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Research Article

Postponement and childlessness: Evidence from two British cohorts

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Postponement and childlessness: Evidence from two British cohorts

Dylan Kneale ¹

Heather Joshi ²

Abstract

This paper starts by reviewing existing projections of childlessness among British men and women. Low current fertility implies high eventual childlessness unless the postponement of parenthood is taken into account. Such re-timing of first births appears to be occurring differentially across social groups. Exploiting the disaggregated evidence of two British cohort studies, the 1958 National Child Development Study and the 1970 British Cohort Survey, this paper investigates the extent of postponement across cohorts and projects its impact on eventual levels of childlessness. Men and women are considered separately in our models of a population stratified by educational attainment. We find the most striking postponement occurring among graduate men. Among graduate women, after taking family building intentions into account, we estimate that about a quarter of 1970 born graduate women will remain childless, rather than something nearer 40 per cent as had been conjectured elsewhere.

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1. Background

Increasing numbers of people in Britain are either postponing parenthood, or not experiencing it at all. Since the 1960s, decreases in Total Fertility have been accompanied by rises in the median age of women at first birth, as fewer women have first births in their teens and early twenties. This partly involves a re-timing of the initiation of parenthood to the late twenties and thirties, but it also involves a gradual rise in rates of eventual childlessness, not necessarily intended. Graduate women have been a focus of scholarly and popular attention as being in the vanguard of this trend. Male fertility histories, on the other hand, have largely been overlooked. In this paper, we examine the pattern of postponement and childlessness in Britain across the range of social groups in two cohorts for both genders. We use the (near) complete observed fertility schedule of the earlier 1958 cohort (NCDS) to estimate a full fertility schedule for the later 1970 (BCS70) cohort, observed only up to age 34.

2. Existing estimates of childlessness

The past four decades have witnessed low and late fertility over much of the developed world. Discussion of the Second Demographic Transition includes both the outcomes of these changes and their determinants (Lesthaeghe and Neels 2002; van de Kaa 1987). The outcome has been below replacement level fertility and rising age at first birth. Social changes in patterns of female labour market and educational participation and changes in marital and cohabitation patterns have been offered as drivers, and explanations for low and late fertility may account for postponement, voluntary childlessness and involuntary childlessness. While these are not stable or mutually exclusive 'states' - one may lead to another, and they may respond to different stimuli - each has very different implications for the level of childlessness that could be predicted, and the extent to which it may be a cause for concern for policy, society and individual couples.

Recent trends in births in Britain are visible through the period Total Fertility Rate (TFR), which (in England and Wales) dropped from a peak in 1964 of 2.95 children per woman, and remained below 1.80 into the twenty-first century, rebounding somewhat to 1.86 in 2006 (Office for National Statistics 2007)³. At the same time, mean age at first birth in England and Wales rose from 26.7 to 27.6 between 1996 and 2006 (Office

³ Office for National Statistics estimates refer to England and Wales alone. However, given that England and Wales account for nearly 90% of the UK population, and that Scottish fertility trends have mirrored those of England and Wales in terms of rising age at birth, it is suggested that these estimates do reflect national trends.

for National Statistics 2007). While not being directly indicative of rising levels of childlessness, these period indicators do demonstrate that fertility is becoming lower and later among British women. In a similar way, lower and later rates of entry to first birth cannot directly illuminate trends in completed family size; but it is easy to speculate that higher levels of childlessness and late entry to first parenthood will have a negative impact on higher order births. Withdrawal from parenthood during the twenties may be a postponement or permanent. While entry to parenthood is irreversible, deferring it increases the risk of it never happening, due to biological and other constraints. Indicators of cohort fertility show that the proportion of eventually childless⁴ women doubled from 9% for those born in 1946 to 18% for those born in 1958 (Office for National Statistics 2007). Projections for women born in 1970 suggest that 18% also will be childless by the age of 45 years (Bray 2008). These latest projections for the 1970 cohort represent a downward revision of projected childlessness for this cohort, compared with previous estimates (Bray 2006; Office for National Statistics 2004), and in fact the 1970 cohort represents a small dip in projected childlessness compared to adjacent cohorts (Bray 2008). These projections are also lower than projections from other sources that placed childlessness for the 1970 cohort around 21.5%-22% (Sobotka 2004)⁵. In fact, the 1970 cohort appears to be experiencing something of a rapid recuperation of first births in the mid thirties so that rates of parenthood become comparable with the 1958 cohort (Office for National Statistics 2007). This belies some commentators who consider recent estimates to be optimistically low (Dixon and Margo 2006). Although there may not be much of a difference in the proportion of the 1970 and 1958 cohorts who are childless at 45, at age 34 there was a 4 percentage point lead in motherhood for the 1958 cohort. In short, recent cohorts of women have been postponing first births, although the pace of this postponement, and consequences as reflected in levels of childlessness, appears to be slowing, and most women may still eventually become mothers.

Despite the widespread interest in childlessness, few studies project ultimate childlessness for relatively young cohorts of women. There is little sound evidence (or questioning) as to whether the retreat from parenthood in the twenties is a delay or a cancellation. Therefore, what has been termed postponement thus far could turn out to be permanent avoidance. Furthermore, it is unclear whether ‘postponement’ implies a full or a partial recuperation of rates of parenthood (Lesthaeghe and Willems 1999). Postponement can be used to describe the state where the proportion of parents in a later cohort is lower than in an earlier one, at the same age (e.g Simpson 2006). However, comparisons are often made of full with partially observed fertility schedules.

⁴ Childlessness in this instance refers to childlessness at the end of reproductive capacity – typically between ages 45-50 years.

⁵ Sobotka’s estimates are based upon the LS (Longitudinal Study) survey for England and Wales.

Without additional evidence, there is no basis for assuming that parenthood is either postponed or is never going to happen. However, as we have seen, the ONS projections for later cohorts (including the 1970) do assume some recuperation. This paper looks within social groups to document retreat from parenthood during the twenties, and offers some basis for the notion of recuperation.

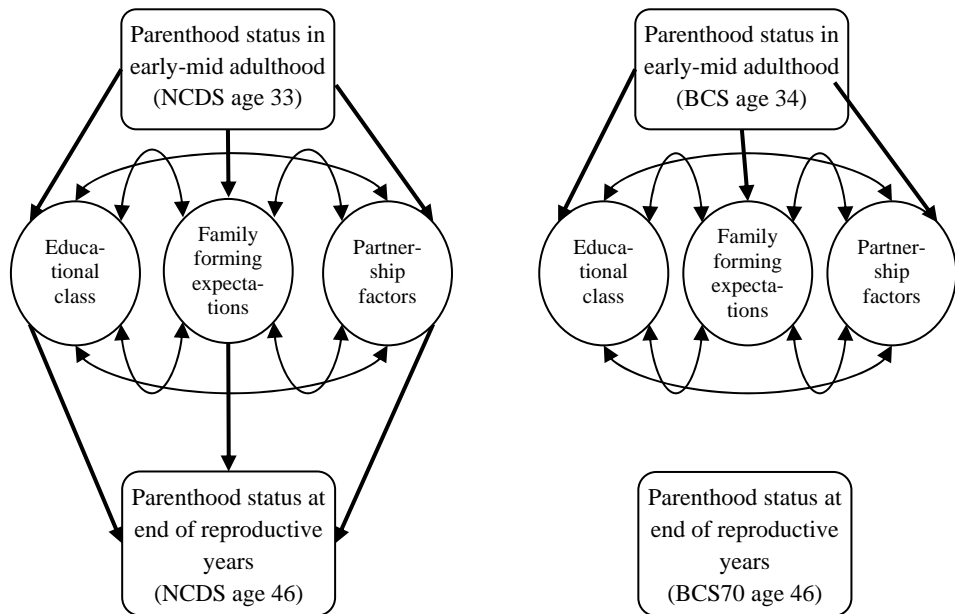
3. Childlessness and educational class in the literature

