What are the Consequences of Fertility Postponement for Women's Completed Family Size?

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1. Introduction

Over the past forty years almost all developed countries have witnessed an increase in the age at entry into parenthood, albeit from different starting points. The delay in entry into motherhood is often referred to as fertility *postponement* (Sobotka 2003).[1] The postponement of childbearing to later ages has important implications for example in terms of health outcomes, increased infecundity and smaller completed family sizes (Schmidt et al. 2012, Te Velde et al. 2012), especially since assisted reproductive techniques currently make only a very small impact on the numbers of women giving birth at the oldest ages (Kocourkova, Burcin, and Kucera 2014, Leridon 2004). Following postponement, fertility rates at older ages have been increasing in many countries, in a so called *recuperation* of childbearing (Billari et al. 2007, Prioux 2005). Fertility recuperation among cohorts which have postponed childbearing can mean that trends in cohort completed family size often remain more stable over time than period measures of fertility (Lesthaeghe and Willems 1999, Sobotka 2004). This has been the case in many northern and western European countries such as Norway and Sweden where there has been considerable recuperation of fertility at older ages (Frejka and Calot 2001): most women have had children later but in almost equivalent numbers in the latest cohorts as compared with the earliest ones (Andersson et al. 2009). However, recuperation of fertility at older ages, and specifically at higher parities does not always take place. In Italy for example, completed cohort fertility remains well below replacement level due to a 'falling behind' later in the life course in the progression to births of higher parities (Billari and Kohler 2004). Furthermore, it does not necessarily follow that because *aggregate* completed family size remains stable, as it has for England and Wales, postponement is followed by successful fertility recuperation at the level of the *individual*. Notably, the parity distribution can have changed, for instance more women today than in the previous cohorts may have few or no children, offset by more women having a large number of children.

In order to examine the relationship between fertility postponement and completed family size for *individual women* we have to move beyond aggregate statistics and utilize

[1] Although there is debate as to the precise underlying mechanisms especially the extent to which women are consciously intending to have births but to have them later on in their reproductive careers (Ni Bhrolchain and Toulemon, 2005).

large scale fertility history data collected on individual women, either through population registers (Andersson et al. 2009), retrospective fertility questions collected in censuses (Neels and De Wachter 2010), or retrospective fertility histories collected in cross-sectional surveys (Beaujouan et al. 2014, Castro 2015). Using individual-level data recent analyses have shown that the relationship between age at entry into motherhood and completed family size for individual women has been changing across cohorts as a result of postponement followed by recuperation at older ages (Castro 2015, Neels and De Wachter 2010). Recuperation of postponed births is identified by the fact that, other things being equal[2], more recent cohorts who have their first child later in life eventually achieve a higher completed family size relative to previous cohorts of women who had their first birth *at the same age*.

Nevertheless, there remains a strong negative relationship between age at entry into motherhood and completed family size (Berrington and Pattaro 2014, Billari and Borgoni 2005, Castro 2015). Whilst it is difficult to statistically identify a causal relationship between them, there are a number of reasons why it can be difficult for women starting their childbearing in their mid to late thirties to fully recuperate births which were postponed from earlier ages. These include declining fecundity with age, competing commitments[3], and lack of a suitable partner with whom they want to have children (Morgan and Rackin 2010). Primary among these is the decline in fecundibility at older ages (Leridon and Slama 2008, Schmidt et al. 2012). Estimates of the percentage of couples who are sterile by the time the woman is aged 45 years range from 58% to 75% (Billari et al. 2007). In addition, it has been shown that cultural deadlines as to the age at which men and women should become parents is well below biological limits and is strongly correlated with the observed age schedule of childbearing within a country (Billari et al. 2010, Settersten and Hagestad 1996). The reluctance to have children from a certain age while still fecund might then partly explain the steep decline in parity progression ratios much before the loss of physical ability to have children.

[2] That is to say completed family size remains the same and the overall level of childbearing does not decrease among mothers.
[3] Which are already present at earlier age but might become more decisive as individuals age.

It is possible that postponement and smaller completed family sizes are not causally related but both result from a third factor such as a desire for a career which may encourage both fertility postponement and a reduction in the overall number of children desired. However, evidence from studies on fertility intentions suggests that British women of all educational groups continue to intend to have family sizes averaging just above two children – this is even the case for childless women at age 30 (Berrington and Pattaro 2011) – and that increasing proportions of childless women at a given age are intending to have at least one birth. For example, 44% of childless women aged 34-37 in 1991-2 did not intend[4] to become a mother as compared to 26% of childless women of the same age in 2005-07 (Ni Bhrolchain, Beaujouan, and Berrington 2010). Such findings are consistent with the concept of women intending to have children but postponing them to later ages. However, it seems that there may be barriers to recuperation. For example Berrington and Pattaro (2014) showed that for the 1958 British birth cohort, more educated women who postponed childbearing to later ages, still intended to have a similar number of children as other educational groups at the age of 23 but ended up with significantly smaller completed family sizes (Berrington and Pattaro 2014). This resulted from a much higher rate of childlessness, but also a smaller number of women progressing to third and higher order births. Very similar findings have been shown for the US (Morgan and Rackin 2010, Quesnel-Vallee and Morgan 2003).

The aim of this paper is thus to examine the relationship between age at entry into motherhood and the level and pace of subsequent childbearing for British birth cohorts born between 1940 and 1968. The paper goes beyond existing research in examining not only educational differentials in the overall likelihood of progressing to second and higher order births, but also whether the ***pace*** of parity progression has increased, especially among more educated members of recent birth cohorts. These research questions are set out below in section 2 in terms of hypotheses 1 to 3. For each hypothesis we briefly review the theoretical arguments followed by a brief summary of any existing empirical evidence that has previously been found. Section 3 describes the data - a unique

[4] Said "no" to the question "*Do you think that you will have any children?".* This does not include those who said "probably not".

set of fertility histories collected from repeated samples of British women during the period 1979 to 2013. The results are provided in section 4, with a discussion in section 5.

2. Background and hypotheses

2.1 The UK context

Whilst postponement of entry into motherhood is a trend common to most developed societies, countries differ in the extent to which the delay has occurred, and the extent to which this increase in the age at entry into parenthood has been educationally homogeneous. Later first childbearing is more common in England and Wales than in many other countries including Norway and France (Rendall et al. 2005). Figure 1 shows that the mean age at which motherhood starts increased steadily by over four years from 23.7 to 27.9 over the period 1970 to 2011 (Figure 1). Not only has fertility been postponed more in the UK than in other countries, this postponement has been concentrated in the most educated groups. Rendall et al (2010) found that in southern Europe and Anglo-American countries the changes in the age pattern at first birth varied by level of education, whereas in two 'universalistic' countries, Norway and France, they did not (Rendall et al. 2010). These educational differences will have important implications in terms of the accepted age at which childbearing should start and end and when a birth will be considered off time. Thus, in the UK, those with low levels of education having their first child in their thirties will be a far more select group as compared with all women with low education, as compared to high educated mothers starting in their thirties. Another persistent feature of UK fertility has been the persistence of a strong two-child norm, although this may have been declining in recent decades (Sobotka and Beaujouan 2014). This strong two-child norm has been seen as the reason behind universally high progression to second birth and a relative small proportion of women having just one child (Berrington and Pattaro 2014).

