approaching the limit: Long-term trends in late and very late fertility. Popul Dev Rev 2007;**33**(1):149–70.
18. Sobotka T. Postponement of childbearing and low fertility in Europe. PhD thesis, University of Groningen. (Amsterdam: Dutch University Press, 2004).
19. Goldin C. The quiet revolution that transformed women's employment, education, and family. Am Econ Rev 2006;**96**(2):1–21.
20. Guzzo KB, Hayford SR. Pathways to parenthood in social and family contexts: decade in review, 2020. J Marriage Fam 2020;**82**(1):117–44.
21. Neels K, Murphy M, Ní Bhrolcháin M, Beaujouan É. Rising educational participation and the trend to later childbearing. Popul Dev Rev 2017;**43**(4):667–93. DOI http://doi.wiley.com/10.1111/padr.12112
22. Blossfeld H, Huinink J. Human capital investments or norms of role transition? How women's schooling and career affect the process of family formation. Am J Sociol 1991;**97**(1):143–68.
23. Organisation for Economic Co-operation and Development (OECD). Education at a glance 2020. 2020; DOI https://doi.org/10.1787/69096873-en
24. Adserà A. Education and fertility in the context of rising inequality. Vienna Yearb Popul Res 2017;**15**:63–92.
25. Rahman F, Tomlinson D. (2018). Cross countries: international comparisons of intergenerational trends. Resolution Foundation. www.resolutionfoundation.org/publications/cross-countries-international-comparisons-of-intergenerational-trends/
26. Clark WAV. Do women delay family formation in expensive housing markets? Demogr Res 2012;**27**(1):1–24.
27. Eurostat. (2020). Statistics on young people neither in employment nor in education or training. Eurostat. https://ec.europa.eu/eurostat/statistics-explained/index.php/Statistics_on_young_people_neither_in_employment_nor_in_education_or_training
28. Lesthaeghe RJ. The unfolding story of the second demographic transition. Popul Dev Rev 2010;**36**(2):211–51.
29. Mikolai J. Partnership histories and the transition to motherhood in later reproductive ages in Europe. Population 2017;**72**(1):123–54.
30. Wagner M, Huinink J, Liefbroer AC. Running out of time? Understanding the consequences of the biological clock for the dynamics of fertility intentions and union formation. Demogr Res 2019;**40**:1–26. DOI 10.4054/DemRes.2019.40.1
31. Raymo JM, Park H, Xie Y, Yeung WJ. Marriage and family in East Asia: continuity and change. Annu Rev Sociol 2015;**41**:471–92. DOI http://doi.org/10.1146/annurev-soc-073014-112428
32. Cheng YA. Ultra-low fertility in East Asia : Confucianism and its discontents. Vienna Yearb Popul Res 2020;**18**: 83–120. DOI http://doi.org/10.1553/populationyearbook2020.rev01
33. Rotkirch A. The wish for a child. Vienna Yearb Popul Res 2020;**18**:49–61. DOI http://doi.org/10.1553/populationyearbook2020.deb05
34. Buber-Ennser I, Fliegenschnee K. Being ready for a child: a mixed-methods investigation of fertility intentions. Fam Sci 2013;**4**(1):139–47. DOI www.tandfonline.com/doi/abs/10.1080/19424620.2013.871739
35. Liefbroer AC, Billari FC. Bringing norms back in: a theoretical and empirical discussion of their importance for understanding demographic behaviour. Popul Sp Place 2010;**16**(4):287–305.
36. Mynarska M. Deadline for Parenthood: Fertility Postponement and Age Norms in Poland. Eur J Popul / Rev Eur Démographie 2009;**26**(3):351–73. DOI http://doi.org/10.1007/s10680-009-9194-x
37. Thévenon O, Gauthier AH. Family policies in developed countries: A "fertility-booster" with side-effects. Community Work Fam 2011;**14**(2):197–216.
38. OECD. Doing better for families. OECD Publishing; 2011. ISBN No: 978-92-64-09872-5.
39. Präg P, Mills MC. Cultural determinants influence assisted reproduction usage in Europe more than economic and demographic factors. Hum Reprod 2017;**32**(11):2305–14.
40. Eurostat. (2021). Eurostat online database. Eurostat. http://ec.europa.eu/eurostat/data/database
41. Rendall MS, Aracil E, Bagavos C, Couet C, De Rose A, Di Giulio P, et al. Increasingly heterogeneous ages at first birth by education in Southern European and Anglo-American family-policy regimes: a seven-country comparison by birth cohort. Popul Stud (NY) 2010;**64**(3):209–27. DOI http://doi.org/10.1080/00324728.2010.512392
42. Max Planck Institute for Demographic Research (Germany) and Vienna Institute of Demography

https://doi.org/10.1017/9781009025270.002 Published online by Cambridge University Press

(Austria). (2021) Human Fertility Database; www.humanfertility.org

43. Beaujouan É, Ní Bhrolcháin M, Berrington A, Falkingham J. (2015). Centre for Population Change General Household Survey Database, 1979–2009: Special Licence Access. UK Data Service. http://discover.ukdataservice.ac.uk/catalogue?sn=7666

44. Beaujouan É, Brown JJ, Ní Bhrolcháin M. Reweighting the General Household Survey 1979–2007. Popul Trends 2011;**145**:115–41. http://doi.org/DOI 10.1057/pt.2011.21

45. Frejka T, Sardon J-P. First birth trends in developed countries: persistent parenthood postponement. Demogr Res 2006;**15**:147–80.