Increases in childlessness among post-war cohorts have been associated with changes in the composition of the female population in terms of educational attainment and labour market participation, and an exodus of women from 'traditional' confines as housewives (Joshi 2002; Sobotka 2004; Simpson 2006). Given the relationship between educational attainment and labour force attachment, graduate women have found themselves at the forefront of these rises, both in real terms and as a focus of popular interest. Even among graduate women, abandonment of the 'traditional' and the embrace of male academic subjects involves additional difficulties in balancing careers and motherhood (Blackwell and Glover 2007; Hoem et al. 2006), which constitute a particular incentive to defer childbearing or avoid it altogether. Low and late fertility among recent cohorts of graduate women reflects these difficulties. One estimate in circulation in the media suggested as many as 40% of British graduate women born in 1970 might expect to enter their forties remaining childless (Wolf 2006a). Other estimates (including our own preliminary ones) placed the level at approximately thirty percent for graduate women born in 1965 (Ratcliffe and Smith 2006) and 1970 (Joshi 2007). A weakness of our own preliminary estimates was the failure to fully account for postponement, something which is addressed in this paper. In fact, once we do examine the notion of postponement, the 'Monstrous Regiment' of child-free career women (Wolf 2006b) turns out to be something of a myth.

The transition to parenthood is one of several which mark the onset of adulthood; others include completing education, finding a stable partner and a permanent place to live. These events do not necessarily occur in an orderly sequence, but the passage into becoming the mother or father tends to be more prolonged for those who have prolonged their education. Graduate women have particular reasons to postpone. Firstly there is a delay while accumulating educational capital, and then there is reason to delay while accumulating career experience and avoiding the loss of earnings (and/or childcare costs) associated with motherhood (Joshi 2002). They also have more knowledge of how to avoid childbearing before they are ready for it. However the arguments for delay do not apply only to graduate women. Asset accumulation prior to embarking upon parenthood may be of greatest concern to those who are able to acquire

the most assets (usually the tertiary qualified), and may also operate entirely differently between groups. Housing is one example, where delaying parenthood is of benefit to those who are to become owner occupiers (especially graduates), but delay may be of little benefit to those who will enter social housing. Given that these benefits are shared with the partner, these factors are replicated among graduate men especially if they have graduate partners. Partnership operates more consistently, and all groups will benefit from delaying entering parenthood until the right partner has been found. In this paper, we analyse three groups for both genders – those in a high, medium and low educational class, where economic reasons to postpone parenthood will tend to be aligned within groups. We use education to proxy for a complement of socioeconomic factors influential in transition to parenthood. We also allow for transition to parenthood to depend on partnership (and partner’s characteristics), as well as family forming expectations, which are tempered by fecundity. These are incorporated into our study and outlined in Figure 1.

Figure 1: Model of factors leading to childlessness at end of reproductive years



In addition to examining the anticipated level of childlessness among graduate women, this paper will compare the situation for graduate women with graduate men, and also with other education groups. In many cases, the fact that these populations differ in their characteristics over time has not been incorporated into projections⁶. In particular, differences that occur according to their family forming intentions – a very potent measure of ‘postponement’ – have been neglected. Conceptually, family formation intentions may be one of a variety of interrelated factors that determine the transition to parenthood from the early thirties onwards. Few of the estimates of childlessness discussed earlier had used any predictors of transition to parenthood beyond educational class to refine projection estimates. This paper introduces a range of projections of levels of childlessness for the 1970 born BCS70 cohort using an observed partial fertility schedule for the 1970 cohort and a complete fertility schedule from the earlier 1958 born NCDS cohort.

The inclusion of male accounts of fertility, as mentioned, is uncommon in the literature. Much of the reason for this lack of analysis of male fertility histories has rested on the inaccuracy associated with male fertility information (Rendall et al. 1999; Greene and Biddlecom 2000). Usually the bias is assumed to be negative, with underreporting of the fathering children, and it is unknown whether underreporting varies by educational group. While this underreporting is a potential consideration of all the information presented in this paper, and specifically any estimate of childlessness we create may be too high; this bias can be assumed to be equal among both our datasets, and our findings will still reflect changes between cohorts as well as being a close approximation of the actual level. Given that parenthood is usually a joint decision between couples, our conceptual chart in Figure 1 reflects factors that apply equally to both genders.

After introducing our data sources and methods, the paper:

- describes entry to parenthood in both cohorts at observed ages
- projects childlessness for BCS70 assuming that transition to parenthood follows the age specific transition observed in NCDS with and without a downward shift based upon its lower rates up to 34
- incorporates reported family building intentions to project rather more recuperation of parenthood.

⁶ This has usually been due to data constraints. The breadth of the British Birth cohort studies allow for exploration of a number of determinants of transition.

4. Data

The British Birth Cohort studies comprise of four prospective longitudinal studies following the lives of individuals born during periods in 1946, 1958, 1970 and more recently in 2000. Ferri and colleagues and Bynner and Joshi outline the history of these studies and some of their most prominent findings (Ferri et al. 2003; Bynner and Joshi 2007) Two of them are used in this research – the National Child Development Study (NCDS) that followed individuals born in 1958 and the British Cohort Survey (BCS70) which began in 1970. Both studies prospectively followed individuals and were essentially a census of all born in one week in 1958 and 1970⁷. For the NCDS, further periods of data collection have occurred at ages 7, 11, 16, 23, 33, 41-42 and 46 years. While this last sweep may represent the end of female reproductive capacity, men may still continue to father children. Data from BCS70 cohort members were collected at ages 5, 10, 16, 26, 29-30 and 34 years. This paper examines live births, excluding stillbirths and other fertility outcomes. It excludes those still pregnant or those who have fathered a pregnancy not carried to full term⁸.

4.1 Data considerations: Attrition among the cohort studies

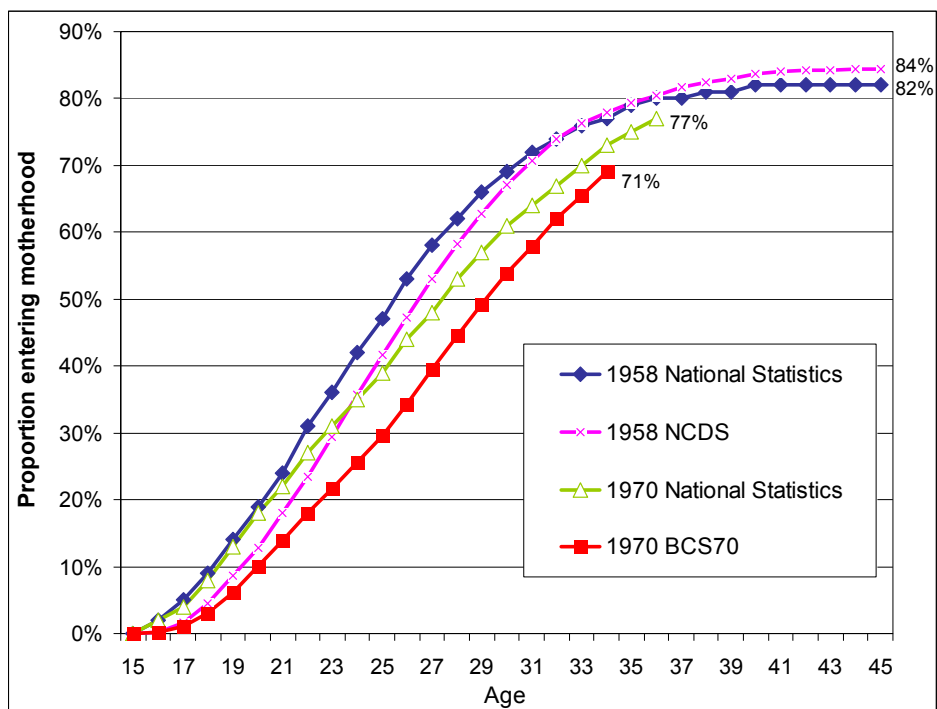
As is the case for all longitudinal studies, both cohorts have witnessed a decline in the size of samples under observation, either through death, emigration, non-response or untraceable cohort members (Plewis et al. 2004; Young et al. 2006). Cohort members who attrit from studies are thought to differ systematically from those who continue to participate (Young et al. 2006; Niccoletti and Peracchi 2005), and studies are more likely to lose men and those of low socioeconomic status. This could affect estimates of entry into parenthood. In addition, not only are men more likely to lose contact with the survey, but they are also more likely to underreport births they have previously fathered (Greene and Biddlecom 2000; Rendall et al. 1999). When comparing birth cohort estimates with national statistics estimates (Office for National Statistics 2007); for women at least, the picture is relatively close (Figure 2) showing that entry into motherhood, as estimated from the cohort studies, is representative. Additionally, entry patterns into first parenthood disaggregated by highest qualifications also mirror those