2.2 Expectations for increased recuperation among more recent birth cohorts

Previous research has consistently shown that age at first birth is one of the strongest predictors of subsequent progression to higher parities (Kreyenfeld 2002, Ni Bhrolchain 1993). As noted by Ni Bhrolchain (1993) the mechanisms by which the association operates are likely to be multifaceted. Those who have their children early have a longer exposure time to the risk of having another birth prior to the end of their reproductive life. In addition, the association may result from selection effects whereby more family-orientated women chose to start their families at a younger age.

There are reasons why we might expect this relationship between age at first birth and parity progression to have changed over time: recuperation; decreasing selectivity of older mothers; and rising social age deadlines. Firstly, as already discussed, if repeated cohorts are postponing births with an intention to 'catch up' later (as appears to be the case in the UK (Berrington and Pattaro 2010, Castro 2015, Ni Bhrolchain et al. 2010), then we would anticipate that recuperation of fertility at older ages would increase across cohorts. Secondly, since postponement of entry into parenthood has become more frequent and widespread, it may follow that more recent 'postponers' are a less select group (Ni Bhrolchain et al. 2010). In earlier cohorts, this group was more likely to be made up of women who did not see childbearing as a priority or had a late transition to parenthood due to fertility problems, for example. More recent cohorts of women are more likely to have postponed for 'positive' reasons such as establishing a career before starting a family (Ni Bhrolchain 1988). Finally, delayed childbearing seems to be an increasingly normative behaviour, with rising social age deadlines for first childbearing (Billari et al. 2010, Settersten and Hagestad 1996). Social age for childbearing differ considerably cross nationally and between social groups within societies (Billari et al. 2010). It is possible that upward shifts in the latest age at which parenthood is seen as normative will weaken the impact of postponement for completed family size (Mynarska 2010, Van Bavel and Nitsche 2013).

Previous evidence suggests that recuperation of postponed fertility is occurring among recent cohorts in some European countries: fertility rates at older ages have been

increasing, especially among childless and prima-parous women (Billari et al. 2007, Prioux 2005) who delayed entry into motherhood to later ages. Register data from Norway and Sweden provide support for increased recuperation of fertility, with the late-starters in more recent cohorts ending up with slightly more children than the late starters in the earlier cohorts (Andersson et al. 2009). This is supported by pooled GGS data from Western Europe, where the emergence of recuperation of fertility among cohorts born in 1956-60 was accompanied by comparatively higher fertility among women who entered motherhood later (Castro 2015). Thus in our analyses we expect the following:

H1: We expect overall rates of parity progression to decline with age at first birth but to have increased across cohorts among the late-starters[5], given age at first birth.

2.3 Expectations for educational gradient in subsequent childbearing given age at entry into motherhood

There are a number of reasons why we would expect more educated women to be more successful in recuperating their fertility at later ages. Explanations for this finding include selection effects, partner characteristics or the desire to concentrate their childbearing within a shorter span of time (Kravdal 2001, Kravdal 2008, Kreyenfeld 2002, Neels and De Wachter 2010). Firstly, it can be argued that highly-educated mothers may be a select, family-oriented sub-group of those with higher education (Kravdal 2001, Kravdal 2008, Kreyenfeld 2002). Hence among this select group progression to second and higher order births will be more common. More successful recuperation may also be seen since they are more likely than those from lower educational groups to have a high-earning partner who is able to help support a second (and subsequent) children. It is also the case that, at least in Britain, the risks of partnership dissolution are lower for more advantaged groups (Berrington and Diamond 1999). Remaining in a stable (especially marital) partnership has been shown to be particularly important in achieving desired number of births both in the UK (Berrington and Pattaro 2014) and the US (Morgan and Rackin 2010, Quesnel-Vallee and Morgan 2003). There is also another selection mechanism that is important, especially in the UK context where the timing of entry into motherhood is so socially polarised – that is to say low-educated women who postpone until their thirties are a

[5] Who we define as above age 29.

select group who, for example, have fertility problems, issues finding a partner, and/or are not family-oriented. These low-educated women would therefore be particularly *unlikely* to progress to higher parities. Thus, educational differentials would be especially pronounced for women entering motherhood later. Furthermore, age norms may differ between educational groups, facilitating further childbearing at older ages among higher educated groups (Van Bavel and Nitsche 2013, Van Bavel and Rozanska-Putek 2010). Van Bavel & Nitsche (2013) find that progression to second birth will be less likely for women who have their first birth at an age which would be considered late. Finally, educational homogamy means that many high educated women will have a partner with high earning potential. Thus, economic opportunity costs of childbearing may be offset by an increased ability of their partner to invest in children and pay for childcare.

In terms of existing empirical evidence, studies have consistently shown that given entry into motherhood, highly educated women are more likely to progress to second and higher order births in a range of European countries eg. (Andersson et al. 2009, Klesment et al. 2014, Kreyenfeld 2002, Neels and De Wachter 2010, Wood, Neels, and Kil 2014). In Belgium, recent cohorts of highly educated women have shown particularly strong rates of fertility recuperation, with progression to third births more common for women with longer durations of tertiary education (Neels and De Wachter 2010). For the UK Rendall and colleagues show that in the 1954-58 cohort, conditional upon age at entry into motherhood, those with higher education were more likely to progress to further births (Rendall and Smallwood 2003). However, Jenkins (2011) using data from the 1958 and 1970 British birth cohorts finds that the likelihood of progression to second birth is similar across educational groups (Jenkins 2011).

In terms of empirical support for the potential explanations for higher rates of parity progression among older highly educated women, Kreyenfeld (2002) showed using German data that this association was explained by partner's educational attainment and the selection into parenthood, whilst Andersson et al (2009) attribute the gradient to relative age deadlines. Given the above we expect that:

H2: Having made the transition to parenthood at a given age, a larger proportion of higher educated women will progress to further births, particularly among women entering motherhood at later ages.

2.4 Expectations concerning the pace of parity progression by age at first birth, cohort and educational level

In comparison to the extensive literature on overall levels of parity progression, less attention has been paid to the pace of childbearing in terms of birth intervals. Ni Bhrolchain (1988) developed Keyfitz's idea that effective methods of contraception can promote shorter birth intervals. "When couples believe that their control over fertility is uncertain, there is an incentive to delay births of any order, and thus to space them further apart, so as to reduce the number of future years potentially at risk, after the last wanted birth, for a birth of an unwanted order" (Ni Bhrolchain 1988 p. 205). Methods of contraception have become increasingly reliable, particularly since the 1960s, and hence we might expect average intervals between births to have decreased across birth cohorts.