46. INSEE. (2011) Survey on family and housing. INSEE. www.insee.fr/en/metadonnees/source/serie/s1233

47. Gnoth C, Maxrath B, Skonieczny T, Friol K, Godehardt E, Tigges J. Final ART success rates: a 10 years survey. Hum Reprod 2011;**26**(8):2239–46.

48. Luke B, Brown MB, Wantman E, Lederman A, Gibbons W, Schattman GL, et al. Cumulative birth rates with linked assisted reproductive technology cycles. N Engl J Med 2012;**366**:2483–91.

49. Becker G. The elusive embryo: how women and men approach new reproductive technologies. (Berkeley: University of California Press; 2000).

50. Friese C, Becker G, Nachtigall RD. Rethinking the biological clock: eleventh-hour moms, miracle moms and meanings of age-related infertility. Soc Sci Med 2006;**63**(6):1550–60.

51. Präg P, Mills MC, Tanturri ML, Monden C, Pison G. The demographic consequences of assisted reproductive technologies. SocArXiv 2017; DOI http://doi.org/10.31235/osf.io/su49v

52. Wyns C, Bergh C, Calhaz-Jorge C, De Geyter C, Kupka MS, Motrenko T, et al. ART in Europe, 2016: results generated from European registries by ESHRE. *Hum Reprod Open* 2021;**3**:hoab026. DOI http://doi.org/10.1093/hropen/hoab026

53. Beaujouan É, Sobotka T. Late childbearing continues to increase in developed countries. Popul Soc 2019;**562**(1):1–4.

54. Beaujouan É, Reimondos A, Gray E, Evans A, Sobotka T. Declining realisation of reproductive intentions with age. Hum Reprod 2019;**34**(10):1906–14. https://doi.org/10.1093/humrep/dez150/5575324

55. Leridon H. Can assisted reproduction technology compensate for the natural decline in fertility with age? A model assessment. Hum Reprod 2004;**19**(7):1548–53. DOI http://doi.org/10.1093/humrep/deh304.

56. Frank O, Bianchi PG, Campana A. The end of fertility – age, fecundity and fecundability in women. J Biosoc Sci 1994;**26**(3):349–68.

57. Towner MC, Nenko I, Walton SE. Why do women stop reproducing before menopause? A life-history approach to age at last birth. Philos Trans R Soc B Biol Sci 2016;**371**(1692):20150147.

58. Settersten RA, Hägestag GO. What's the latest? Cultural age deadlines for family transitions. Gerontologist 1996;**36**(2):178–88.

59. GGP. (2021) Generations & Gender Programme. GGP. https://www.ggp-i.org/

60. Beaujouan É. Late fertility intentions and fertility in Austria. *Vienna Institute of Demography Working Papers, No. 06/2018* (Vienna: Austrian Academy of Sciences (ÖAW), Vienna Institute of Demography (VID), 2018). http://dx.doi.org/10.1553/0x003ccd3c

61. Billari FC, Goisis A, Liefbroer AC, Settersten RA, Aassve A, Hagestad GO, et al. Social age deadlines for the childbearing of women and men. Hum Reprod 2011;**26**(3):616–22. DOI http://doi.org/10.1093/humrep/deq360.

62. Wyndham N, Marin Figueira PG, Patrizio P. A persistent misperception: assisted reproductive technology can reverse the "aged biological clock. Fertil Steril 2012;**97**(5):1044–7. DOI http://dx.doi.org/10.1016/j.fertnstert.2012.02.015

63. Hellstrand J, Nisén J, Miranda V, Fallesen P, Dommermuth L, Myrskylä M. Not just later, but fewer: novel trends in cohort fertility in the Nordic countries. *MPIDR Working Paper* 2020;WP 2020–00. https://doi.org/10.4054/MPIDR-WP-2020-007

64. Verweij R, Mills M, Snieder H, Stulp G. Three facets of planning and postponement of parenthood in the Netherlands. Demogr Res 2020;**43**(September):659–72.

65. Miller AR. The effects of motherhood timing on career path. J Popul Econ 2011;**24**(3):1071–100.

66. Bratti M, Cavalli L. Delayed first birth and new mothers' labor market outcomes: evidence from biological fertility shocks. Eur J Popul 2014;**30**(1):35–63.

67. Sobotka T. Shifting parenthood to advanced reproductive ages: trends, causes and consequences. In: A young generation under pressure? (Springer Berlin / Heidelberg; 2010) pp. 129–54.

68. HFEA. (2020) Information on Fertility treatments 2018: trends and figures. Human Fertilisation and Embryology Authority. www.hfea.gov.uk/about-us/publications/research-and-data/fertility-treatment-2018-trends-and-figures/

https://doi.org/10.1017/9781009025270.002 Published online by Cambridge University Press