⁷ Both studies cover the three countries of Great Britain - England, Wales and Scotland. Although the 1970 cohort initially included Northern Ireland in collection of data at birth, cohort members from Northern Ireland were not followed-up. Immigrants were added to both studies in childhood waves. Ethnic minorities are not analysed separately because of the low numbers present in both cohorts.

⁸ Further details of the inclusion criteria and construction of fertility information can be found in Appendix 1.

from other sources (Rendall and Smallwood 2003)⁹. Despite these positive indications, attrition means the cohort studies no longer reflect a true census of people born in 1958 and 1970, but are a close approximation. As such all the results presented in this study are likely to contain some margin of error.

Figure 2: Comparison of national statistics cohort estimates of rates of entry into first motherhood with NCDS and BCS70 rates



⁹ Rendall and Smallwood (2003) present the following statistics from the ONS Longitudinal Study (LS) for women born 1954-1958, with NCDS equivalent figures in brackets.

Women with tertiary qualifications:

- Age at first 10th percentile of entering parenthood – 24 years (23 years)
- Final estimate of childlessness – 22.5% (23.4%);

Women with no qualifications or intermediate qualifications:

- Age at first 10th percentile entering parenthood – 18 years (18 years)
- Final estimate of childlessness – 15.2% (13.3%).

5. Methods

The methods employed in this research are grounded in Event History analysis. Specifically, the hazard rate and survivor functions are derived from lifetables and are used both to derive observed estimates and as a basis for projecting future estimates. Lifetables were selected, as opposed to a continuous estimation method, as the focus was partially on the estimation and projection of the hazard rate itself, and projecting a continuous hazard rate would have been computationally demanding¹⁰. A number of different methods are used in this paper to estimate the expected differential rates of entry into first parenthood and are described where relevant.

6. Summarising childlessness in two British cohorts

Table 1 shows levels of transition into parenthood reflected in proportions still childless at successive ages. There is a broad consistency between cohorts in levels of young parenthood (occurring before 22 years), with differences opening up thereafter. The median age at first parenthood shifted from approximately 29½ years to 33 years for men and from 26½ years for women to almost 28 years between the NCDS and BCS70 cohorts. Among all education groups the proportion of parents was lower in the BCS70 cohort, at comparable ages, than was the case in the NCDS cohort. The notable exception to this trend would be the comparatively high level of young motherhood among tertiary qualified women in the BCS70 cohort. The retreat from parenthood is greater for males, and in particular, those with tertiary qualifications up to the age of 33/34. This research examines how this difference will impact on levels childlessness for the BCS70 cohort at the end of the fertility schedule¹¹, and questions whether these existing differences in transition represent postponement or avoidance of parenthood.

This analysis uses highest qualification gained by age 33/34 years, and for the most part it is expected that this level of qualification preceded parenthood. Such assumptions are also made in other studies (Rendall et al. 2005). For the most part, this assumption is likely to ring true – the exception being tertiary qualified young mothers, more prominent although still a minority in the BCS70 cohort. The advantages of using this method which matches qualifications at two equivalent time points outweighed the advantages of using different methods such as a time varying covariate approach. In addition, this method was deemed in line with the approach of this study, which

¹⁰ Those lost to follow-up or exiting the study for reasons other than entry into parenthood are estimated to have been present for half the interval, as is standard among life table estimators.

¹¹ Fertility schedule for women, defined as 45 years here.

describes differentials and trends within populations delineated by education level, as opposed to directly measuring the impact of education.

Table 1: Cohort comparison of levels of childlessness by education level (at age 33/34 years) and gender

Gender	♂		♀	
	NCDS (N = 1,727)	BCS70 (N = 2,108)	NCDS (N = 1,550)	BCS70 (N = 2,301)
Tertiary level qualifications¹²				
Childless at age 22 years	97.2% (96.3%-97.9%)	98.0% (97.3%-98.5%)	95.3% (94.0%-96.4%)	92.7% (91.6%-93.7%)
Childless at age 34 years	38.6% (36.1%-41.0%)	55.8% (53.6%-58.0%)	35.4% (33.0%-37.9%)	42.3% (40.2%-44.4%)
Childless at age 45 years	21.7% (19.6%-23.8%)		23.6% (21.4%-25.9%)	
Intermediate qualifications	NCDS (N = 3,261)	BCS70 (N = 2,511)	NCDS (N = 3,459)	BCS70 (N = 2,716)
Childless at age 22 years	89.4% (88.3%-90.4%)	92.0% (89.2%-91.5%)	77.0% (75.6%-78.4%)	79.2% (77.6%-80.7%)
Childless at age 34 years	30.1% (28.5%-31.7%)	42.8% (40.9%-44.8%)	19.4% (18.1%-20.7%)	24.4% (22.8%-26.0%)
Childless at age 45 years	20.5% (19.1%-21.9%)		14.0% (12.8%-15.2%)	
No qualifications	NCDS (N = 686)	BCS70 (N = 285)	NCDS (N = 824)	BCS70 (N = 245)
Childless at age 22 years	78.6% (75.3%-81.5%)	84.9% (80.2%-88.6%)	49.9% (46.4%-53.2%)	47.3% (41.0%-53.4%)
Childless at age 34 years	28.3% (25.0%-31.7%)	39.6% (33.9%-45.2%)	12.0% (9.9%-14.3%)	18.7% (14.9-23.9%)
Childless at age 45 years	24.3% (21.1%-27.7%)		10.6% (8.5%-12.8%)	

Note: Numbers in brackets represent the 95% confidence intervals

¹² Tertiary level qualifications are measured at age 33/34 years and are defined as equivalent to NVQ Level 4 and above in this analysis. ‘Tertiary’ and ‘graduate’ are used interchangeably in this paper. The sample is boosted further through the addition of those recorded as having achieved a tertiary qualification at an earlier wave of data collection (age 23 years for NCDS and age 30 years for BCS70).

In terms of measuring levels of childlessness among graduates in the NCDS cohort, around a fifth of the males, and nearly a quarter of the females remain childless at age 45 respectively. Higher education is associated with higher rates of childlessness, particularly for women, where the trend is monotonic. This trend is less ordered among men, where those with no qualifications are most likely to be childless at 45. These figures do not support the conjecture that 40% of highly qualified women born in 1970 would be entering their forties without having children. By the age of 34 years, just over 42% of the BCS70 graduate women remained childless. The conjecture would only be fulfilled if no more than 2% of graduate women had children in the rest of their thirties. Forty-percent childlessness is looking more mythical than realistic, even for graduates.