However, we might expect the improvement in contraceptive techniques on the pace of parity progression to work rather differently for teenage mothers: Early demographic research highlighted the swift progression to further births among teenage mothers, citing both biological and social mechanisms (Bumpass, Rindfuss, and Jamosik 1978). There is evidence, however, that this relationship has weakened over time, for example due to better contraceptive use among young mothers (Morgan and Rindfuss 1999).

There are reasons why we might expect the pace of parity progression to be faster among older mothers. Women who enter motherhood at later ages have less time available for childbearing before reaching biological age limit of fertility which is likely to encourage rapid progression to further births (Kreyenfeld 2002). Women who delay childbearing to later ages may also speed up childbearing since they may be concerned about the effects of biological clock (Beaujouan and Solaz 2013), not only for getting pregnant but due to increase in negative health outcomes associated with later childbearing (Nabukera et al. 2009). Furthermore, it has been argued that there is a greater incentive for short birth intervals among higher educated to minimise forgone earnings and impact on career progression. Higher educated women want to resume employment shortly after childbearing (Kreyenfeld 2002, Ni Bhrolchain 1986).

Existing empirical research on the pace of childbearing in developed countries is surprisingly sparse. Ni Bhrolchain (1988) finds evidence in support of a decline in the length of the interval to second birth up until the late 1960s, consistent with the contraceptive confidence idea. More recent UK data suggests that birth interval lengths may have stabilised in the 1970s (Ni Bhrolchain 1993). However, Ni Bhrolchain finds evidence to suggest that the interval between first and second birth is shorter among more educated women. Consistent with these UK findings are those from Canada, where highly educated women of younger cohorts are found to have more closely spaced births (Rahim and Ram 1993). Given the above we expect that:

H3: The pace of progression will be higher for women who enter parenthood later and for more educated women, and have increased among more recent birth cohorts.

We now proceed to test our hypotheses using a unique time series of fertility histories for Britain for cohorts of women born between 1940 and 1968.

3. Data and Methods

3.1 Dataset

The analyses are based primarily on retrospective fertility histories collected in repeated rounds (1979-2009) of a nationally representative cross-sectional survey of adults in Britain – the General Household Survey (GHS)[6]. A team of researchers at the ESRC Centre for Population Change has combined these retrospective histories to provide a unique data source to study family change in Britain (Beaujouan et al. 2014). The histories include information on the fertility experiences of more than 600,000 men and women across periods, cohorts and at different ages. Ni Bhrolchain and colleagues (2011) demonstrate that the retrospective reports of fertility are consistent with estimates from national birth registration, especially for mothers (Bhrolchain and Beaujouan 2011). Our estimates of completed fertility are based on women aged 45+ at the time of the interview. Our analyses are based on revised fertility histories from 31,583 women where retrospectively reported births are augmented with additional information on children

[6] Later renamed the General Lifestyle Survey.

living within the household (Beaujouan et al. 2014, Ni Bhrolchain, Beaujouan, and Murphy 2011). The data are weighted to take account of survey design and non-response (Beaujouan, Brown, and Ní Bhrolchaín 2011).

A limitation of the GHS data is that the sample sizes for more recent cohorts are smaller than for older cohorts because the fertility experience of younger cohorts of women is only captured in the most recent surveys among women who have recently reached age 45, whereas the experience of older cohorts is represented in the retrospective reporting of repeated survey rounds. The analysis of changes across cohorts therefore requires the use of an additional, more recent data source that is comparable to the GHS, to enhance the sample sizes in the younger cohorts. To this end, we supplement the GHS data using the UK Household Longitudinal Study, Understanding Society, a panel study of over 30,000 households in the UK (Mcfall 2013). Like the GHS, Understanding Society is a household-level survey that aims to be representative of the adult population in Britain, residing in private households. We use data from Waves 1 to 4 of the panel collected in 2009-2013. In wave 1 a retrospective fertility history was collected. We then add births occurring during the panel follow up to record the completed family size at the time of interview for all women who were aged 45+ at their last interview. This allows us to incorporate cohorts born right up until 1968 who reached exact age 45 around 2013. The analyses are weighted using cross-sectional wave 1 weights, standardised to the sample size. Before combining fertility histories from the two surveys we evaluated the consistency of key findings from the two data sources, such as completed family size and the age pattern of childbearing, and found them to be comparable to each other. Furthermore, completed parity distributions and age patterns of childbearing within both of the samples closely match national data from vital registration (Office for National Statistics 2013).

3.2 Indicators of level and pace of progression to subsequent births

Event history analysis of progression to further births tend conflate the overall likelihood of the transition happening and the speed with which is happens (Klesment et al. 2014, Ni Bhrolchain 1993). In this paper we differentiate between the two as follows: The level of childbearing is indicated by the proportion who progress to the next parity by age 45. The pace of childbearing is captured by the mean birth interval among those who have

progressed to the next parity. We examine progression to second, third and fourth births when examining overall cohort trends. But, due to sample size constraints, we only examine progression to second and third births in those analyses which are stratified by education.

3.3 Measure of education

We argue that women's highest qualification on first leaving education (ie. at the end of continuous education) provides the best indication of educational attainment prior to entry (or potential entry) into motherhood. We use four categories of education: Less than Ordinary (O) Level; Ordinary (O) level; Advanced (A) level; Degree or equivalent. O level qualifications are equivalent to a school leaving qualification taken at age 16 years. A level qualifications are taken at age 18 years and are generally required in order to progress to a tertiary (university) educational setting. The interpretation of changing educational differentials in fertility over time is made complex by the changing composition of the British population by education. As shown in Figure 2 the proportion of the female population with either no qualifications or who fail to achieve any Ordinary Level (O Level) qualifications at the end of compulsory schooling (generally at age 16), decreases from 64% among women born 1940-49, to just 18% of women born 1960-68. At the same time, the proportion with a degree or other higher level qualification increases from 9% to 20%. In terms of the impact of educational enrolment on postponement we would argue that the effect of having degree level qualifications will remain similar across cohorts. However, in terms of the impact of higher educational attainment on fertility behaviour we cannot assume that the causal effect of having a degree will remain the same across cohorts. If incentives to postpone are linked to the earnings opportunities that accompany investments in education, more women with higher qualifications could result in more women with similarly strong incentives to postpone. However, female graduates among cohorts born in the 1940s and 1950s were a very select group of women who arguably were less family orientated, whereas today they form a significant minority who could be select in terms of their attitudes to family and work. We might expect therefore that the association between having higher level qualifications and fertility behaviour might change across cohorts due to the widening pool of women who are part of this group (Ni Bhrolchain 1993). In parallel, the least educated group of women will have become more selected for poorer socio-economic

characteristics and hence this group may behave in a way different to that of previous cohorts.

4. Results

4.1 Increased recuperation among more recent birth cohorts

H1: We expect overall rates of parity progression to decline with age at first birth but to have increased across cohorts, given age at first birth.