7. Estimating childlessness: Exploring assumptions of a withdrawal from parenthood

If 40% is not a reasonable estimate for graduate women's childlessness, what would be? Our first attempt to project the proportion of graduate women in BCS70 remaining childless on the basis of NCDS experience post 34 came out as likely to stand in the high twenties, with a top estimate given as 31% (Joshi 2007)¹³. Our projections are sensitive to the assumptions made to take forward the lower proportion of parents at age 34 years in the 1970 cohort compared to the earlier 1958 cohort. In this section we use two assumptions about progression to parenthood. The first is that the BCS70 cohort has a permanently lower propensity to enter parenthood at any given age than NCDS which involves a constant downward shift of the hazard of a first birth at all ages. In other words, the overall lower propensity for entering parenthood observed over earlier years is set to continue at the same proportional rate compared to that of NCDS, for imputed BCS70 values. We refer to this first scenario as a 'flight from parenthood'. The second scenario is that the BCS70 cohort have been following a slow path into parenthood during their twenties and early thirties, but will replicate the same age specific propensities to become parents as the NCDS at equivalent ages, if childless after 34 years. We refer to this scenario as a 'late NCDS scenario', which applies the pattern of consistently diminishing hazards of entry into parenthood of the NCDS cohort onto the later BCS70 cohort. This scenario is almost analogous to saying that some obstacle is removed at age 34 years so that the BCS70 can progress into parenthood at the same rate as the NCDS cohort thereafter. Neither approach fully

¹³ This was rounded to a 'third of graduate women' remaining childless in press coverage (Leapman 2007; Clerkin 2007).

embraces the notion of postponement as neither explicitly incorporates any catch-up effect of births 'lost' during the twenties. To return to the discussion at the beginning of the paper, both of these approaches only allow for a permanent flight from parenthood, as opposed to re-timing - both approaches differ in their assumption as to the length of this withdrawal, the former stating that the brake on entering parenthood lasts over the whole fertility schedule, the latter that it is only held down until the early thirties, but that the subsequent regaining of speed is not sufficient to make up the ground previously lost. The results from both scenarios are presented in Table 2, where all estimates again refer to the proportion childless – based on observed data for NCDS and projected data for BCS70.

Should the difference in the rates of childlessness at 33/34 years be interpreted as a permanent and continuing avoidance of parenthood ('flight from parenthood' referred to earlier), then this difference could be modelled using the derivative from a traditional Cox model. This assumes that the difference in transition rates between the BCS70 cohort relative to the NCDS cohort should be factored in future projections of BCS70 parenthood. The model makes the assumption that the difference remains constant throughout the parenthood schedule, known as the proportionality assumption (Singer and Willett 2003; Jenkins 2004)¹⁴. When 'flight from parenthood' models are constructed, Table 2 shows a level of 31% childlessness is reached for graduate women born in 1970. This estimate represents a conservative estimate of entry into parenthood for the 1970 cohort in the absence of postponement and further reduces the possibility of 40% childlessness among graduate women. Of interest, however, is that predicted childlessness among graduate men, under the assumption that parenthood is being consistently avoided by BCS70 cohort members, does reach 40%.

In the second, 'late NCDS scenario', assuming that the BCS70 cohort will follow the same transition rates as the NCDS cohort during their thirties and forties, the proportion of tertiary qualified women expected to remain childless would reach around 28.3% (Table 2). For highly qualified men, the level of childlessness under this scenario is expected to reach 30.5% – for both sexes well under one third. 'Late NCDS scenario' projections show some interesting trends in terms of education and predict divergent trends by education for men and women. For BCS70 women, educational attainment appears to restrict entry into motherhood, as was the case among the NCDS cohort. However, this differential may be narrowing. In the NCDS cohort, for each woman with no qualifications who remained childless at the age of 45 years, there were expected to be 2.23 childless tertiary qualified women. For the BCS70 cohort, this ratio had reduced

¹⁴ Schoenfeld residual tests are used to assess the proportionality assumption. Where appropriate, the cohort effect for the whole observation period (16-32 years) is used. Where there proportionality assumption is violated through using such a wide observation period, a narrower, later range is used.

to 1.66. In the case of men, the projected rates of childlessness are not significantly different across educational groups.

While both sets of projections provide a range of possible courses of transition to parenthood, they do not take into account any postponement effect, as births lost during earlier years are not recuperated. In essence, these methods assume that a compensatory catch-up effect will not occur to account for the reduced rate of transition to first parenthood observed among the BCS70 cohort up to the age of 34 years. The following sections begin by presenting descriptive statistics that offer evidence of postponement, as opposed to avoidance, through examining family building intentions, before taking these into account in the models. Once these intentions are accounted for, the results are far less suggestive of any significant rise in childlessness, particularly among graduate women.

Table 2: Estimated childlessness at age 45 years for the NCDS cohort and projected childlessness for the BCS70 cohort using coefficients derived from 'flight from parenthood' and 'late NCDS' scenarios (see Appendix for model coefficient)

Gender	Education level	NCDS childless (age 45 years)	BCS70 childless	BCS70 childless
			projections in 'flight from parenthood' scenario)	projections in 'late NCDS' scenario)
♂	Tertiary qualifications	21.7% (19.6%-23.8%)	39.7% (37.6%-41.8%)	30.5% (28.6%-32.4%)
	Intermediate qualifications	20.5% (19.1%-21.9%)	33.9% (32.0%-35.8%)	30.1% (28.3%-31.9%)
	No qualifications	24.3% (21.1%-27.7%)	35.3% (29.8%-40.9%)	33.9% (28.5%-39.4%)
♀	Tertiary qualifications	23.6% (21.4%-25.9%)	31.0% (29.0%-33.0%)	28.3% (26.4%-30.3%)
	Intermediate qualifications	14.0% (12.8%-15.2%)	18.6% (17.1%-20.1%)	17.3% (15.9%-18.8%)
	No qualifications	10.6% (8.5%-12.8%)	17.6% (13.1%-22.7%)	17.0% (12.6%-22.0%)

Note: Numbers in brackets represent 95% confidence Intervals ¹⁵

¹⁵ Confidence intervals for cumulative survivorship functions are calculated using Greenwood's formula. See Collett (2003) for theoretical description and Robertson and Westbrooke (2005) for both a description and a guide to manual calculation

8. Exploring measures of postponement and partnership characteristics for estimating childlessness

We have already witnessed the consequence of avoidance of parenthood, which may be equated to a certain extent with deliberate/voluntary childlessness. This section takes this further by examining family forming intentions (which we term an indicator of 'postponement') and patterns of partnership, both of which are likely to be direct mediators of entry into parenthood (Simpson 2006). In particular, while we examine changes in partnership rates among those childless at their early thirties, we also examine the impact of changes in terms of the age differential between partners.

Our educational groups can be further stratified by family formation intentions. There is some information on intentions about becoming a parent collected at age 33 years for NCDS, and 30 years for BCS70 cohort members. This three year gap in measurement point is a weakness of our paper, although a three year gap between 30 and 33 years is of less concern for us than a three year gap at younger ages. In addition, other datasets indicate that the intentions of women changed very little between these ages (Smallwood and Jefferies 2003)¹⁶; and we feel that this small disparity in measurement point is a limitation rather than a prohibition of using this information. There is also data on cohabitation, marriage and other relationships, at these points as well as at 34 years for BCS70. Descriptively, the population that remained childless at the early thirties has changed between cohorts in terms of intentions although has remained relatively stable in terms of whether or not they have a partner (Table 3). However, there are differences in the nature of these relationships including the age of the partner.