Figure 3 shows that age at first birth has a strong impact on the likelihood of progression to the next birth, not only for second birth but also for the following ones. For those born in 1960-68, 88% of those who had their first birth in their early twenties went on to have another child, compared with 44% of those who had their first birth in their late 30s. This gradient remains for progression to third birth, but becomes less pronounced for fourth births (because the chances of progressing to fourth birth are less than 50% even for those who became a mother in their early twenties). In sum, a woman who had her first child aged 35-39 is very unlikely to have a third child, and will mostly not have a fourth one. Turning our attention to cohort changes in the relationship between age at entry into motherhood and subsequent parity progression we see that the percentage progressing to parity two has increased over cohorts for women with a higher age at first birth and decreased slightly for younger ages at motherhood. As a consequence, the 'age curve' of progression to second birth has become slightly flatter. This has also happened to a lesser extent for progression to third birth. In other words, the difference in the percentage progressing according to age at first birth has become less pronounced. However much of this cohort change took place between the 1940-49 and 1950-59 cohorts, and the curve, e.g. for progression to second birth in Figure 3, has not changed for those born in 1960-68 in comparison to the 1950-59 cohort.

4.2 Positive educational gradient in progression to further births

H2: Given they have made the transition to parenthood, a larger proportion of higher educated women will progress to further births, particularly among women entering motherhood at later ages.

Within each cohort, controlling for age at first birth, there is a positive educational gradient in the likelihood of progression to second birth, and this positive gradient is most pronounced for older ages at first birth (Figure 4a). Even for progression to third birth (Figure 4b), women with the highest levels of education remain the group most likely to progress, given their age at first birth. For example, among the 1960-68 cohort, among women who entered motherhood at age 25-29, 32% of those with less than O level qualifications (i.e. the least educated) progressed from second to third birth, compared to 43% of degree educated women.

In general, the patterns of progression to higher-order births according to age at first birth and education remain relatively similar across birth cohorts. Even among degree educated women and those with intermediate education levels (A level) who have their first birth in their early thirties (ie. postponers), progression to second birth remains rather constant (Figure 4a). For example among degree educated women having their first birth at age 30-34 the likelihood of progression to second birth is 78%, 78% and 76% in the three cohorts. For progression to third birth (Figure 4b), the main change over cohorts is that the educational gradient appears to have narrowed, largely driven by an increase in the proportion of mothers with lower levels of education (less than O level and O level) who progress to third birth, for all ages at first birth. For example, among women with O level qualifications who had their first birth in their late twenties the percentage progressing to a third birth increased from 21% among the 1950-58 cohort to 29% among the 1960-68 cohort.

Thus we find support for hypothesis 2, but highly educated women do not seem to have intensified their recuperation of fertility at older ages in more recent cohorts.

4.3 Differences in the pace of progression to further births

H3: The pace of progression will be higher for women who enter parenthood later and for more educated women, and have increased among more recent birth cohorts.

Table 1 shows how the pace of progression to second and third birth varies according to age at first birth, comparing women born in 1940-49, 1950-59 and 1960-68. Table 2 shows for the combined 1950-1968 cohorts the mean birth interval by age at first birth and level of education. Due to relatively small numbers in certain subgroups progressing to third birth there is lack of precision in some estimates, and our conclusions are therefore tentative. Nevertheless we can see some patterns. Looking first at the "all ages" row in Table 1 we see that the overall pace of progression to second and third births is not increasing over cohorts. In fact the average interval from first to second birth has increased from 36 to 40 months, whilst for third birth it increased from 46 to 50 to 52 months across the cohorts. However, we do find evidence that the mean birth interval between first and second and second to third birth decreases with age at entry into motherhood. This differential according to age at first birth has increased over the cohorts 1940-48, 1950-59 and 1960-68, especially for the interval between first and second birth. The increase over cohorts in the gradient according to age at entry into motherhood is caused by two things: First, subsequent birth intervals for teenage mothers have got longer. Secondly for those who enter into motherhood in their late thirties, birth intervals have got shorter. In sum, we do not see an overall increase in the pace of childbearing. We do find however some evidence for a faster pace of childbearing among those who start their childbearing later. Furthermore, among the group of women postponing their childbearing to their late thirties we see some tentative evidence of a faster transition to second birth in the most recent cohorts.

Table 2 provides the information as Table 1 but for a single birth cohort (1950-68) and broken down by highest educational qualification. Within each educational group, the shortening of birth intervals associated with a later age at entry into motherhood becomes much clearer. For example, among those with A level qualifications the mean interval between first and second birth reduces from 50 to 36 months when comparing teenage mothers, with those who entered motherhood in their late thirties. For the same group of women with advanced (A level) qualifications who have a third birth, the

average birth interval reduces from 50 months among those starting childbearing in their teens to 42 months among those starting childbearing in their early thirties.[7] However, the data suggest that there is no clear difference in the pace of progression to second or third birth according to education once age at first birth is accounted for. In other words, whilst degree educated women tend to have shorter birth intervals (44.5 months against more than 49.7 in the other groups) this can be explained (at least statistically) by their later age at entry into motherhood.

4.4 Consequences for completed family size

The combined result of the above mechanisms is significant differences in completed family size for mothers according to highest level of education. Among the 1960-68 cohort, mothers with the least education stand apart as having much higher levels of childbearing with an average of 2.74 children (See the "all ages" row in Table 3). The remaining mothers have more similar levels of childbearing – ranging from 2.12 for those with advanced (A level) qualifications to 2.22 for those with degrees and 2.27 for those with ordinary (O level) qualifications.

Overall mean completed family size falls dramatically as age at first birth increases. For example (looking at the "total column" in Table 3) in the 1960-68 cohort women who have their first child before the age of 20 years have a mean completed family size of 3.05, compared with 1.50 for women who have their first birth at age 35-39 years. This gradient has remained remarkably stable over the three successive birth cohorts. That is to say there appears to be only a modest amount of recuperation in more recent cohorts. If we focus on those who postpone motherhood until their late thirties, completed family size increased a little between the 1940-49 cohort and 1950-59 cohort (from 1.43 to 1.52) but then remained similar for the 1960-68 cohort (at around 1.50).

Within each educational group we see a negative relationship between age at first birth and completed family size. However, this gradient is less steep for those with higher levels of education, as compared with lower levels of education. In other words, degree

[7] Too few women with advanced (A level) qualifications who started childbearing in their late thirties progressed to a third birth for us to make an estimate of the interval from second to third birth for this group.

educated women who start their childbearing in their late twenties and early thirties tend to have a larger completed family size as compared to low educated women who enter motherhood at later ages. For example, among women born 1960-68 who have their first birth aged 30-34, average completed family size is 1.96 for those with degrees, as compared with 1.58 for those with 'O level' qualifications. This is what we would expect given selection mechanisms and the postponement and recuperation of childbearing among more educated women (Berrington and Pattaro 2014, Rendall et al. 2010). What is more unexpected is the way in which these educational differences have remained relatively stable over the cohorts born over a 30 year period. There is no increase in completed family size for women with degrees who have their first birth in their thirties (ranging from 1.62 to 1.56) for those entering motherhood at age 35-39).