There is little difference in the proportion of childless BCS70 cohort members compared to NCDS cohort members involved in a relationship when considering relationship status as being any form of relationship, be this marriage, cohabiting or 'living apart together'¹⁷ at age 33/34 years. However, BCS70 cohort members of both genders and all education levels are more likely than their NCDS counterparts to be aged within a year of their cohabiting/marriage partner. Among men, there is an overall levelling of differentials within cohabiting and marital relationships in terms of age although among women, despite the increase in relationships where both partners were aged within approximately a year of each other, there was also a slight increase in relationships where women were the older partner. Preliminary examinations found the


¹⁶ Smallwood and Jefferies' data suggests that for women aged 30-32 years in 1988-90 (our NCDS equivalent), 9% wanted to remain childless and the average family size was 2.14. For women aged 33-35 years in 1991, 9% intended to remain childless and gave an average intended family size of 2.17. This data refers to all women (mothers and childless) and measures intentions.

¹⁷ No age information on the partner exists for those 'Living Apart Together'.

age differential between partners to impact upon transition to first parenthood, with a younger partner being associated with quicker transition to parenthood (not shown).

Table 3: Relationship status and age differential among the BCS70 and NCDS cohort members who remained childless at age 33/34 years (based on those with valid fertility information and education status)

Relationship status/ age differential (Women)	Tertiary qualified		Intermediate qualifications		No qualifications	
	NCDS (n=654)	BCS70 (n=982)	NCDS (n=1030)	BCS70 (n=1056)	NCDS (n=200)	BCS70 (n=113)
Cohabiting/married and over 1 year older than partner	33.6%	27.3%	28.7%	28.8%	15.0%	8.6%
Cohabiting/married and aged within 1 year of partner	8.9%	18.6%	6.8%	14.7%	6.5%	10.6%
 Cohabiting/married and over 1 year younger than partner	15.4%	10.2%	13.0%	10.4%	7.0%	10.6%
Cohabiting/married with no age information or in a non-cohabiting relationship	15.7%	15.9%	16.0%	11.9%	9.0%	10.6%
Not in a relationship	24.6%	26.2%	34.4%	31.7%	61.0%	47.8%
No information	1.7%	1.8%	1.1%	2.5%	1.5%	1.8%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Relationship status/ age differential (Men)	Tertiary qualified		Intermediate qualifications		No qualifications	
	NCDS (n=541)	BCS70 (n=845)	NCDS (n=715)	BCS70 (n=655)	NCDS (n=100)	BCS70 (n=46)
Cohabiting/married and over 1 year older than partner	8.5%	11.6%	8.8%	11.3%	2.0%	6.5%
Cohabiting/married and aged within 1 year of partner	11.8%	19.3%	10.2%	16.3%	8.0%	8.7%
 Cohabiting/married and over 1 year younger than partner	36.4%	26.3%	38.5%	33.4%	33.0%	13.0%
Cohabiting/married with no age information or in a non-cohabiting relationship	18.1%	15.7%	16.9%	11.8%	12.0%	23.9%
Not in a relationship	24.4%	25.6%	25.3%	24.9%	45.0%	45.7%
No information	0.7%	1.5%	0.3%	2.3%	0.0%	2.2%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

In these data, family formation expectations are grouped into five different categories from cohort members' responses to questions about the fecundity status of themselves and their partner and about their desire to have children. Both cohorts were asked virtually identical questions about their desire to have children and we group those who said 'yes' as being those open to having more children, those who said 'no' as categorically not wanting children. The split between these two categories is displayed in Table 5 for comparative purposes. We group as third category those who responded 'don't know' together with those who responded that they were fertile but gave no response on the desire for children. Our fourth category, infertile, is composed of those who responded that they, or their partner, were infertile or had been sterilized. This group is likely to represent an undercount, given that some cohort members would not know if they were sterile/infertile, although we assume the same bias exists in both cohorts. Our final category is those where we don't know both their fecundity status and intentions. Given that we know the parenthood and educational status of this group, we choose not to lose these observations, so we model the information for this group as 'missing' and assume that the reasons for missing information are similar among both cohorts. The comparison between graduate females (non-mothers) of the two cohorts (Table 4) and shows a larger population of highly educated childless women in BCS70 who intend to have children (childless at 34 but intentions asked at 30) compared to NCDS (at 33) among those with non-missing data. Further evidence on those still childless at each educational level (Table 5) shows a generally rising ratio between those categorically not wanting children (and likely to remain voluntary childless) and those who intend to have children in the future (potentially involuntary childless). Among those BCS70 cohort members who remained childless at age 34 years, a significant rise in those intending to become parents when asked at age 30 years (compared to those categorically avoiding parenthood) is observed in Table 5 between cohorts for all groups except for tertiary qualified men, where the rise is not significant.

**Table 4: Family formation intentions for tertiary qualified females
(Non missing data for - BCS70: childless at 34 but intentions asked at 30; NCDS: intentions asked at 33, data for those childless at 33)**

Fertility expectations	NCDS	BCS70
Fertile and open to having more children	44.6%	58.3%
Fertile and categorically not want children	20.9%	13.9%
Fertile and don't know intentions	32.2%	23.6%
Infertile/partner infertile	2.4%	4.2%
N	435	721

Table 5: Ratio of positive to negative fertility intentions by cohort, gender and education level for fertile¹⁸ BCS70 and NCDS cohort members (BCS70: childless at 34 but intentions asked at 30; NCDS: intentions asked at 33, data for those childless at 33)

Gender	Education level	NCDS	BCS70
♂	Graduate level	4.0 : 1 (n=356)	4.9 : 1 (n=668)
	Less than graduate	2.2 : 1 (n=476)	3.8 : 1 (n=704)
	No qualifications	1.1 : 1 (n=77)	2.5 : 1 (n=63)
♀	Graduate level	2.1 : 1 (n=276)	4.2 : 1 (n=571)
	Less than graduate	1.6 : 1 (n=343)	3.1 : 1 (n=440)
	No qualifications	0.9 : 1 (n=40)	1.9 : 1 (n=26)

The exploration of family formation intentions suggests that more of the BCS70 cohort members still childless at 34 intended to have children, than among those remaining childless at 33 in NCDS, who would have a larger component of people with low probability of ever becoming parents. This descriptive evidence suggests that the BCS70 cohort is postponing, as opposed to avoiding, parenthood. This postponement may also be partly structural, as opposed to solely preference based, given that there was a smaller age gap and more cohabitation among the BCS70 cohort than NCDS (Table 3). In terms of the intentions, while there is always the possibility that the differences may be caused by differentials in measurement point, this is contested by other evidence (Smallwood and Jefferies 2003) and by the small nature of the interval. In the next section we introduce both partnership and family building intentions into our models.

¹⁸ 'Fertile' refers to both the cohort member's fertility and that of their partner. Generally, those who were infertile or who had a partner who was infertile were not asked about their fertility intentions in this section. Therefore, those who have no response for either the infertility or intentions questions are categories in the missing category.

9. Refining estimates of childlessness

In the preceding section it was observed that the childless population measured at the early thirties had changed between cohorts both in terms of partnership characteristics and family forming intentions. This information can be incorporated into projections of entry patterns into parenthood through adaptations to the Cox Proportional Hazards model. The separability assumption of covariates from the baseline hazard and the additive properties of the covariates (Singer and Willett 2003; Jenkins 2004) mean that derivatives from the models can be incorporated into projections.

$$\theta(t | x_j) = \theta_0 t * \exp(\beta_j x_j)$$

The model describes the relationship between covariates on the hazard of experiencing parenthood within a given period, in relation to the baseline hazard. The baseline hazard represents the hazard when the value of covariates is set to zero. In this case, the baseline hazard is taken from a joint consideration of sample size and frequency of events. A condition of the model is that the relationship between covariates should remain proportional throughout the observation period. The model in this case describes the effect of partnership and fertility intentions¹⁹ on entry into parenthood among NCDS cohort members from age 33 to age 45 years. Derivatives from the fitted model are then applied onto specific subpopulations of childless BCS70 cohort members. The underlying assumption is that both cohorts will behave similarly according to fertility intentions and equally those with missing responses will also behave similarly on aggregate. The baseline category used for the BCS70 is also that used for NCDS in this case. In essence the model accounts for the different composition in terms of intentions and partnership and weights for these factors accordingly. The model is dependent on having a large number of events and individuals belonging to the baseline category.