5. Discussion

The postponement of childbearing to later ages means that reproduction is increasingly taking place within a shorter time span before the end of the reproductive period. In this paper we reviewed literature which often assumes that the increased postponement of childbearing will be accompanied by greater recuperation of births among those who enter motherhood at later ages. Evidence in support of this assumption has been found in some Nordic (Andersson et al. 2009) and western European countries (Castro. 2015; Neels and Wachter 2010). This would cause the relationship between age at entry into motherhood and completed family size to weaken, especially for more educated women. Moreover, we have put forward reasons why we had expected the pace of childbearing to have sped up among recent cohorts who postpone entry into motherhood to later ages. However, the evidence, based on a unique, long, time series of fertility histories for Britain suggests that some of these assumed trends might not be taking place. Limited sample sizes, especially for the younger cohorts means that our conclusions must remain tentative. Nevertheless, we would argue that there is a significant degree of stability in the subsequent childbearing patterns of British women, given their age at entry into motherhood.

The strong negative relationship between age at first birth and likelihood of progression to second, third and fourth birth has remained remarkably consistent across British cohorts born between 1940 and 1968. Whilst educational differentials in these relationships are (in all cohorts) as we might anticipate (e.g. given selection effects, partner effects and so forth), these educational differences do not seem to have changed over time. This is in contrast to the overall increases in recuperation, especially for highly educated women documented for other developed countries (Andersson et al. 2009, Castro 2015, Neels and De Wachter 2010). Comparison across cohorts suggest that it is only the likelihood of progression to second birth that has slightly increased for more recent cohorts of older mothers. In other words, given age at entry into motherhood recent cohorts of women postponing motherhood to their thirties are no more likely to go on to have third or fourth births as compared with women born twenty years earlier.

As a consequence, the overall relationship between age at entry into motherhood and completed family size has changed only slightly, becoming less negative. For example, average completed family size for women entering motherhood in their late thirties has increased from 1.43 among those born 1940-49 (who were recuperating their births in the late 1970s and 1980s) to 1.50 for those born 1960-68 (who were recuperating their births in the 2000s. Given this relatively small increase in completed family size for more recent cohorts postponing entry into motherhood into their late thirties we question whether the conceptual model which sees the overall stability of UK fertility as being a consequence of strong postponement followed by recuperation (Frejka and Calot 2001), is applicable. We would argue that aggregate cohort completed family size has remained constant in Britain due to divergent childbearing patterns among different sub-groups of a population. That is to say strong postponement followed by incomplete recuperation among higher educated women, but increased rates of progression to higher order births among the proportion of the population who did not postpone their births.

Recuperation at the individual level in terms of continuing on, especially to third and fourth births is not happening for recent cohorts of women who postponed into their late thirties. We can only speculate on the reasons for this. Explanations might relate to the biological limits to childbearing which makes progression to third and fourth births particularly difficult in the time remaining to older mothers. Whilst we recognise

developments in assisted reproductive techniques such as IVF, they are not available on the scale required, or to be sufficiently successful at older ages to have (yet) had a significant effect on extending the reproductive life span at the population level (Leridon 2004, Te Velde et al. 2012). However, the fact that recuperation at older ages does occur in other country settings would suggest that this cannot be the whole story. Alternatively it could be that social age deadlines for having a baby have not increased that much in the British population. Whilst we know that childless women in their thirties increasingly want at least one child (Ni Bhrolchain et al. 2010), the factors associated with a desire to postpone entry into motherhood e.g. the demands of a career, may limit intentions to no more than two children. This may relate to the difficulties facing mothers in combining a career and childbearing that persist even though some policies were enacted during this period, in the context of a strong two child norm (Sobotka and Beaujouan 2014). Such an explanation would be consistent with the revising downward of intentions across the life course documented among older British women (Iacovou and Tavares 2011) as a consequence of experiencing the realities of combining motherhood and a career.

There are two areas where we find evidence of cohort change in the pace of subsequent childbearing: a lengthening of subsequent birth intervals for teenage mothers; and a shortening of the interval between first and second birth for women who postpone childbearing until their late thirties. Our finding for teenage mothers mirrors evidence from the US where Morgan and Rindfuss (1999) suggest that the lengthening birth intervals may be explained by increased use of efficient contraception and increased returning to education subsequent on becoming a teen parent in more recent cohorts (Morgan and Rindfuss 1999). We would suggest that another potential explanation is an increase in more recent cohorts in the risk of partnership dissolution among young mothers. Time spent out of a co-residential union will lengthen the time between subsequent births.

The second area where we find tentative evidence for an increase in pace across cohorts is a faster progression to second birth among women who postponed childbearing into their late thirties. We find evidence consistent with the "time squeeze" effect whereby women who start their childbearing at older ages have a more rapid progression to subsequent births. However, contrary to our expectations, we do not find any educational

difference in the pace of childbearing for a given age at first firth. How might we go about explaining this lack of educational differences in pace? Firstly, we might look to the strong two child norm that continues in the UK – a very high proportion of women with one birth progress to a second across all the educational groups and culturally there is an expectation that the second will follow within a few years of the first child. Secondly, whilst there may be a stronger economic rationale for shorter birth intervals among highly educated women, such an effect could be being offset by other factors including: the greater risk of contraceptive failure or mistimed births among lower educated women; a lower social age deadline for childbearing among less educated women which encourages a quick progression. Furthermore, it is unclear what impact childbearing within second families will have on the pace of childbearing. It is likely that more of the second and third births to lower educated women at older ages are children being born within second or higher order unions. Thus, less educated women might be keen to compress their childbearing if it is the case that social age deadlines for these less educated women will be lower.

As is clear from the previous discussions, the sorts of data available to us at present mean that we can only speculate on the potential mechanisms underlying these observed trends. Further research (to include new data collection) is needed to understand for Britain whether social age deadlines to childbearing do differ within different population subgroups, or whether there has been change over time in the accepted age at becoming a mother, or having a final birth. Furthermore, qualitative research needs to be carried out to understand the nature and strength of the countervailing drivers of birth intervals. The timing of subsequent childbearing not only depends upon biological factors, including infecundity and contraceptive effectiveness, but also a whole host of economic and social factors including foregone earnings and career progression, access to subsidized childcare, impact of social age deadlines and so forth. These issues need to be examined in the context of both stable and unstable partnership histories across the life course. Whilst there is clearly a need for more research to understand the factors affecting the decision-making of contemporary cohorts of postponers in Britain, research is also needed to examine how and why these factors relate to the divergent patterns of recuperation cross nationally.

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Table 1: Mean interval between first and second birth; and second and third birth, by cohort and age at first birth. Weighted means, unweighted sample size.

	Age at first birth	1940-49 Mean	n	1950-59 Mean	n	1960-69 Mean	n
First to second birth	<20	35.7	2,083	46.8	1,645	48.3	455
	20-24	36.4	5,893	40.7	3,239	38.6	944
	25-29	36.2	3,171	37.6	2,597	41.1	934
	30-34	36.1	751	35.9	1,060	39.7	492
	35-39	33.2	149	36.2	242	28.1	120
	All ages	36.2		40.3		40.6	
Second to third birth	<20	43.5	1,473	52.9	1,022	58.1	318
	20-24	47.1	2,840	51.0	1,472	54.0	524
	25-29	46.6	996	46.5	810	47.2	331
	30-34	39.4	163	41.1	282	54.1	134
	35-39	-	22	-	38	-	19
	All ages	45.8		49.7		52.8	

Note: - represents cell where denominator is less than 50 individuals

Table 2: Mean interval between first and second birth; and second and third birth, by education and age at first birth. 1950-1968 cohort. Weighted means, unweighted sample size.

		< O level		O level		A level		Degree	
	Age at first birth	Mean	n	Mean	n	Mean	n	Mean	n
First to second birth	<20	42.2	1,108	54.8	510	50.2	423	59.5	59
	20-24	41.1	1,625	39.2	1,135	41.2	1,000	41.0	423
	25-29	39.6	797	38.4	823	37.3	894	35.9	1,017
	30-34	34.7	248	37.1	277	38.8	368	34.9	659
	35-39	-	49	29.0	70	36.4	83	33.0	160
	All ages	41.0		41.1		40.6		37.3	
Second to third birth	<20	51.6	735	58.7	322	50.2	248	-	35
	20-24	51.2	827	54.2	519	49.7	441	45.9	209
	25-29	40.8	251	52.1	235	52.2	277	43.0	378
	30-34	46.8	72	34.7	66	41.7	96	42.5	182
	35-39	-	1	-	13	-	13	-	27
	All ages	49.8		53.7		49.7		44.5	

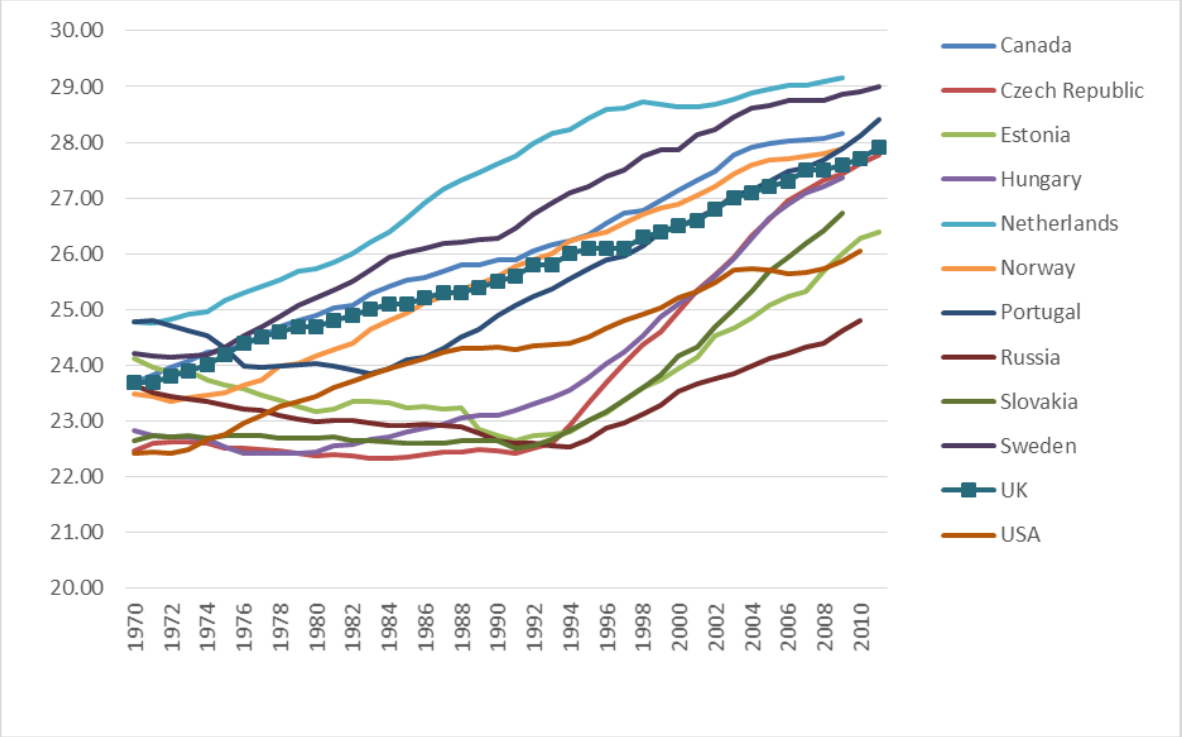
Note: - represents cell where denominator is less than 50 individuals

Table 3: Mean number of children among mothers by age at first birth, education and cohort. Weighted means, unweighted sample size.

Cohort	Age at first birth	< O level		O level		A level		Degree		Total	
		Mean	n	Mean	n	Mean	n	Mean	n	Mean	n
1940-49	<20	3.43	1,705	2.89	258	3.14	214	-	35	3.35	2,212
	20-24	2.63	4,310	2.48	1,053	2.49	897	2.56	330	2.59	6,590
	25-29	2.12	1,826	2.14	677	2.24	631	2.28	689	2.16	3,823
	30-34	1.65	481	1.69	219	1.94	205	2.10	261	1.80	1,166
	35-39	1.35	147	1.53	55	1.39	71	1.62	64	1.43	337
	All ages	2.59	8,469	2.32	2,262	2.36	2,018	2.26	1,379	2.50	14,128
1950-59	<20	3.04	1,004	2.76	411	2.69	365	-	41	2.90	1,821
	20-24	2.62	1,563	2.44	910	2.37	844	2.67	330	2.53	3,647
	25-29	2.10	858	2.07	721	2.14	741	2.33	810	2.16	3,130
	30-34	1.75	324	1.76	289	1.90	365	2.02	564	1.88	1,542
	35-39	1.33	111	1.66	100	1.48	124	1.59	187	1.52	522
	All ages	2.49	3,860	2.26	2,431	2.21	2,439	2.22	1,932	2.33	10,662
1960-68	<20	3.24	199	2.98	164	2.01	110	-	24	3.05	497
	20-24	2.72	291	2.50	348	2.33	285	3.17	131	2.56	1,055
	25-29	2.44	137	2.15	291	2.21	340	2.38	338	2.24	1,106
	30-34	1.95	79	1.58	160	1.86	174	1.96	278	1.82	691
	35-39	-	23	1.51	-	1.42	62	1.56	112	1.50	245
	All ages	2.74	729	2.27	1,011	2.12	971	2.22	883	2.31	3,594