Construction of an education and gender specific model that accounted for a binary indicator of partnership status, age differentials, and fertility intentions was found to raise the levels of childlessness predicted among BCS70 cohort members compared to all earlier projections presented thus far. This was due to the small number of events that occurred in some years within the baseline category. The models constructed were very sensitive to the impact of any periods where no events occurred and this led to high rates of childlessness among tertiary qualified males of 40.4%, and for females up to 33.6%. In addition, the model derivatives from the underlying Cox model were found to violate the proportional hazards assumption when examining Schoenfeld residuals.

¹⁹ Fertility intentions in this case is composed of a joint variable that reflects infertility and fertility intentions.

These proportionality issues were not encountered in a simpler model that treated partnership status as a binary variable (partnered versus non partnered) and ignored any age differentials. The results from this simpler model are presented in Table 6, with the results from both the simpler and more complex models using this method giving very similar results²⁰.

Table 6: Estimated childlessness at age 45 years for the NCDS cohort and projected childlessness for the BCS70 cohort using coefficients derived from Cox model of the effect of partnership and intentions NCDS (see Appendix Table A3 for model coefficients)²¹

Education level	NCDS childless (age 45 years)	BCS70 childless (age 45 years projections using Cox method)
Tertiary qualified males	21.7% (19.6%-23.8%)	40.7% (37.6%-43.7%)
Tertiary qualified females	23.6% (21.4%-25.9%)	34.6% (32.0%-37.2%)
Males with intermediate qualifications	20.5% (19.1%-21.9%)	34.5% (32.3%-36.7%)
Females with intermediate qualifications	14.0% (12.8%-15.2%)	21.9% (20.2%-23.7%)

10. Towards a preferred estimate of childlessness

Including both information on intentions and partnership presented two problems in our models. Foremost, from a computational perspective, information from small sub-samples of the population was being projected as leading to no events being observed in some periods. This may have exaggerated estimates of childlessness in BCS70, and the problem was compounded with further stratification given the low number of events in the NCDS after age 33 even among those who did intend to have children in some years. Secondly, although the models controlled for postponement in childbearing with the inclusion of family forming intentions; they did not control for the possible postponement of partnership formation beyond the situation observed at 33/34. From a theoretical perspective, partnership expectations, should have been included in the

²⁰ Estimates were not constructed for those with no qualifications because of sample size issues.

²¹ Confidence Intervals are again based upon Greenwood's formula. However in this case, these are only approximations of the Greenwood formula given that this estimate is based upon aggregated data itself.

models rather than partnership status, but this information was not collected at the relevant time for the cohort studies. As such, a simpler model that includes only fertility intentions may be the most computationally and theoretically viable.

In fact, when future stratified projections are adjusted to account for family building expectations²², the proportion of the BCS70 cohort expected to remain childless reduced significantly for all groups compared to all previous estimates presented thus far. At the age of 33 years, of those childless women who were fertile and intended to have a first child among the NCDS cohort, 60% were estimated to become mothers up to the age of 45 years. Given that such a high proportion of BCS70 women fell into this latter category of currently childless but intending to have children, weighting the data accordingly reduced the proportion of tertiary qualified women projected to be childless. A similar story existed for tertiary qualified men. These changes show that for tertiary qualified women, after accounting for family building intentions, the projected estimate of childlessness is just 1.8 percentage points higher for BCS70 women and 4.8 percentage points higher for BCS70 men, compared to NCDS levels. We propose that taking into account family building intentions in these models picks up postponement in the BCS70 cohort and therefore overwrites the ‘flight from parenthood’ scenario that postulates a permanent withdrawal from parenthood.

Similar reductions in the proportion childless were observed among other education groups once infertility and intentions information was accounted for, with the largest reduction observed among males with intermediate qualifications compared to an unweighted estimate (late NCDS scenario). All the reductions were due to a higher proportion of BCS70 cohort members stating that they intended to have children.

²² In this case, Cox model derivatives are not necessary as with less stratification there are larger sample sizes. The projections represent the projected fertility schedule for BCS70 when the samples are split into those infertile, those fertile and intending on having children, those fertile and not intending to have children, those fertile and whose intentions are unknown and those where fertility status and intentions are unknown. The infertile group is composed of those cohort members who are infertile and/or have an infertile partner, under the assumption that partnership status will remain constant.

Figure 3: Females with tertiary qualifications: estimated entry patterns for the NCDS cohort and projected entry patterns for BCS70 cohort members using NCDS transition rates ('late NCDS scenario' leading to higher estimated childlessness) and NCDS rates adjusted for postponement and infertility (lower estimated childlessness)

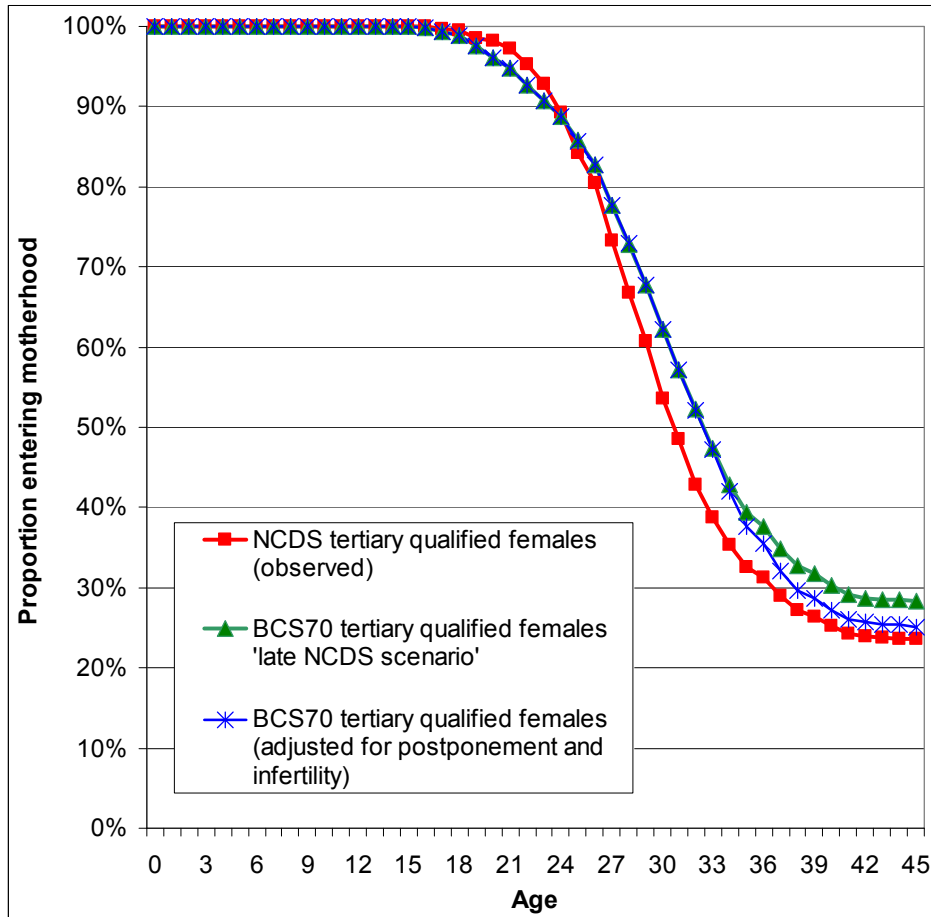


Figure 4: Males with tertiary qualifications: estimated entry patterns for the NCDS cohort and projected entry patterns for BCS70 cohort members using NCDS transition rates ('late NCDS scenario' leading to higher estimated childlessness) and NCDS rates adjusted for postponement and infertility (lower estimated childlessness)