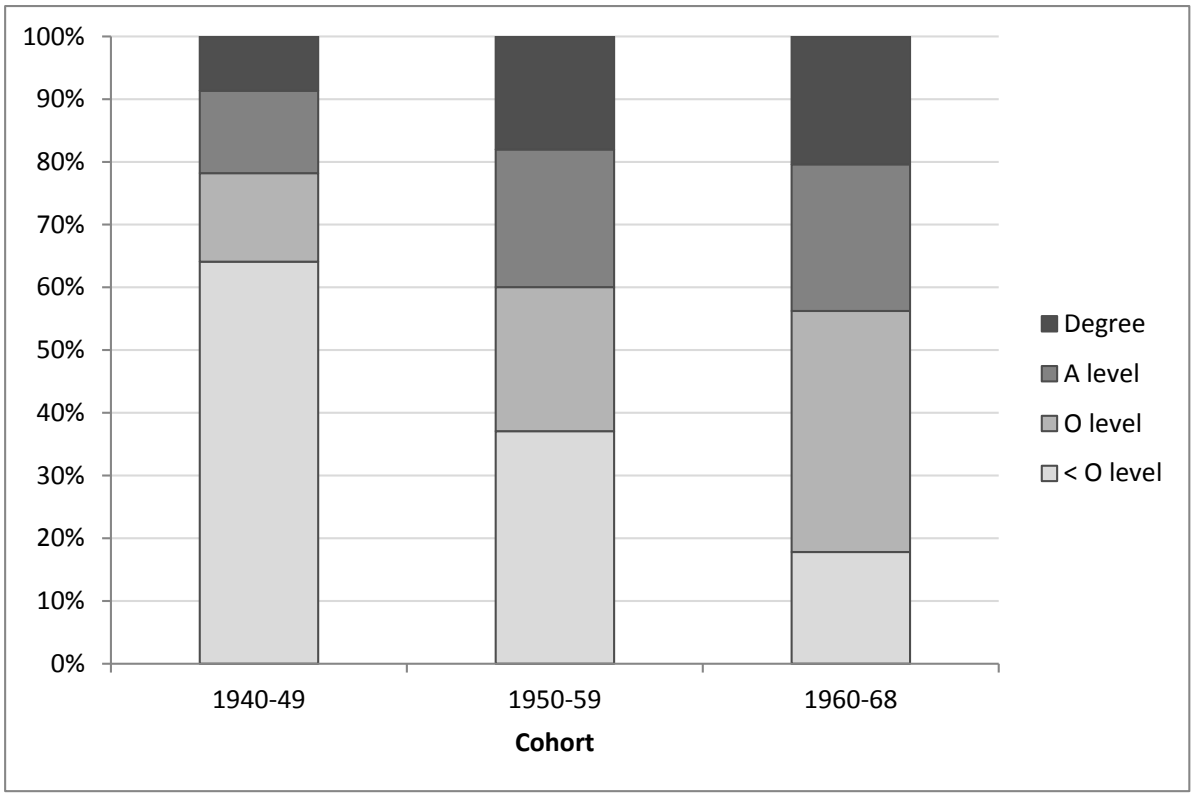
Note: - represents cell where denominator is less than 50 individuals

Figure 1: Trend in mean age at first birth in selected developed countries



Source: UK Office for National Statistics and Human Fertility Database Max Planck Institute for Demographic Research (Germany) and Vienna Institute of Demography (Austria). Available at www.humanfertility.org.

Figure 2: Distribution of educational attainment among women aged 45+ by cohort.



Source: CPC GHS time series.

Figure 3: Proportion of mothers who have a second and third birth according to age at first birth and cohort