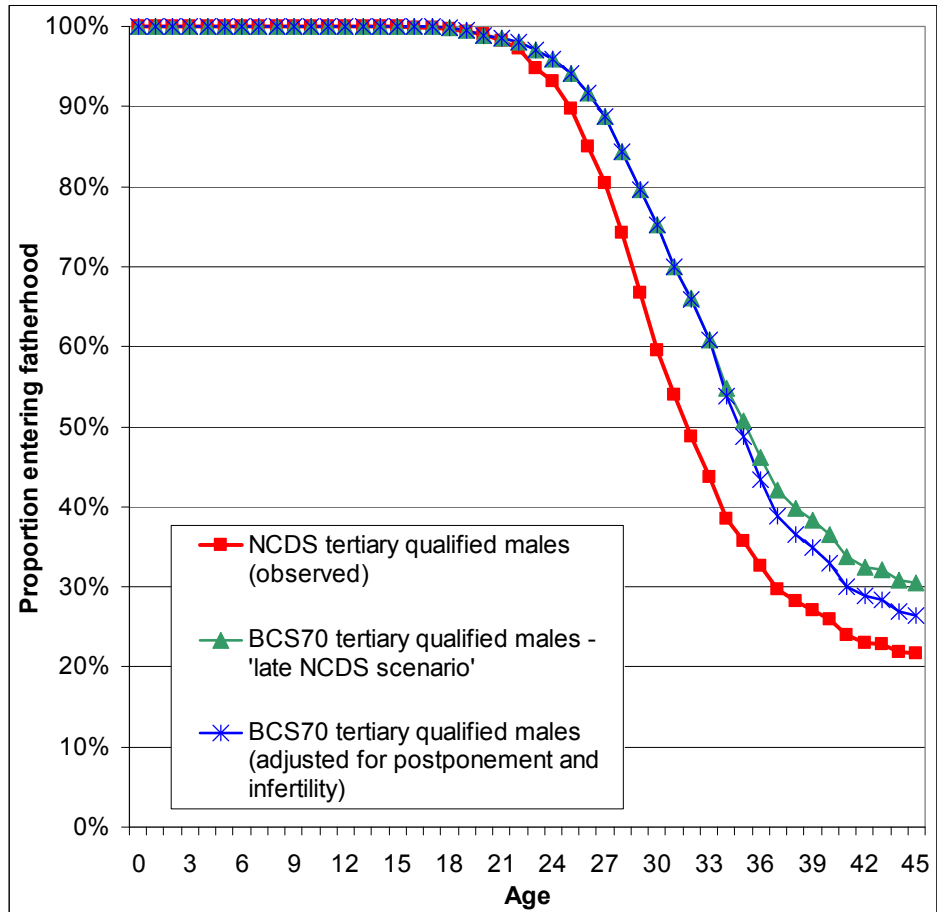


Table 7: NCDS and BCS70 projected rates of childlessness at age 45 years using NCDS transition rates – without and with adjustment for infertility and intentions information

Gender	Educational level	NCDS % childless at age 45 years	BCS70 projected % childless at age 45 years	
			'late NCDS' scenario ²³	adjusted for fertility intentions and infertility
♂	Tertiary qualifications	21.7% (19.6%-23.8%)	30.5% (28.6%-32.4%)	26.5% (24.5%-28.5%) ²⁴
	Intermediate qualifications	20.5% (19.1%-21.9%)	30.1% (28.3%-31.9%)	25.6% (23.8%-27.3%)
	No qualifications	24.3% (21.1%-27.7%)	33.9% (28.5%-39.4%)	29.3% (24.1%-34.6%)
♀	Tertiary qualifications	23.6% (21.4%-25.9%)	28.3% (26.4%-30.3%)	25.2% (23.3%-27.0%)
	Intermediate qualifications	14.0% (12.8%-15.2%)	17.3% (15.9%-18.8%)	15.3% (14.0%-16.7%)
	No qualifications	10.6% (8.5%-12.8%)	17.0% (12.6%-22.0%)	16.1% (11.8%-21.0%)

11. Summary and study limitations

The extended period of transition into adult roles means that men and women are on average older when they experience parenthood in more recent cohorts. The median ages at first parenthood rose by 3½ years and 1½ years for men and women of the BCS70 cohort respectively compared to their NCDS counterparts. Because of changes in the social composition of cohorts, it is logical to look at trends in entry to parenthood within socially stratified groups. This investigation began with some of the estimates of transition to parenthood of one such group – tertiary qualified women – but has documented changes within all strata and for men as well as women. This paper has also described some of the trends towards increasing gender equality in the BCS70 cohort – not only are BCS70 women more likely to be tertiary qualified than their predecessors, and to the equivalent level of their male counterparts; but they are also more likely to have partners close to their own age. In particular, a key finding of this paper has been the incompleteness of considering only female fertility histories when examining fertility trends.

²³ Using NCDS Rates, as Table 3.

²⁴ Confidence Intervals are again based upon Greenwood's formula. However in this case, these are only approximations of the Greenwood formula given that this estimate is based upon aggregated data itself.

Males of all education levels in the 1970 cohort entered parenthood at a lower pace than their equivalent NCDS predecessors, and much more so than BCS70 women. Highly educated males showed most postponement at age 34 years, even more than highly educated women. When projecting these data forward and establishing how many BCS70 cohort members would eventually become parents by age of 45, under a variety of assumptions, BCS70 tertiary qualified men were predicted to sustain rates of childlessness ranging between 26-40%, the highest of any group. BCS70 tertiary qualified women were projected to experience rates of eventual childlessness of between 25-35%. Projections for those males and females with intermediate and no qualifications showed a lower proportion of parents than NCDS, but differences between these two groups tended to narrow for BCS70. Our preferred method of projection, stratifying the cohort according to fertility intentions to allow for postponement, unsurprisingly, generates the lowest rates of childlessness. These forecast approximately a quarter of tertiary qualified men and women to be childless by age 45. These projections consolidate descriptive evidence that later cohorts are postponing, as opposed to avoiding, parenthood. We find no credible evidence to suggest 40% of tertiary qualified women born in 1970 will enter their forties childless and a figure well under a third is far more likely.

This exercise has revealed the inadequacy of considering only female fertility histories when considering fertility trends. The increasing and differentiated delay at entry to fatherhood and male childlessness are important aspects of the shifting pattern of parenthood in Britain. While we acknowledge that there is some margin of error associated with estimates in terms of underreporting of fatherhood trajectories, we have assumed that this error is distributed equally across cohorts.