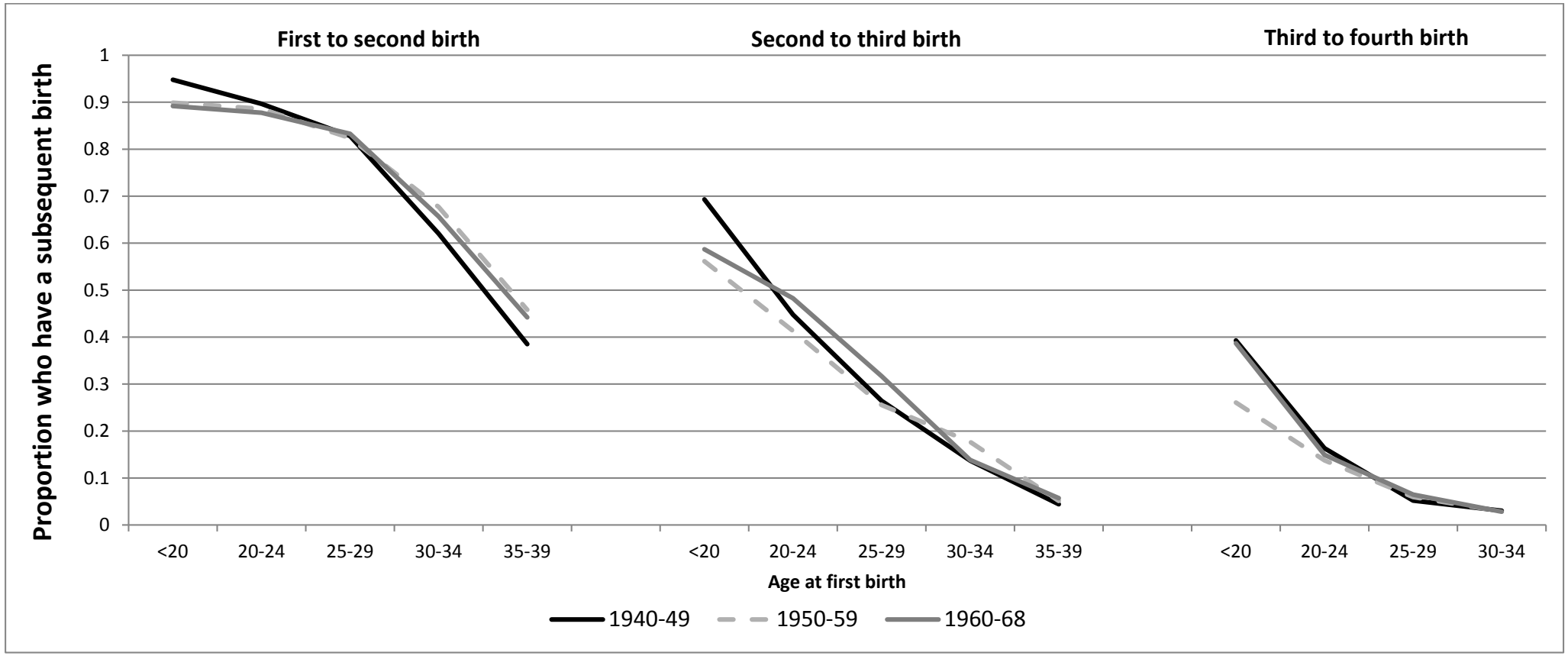
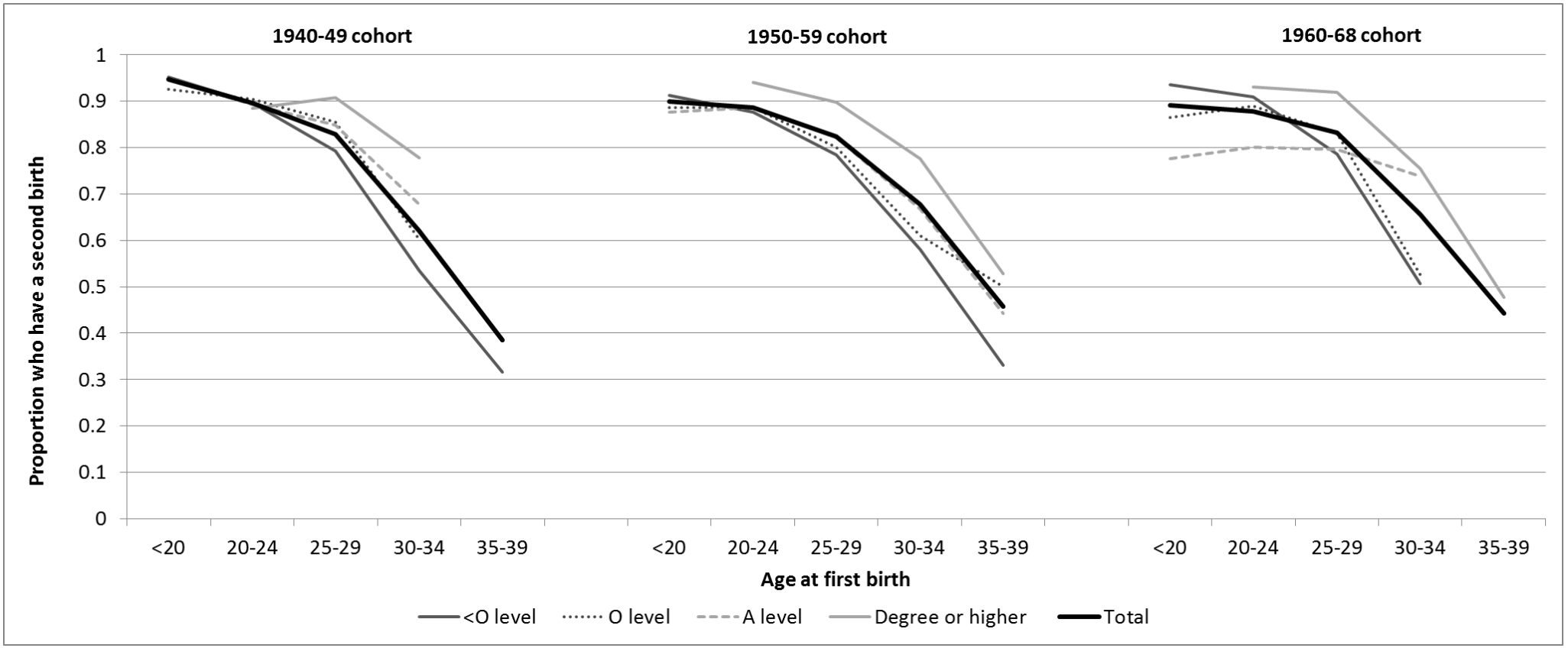
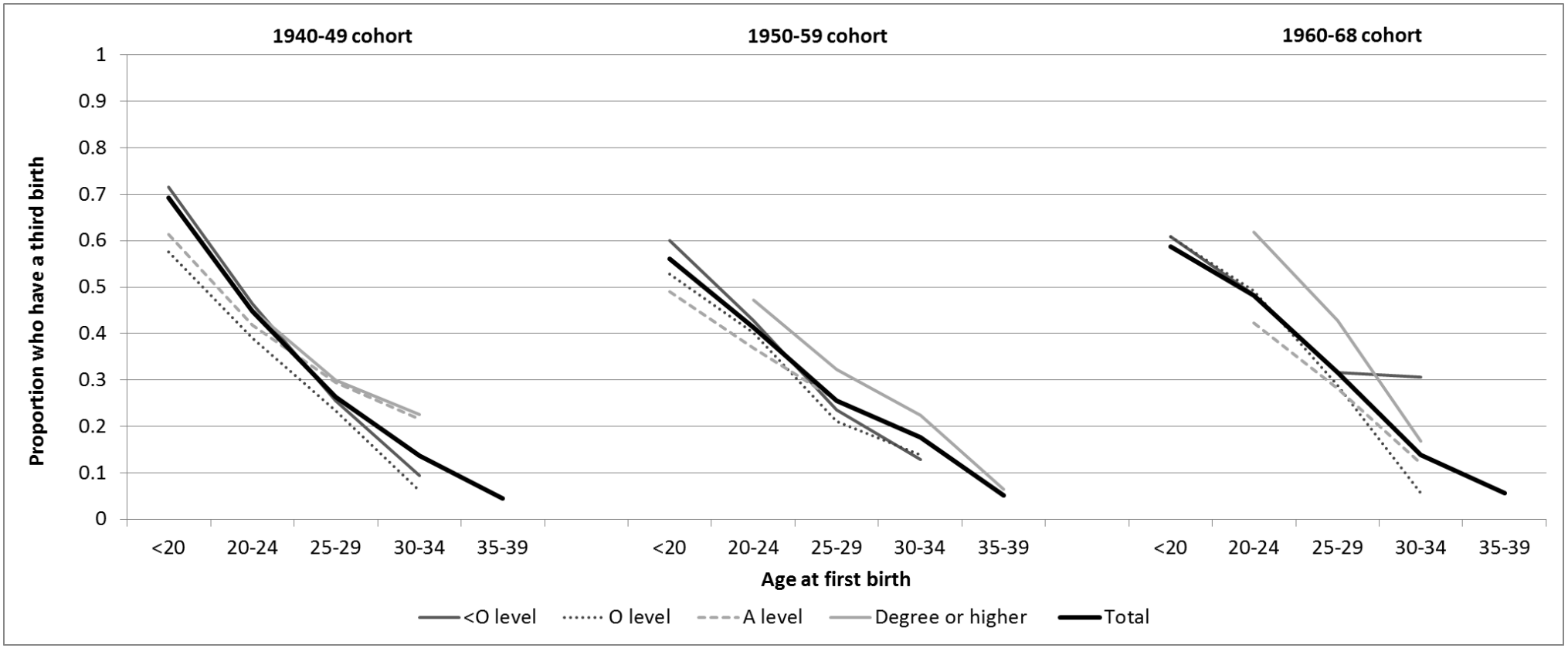


Figure 4a: Proportion of mothers who have a second birth according to age at first birth and highest level of education



Note: data points omitted when n of the denominator<100

Figure 4b: Proportion of mothers who have a third birth according to age at first birth and highest level of education



Note: data points omitted when n of the denominator<100

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