As noted, these projections rest upon various assumptions, which in themselves present theoretical challenges. This paper does not attempt to model the causal relationship between fertility and education. Instead, it examines trends within separate populations that are stratified by the level of education attained in the early thirties, describing their trajectories of entry into parenthood and projecting these patterns forward. This rests upon the assumption that education preceded childbirth, or was anticipated. This may not be the case particularly for the non-negligible minority of tertiary qualified early mothers in the BCS70. Any earlier age of assessing attainment would have introduced inconsistencies in measurement points between cohorts²⁵. It also should be noted that the favoured projection is based upon reported expectations: material and biological circumstance may prevent cohort members from achieving

²⁵ Age 33/34 was the point that was closest between both cohorts. An alternative could have been comparing the 23 year olds with 26 year olds but this difference would be great given the relative young age of both cohorts. In addition, the BCS70 26 year old survey would have suffered from low response as a self-completed postal survey was used. The date of obtaining highest qualification is not collected consistently between cohorts, which precluded using qualifications gained by a younger age, retrospectively.

intended fertility which may change over time. In addition, some research has highlighted the tendency of women to overestimate their future fertility and this may be linked to age (Smallwood and Jefferies 2003; Berrington 2004; McAllister and Clarke 1998)²⁶. However, given that both cohorts were asked the same question at around the same age, there is little reason to expect that this ‘overestimating’ bias would be unevenly distributed between cohorts. In reality, all intentions with respect to female fertility, and to a lesser extent male fertility, are moderated by fecundity – known to decrease linearly from the early twenties (McDonald et al. 2005). This may be moderated for a minority by assisted fertility technology to which the BCS70 cohort have more access. Nevertheless, postponement represents a risky strategy and there is no indication of exactly how far into the fertility schedule BCS70 cohort members intend to postpone. Finally, there is both a lack of evidence and of neutral vocabulary to distinguish the situation where not becoming a parent is seen as revealing positive agency (avoidance) or has the negative connotations of failures or frustration beyond individual control. In practice, some childlessness seen is ambivalent²⁷.

12. Conclusions

The implications of postponement, presented in this paper as the rise in population who do not have children until their thirties, are two-fold. Firstly, we can expect a rise in the numbers experiencing ‘ambivalent’ childlessness is likely to occur. This group of people have been termed ‘perpetual postponers’ elsewhere in the literature – a group (of women) who maintain a latent desire for children but do not act upon this either at all, or until it’s too late (Berrington 2004). The rise in ‘perpetual postponers’ could lead to, greater reliance on assisted methods of conception (Beets 1995), further decreases in birth rates at all orders, rises in the numbers adopting or fostering children and possible rises in partnership dissolutions where childlessness becomes a destabilising factor. This is a group whose fertility ideals might be addressed by policies which eased the obstacles to starting parenthood sooner. Secondly, the impact of having older (and ‘oldest’, those aged 40 and above) parents on children’s development and socioeconomic circumstances is comparatively under-researched in comparison to the

²⁶ McAllister and Clarke (1998) state that younger women actually under estimate their fertility when asked about family formation in their early twenties, although Smallwood and Jefferies find young women in their study overestimate their fertility by at least 10%.

²⁷ The term ambivalent is used as opposed to involuntary childlessness to reflect the distinction that these were cohort members who were open to having children, although not necessarily actively planning/seeking to become parents. The portion of this group not actively planning/seeking to become parents who remain childless should more accurately be termed voluntary childless, as according to McAllister and Clarke’s distinction (1998).

impact of having younger parents. While it is known that having an older first time mother is usually associated with advantageous material circumstances, this is not always the case for the oldest first time mothers. Little is known of the effect of having older parents on parenting styles, health or future material dependency. In addition, the composition of households may begin to change, parents may become dependents much earlier in their children's working lives.

The process of delaying parenthood among the 1970 birth cohort is more striking for highly qualified men than highly qualified women. This suggests that the postponement of parenthood is not solely due to the career aspirations of highly qualified women. In many cases it is likely to be a joint decision of career couples, or a decision of both men and women with careers to avoid commitments to childrearing partnerships. In addition, smaller age gaps between partners may also be influential in slowing transition to first parenthood. As parenthood is a two-person enterprise, it is apparent that family friendly policies should concern both men and women given that careers need not necessarily be incompatible with childrearing.

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Appendix 1: Sample inclusion for fertility data

NCDS sample inclusion

At age 23 and 33 years, full fertility histories were collected. At age 33 years this was collected through two measures, with differences reconciled in a later release (Di Salvo 2000). At the next point of data collection (41-42 years), fertility information was collected through a CAPI (Computer Assisted Personal Interview) instrument. For those respondents present at 33 years, fertility information since 1991 was explicitly collected; while for other respondents fertility information since their previous interview was collected through a CAPI filtering system. However, the analysis of births reveals no distinction in the average date of first birth recorded between those continuing the study and those rejoining. While for some respondents rejoining the study at 41-42 years, this may represent an accurate picture in that their first birth did occur after 1991, this is unlikely to be the case for some recorded in this way.²⁸ Because of this potential problem, some observations have been artificially truncated at age 23 years, while information for a small minority of others has not been used in this analysis. The following table outlines the inclusion criteria for NCDS fertility information.

Further reduction of the sample used for the analysis occurs through missing data for other covariates, as can be observed in the sample sizes included in the paper.

BCS70 sample inclusion

For BCS70, no such complex inclusion criterion is needed. Cohort members were asked for a full fertility history at age 30 and 34 years. In total, 11,924 records of fertility history can potentially be used in the analysis, although as for NCDS, some reduction is expected where there is missing data on covariates.

²⁸ While there are cases of births occurring before 1991 among those rejoining the study and those continuing the study; these cases are proportionally more numerous in the group continuing the study.

Table A1: Inclusion criteria for use of fertility data: NCDS by presence at sweeps 4-7

Present	Number	Truncation/adjustment
Ages 23, 33, 41-42, 46 years	7138	Censored at 46 years
Ages 33, 41-42, 46 years	947	Censored at 46 years
Ages 41-42, 46 years	294	Not used
Ages 23, 46 years	104	Censored at 23 years
Ages 23, 41-42 years	383	Censored at 23 years
Ages 23, 33 years	887	Censored at 33 years
Ages 23, 33, 41-42 years	1444	Censored at 42 years
Ages 33 and 46 years	63	Censored at 46 years
Age 23 years	1591	Censored at 23 years
Age 33 years	310	Censored at 33 years
Age 41-42 years	203	Not used
Ages 33, 41-42 years	320	Censored at 42 years
Ages 23, 33 and 46 years	298	Censored at 46 years
Ages 23, 41-42, 46 years	690	Censored at 23 years
Total potentially included	14672	
Total in analysis	14175	

Appendix 2: Cox model coefficients examining cohort differential in entry to first parenthood

These coefficients represent the impact of being in the BCS70 cohort versus the NCDS cohort (baseline), stratified by educational level, on the hazard of parenthood and are used in the calculations presented in Table 2 (flight from parenthood scenario).

Table A2: Cox model coefficients examining the impact of cohort in observed transitions up to age 34 years

Gender	Education level	B	p-value
♂	Tertiary qualifications	-0.51	0.00
	Intermediate qualifications ²⁹	-0.36	0.00
	No qualifications	-0.26	0.00
♀	Tertiary qualifications	-0.22	0.00
	Intermediate qualifications	-0.20	0.00
	No qualifications ³⁰	-0.34	0.01

²⁹ Because of concerns of proportionality, the beginning observation date was altered to 23 years

³⁰ Because of concerns of proportionality, the beginning observation date was altered to 23 years

Appendix 3: Cox model coefficients examining the effect of partnership and intentions on entry into parenthood among the NCDS cohort from the age of 33 years

These coefficients represent the impact of different categories of partnership and family forming intentions among NCDS cohort members from the age of 33 year onwards and are used in the calculation of estimates presented in Table 6. The information for those with no qualifications is not presented as no estimates were created due to the consistently small sample sizes that this level of stratification brought.

Table A3: Cox model coefficients examining the effect of partnership and intentions on entry into parenthood among the NCDS cohort from the age of 33 years

	Males				Females			
	Tertiary qualified		Intermediate qualifications		Tertiary qualified		Intermediate qualifications	
	β	p-value	β	p-value	β	p-value	β	p-value
Fertility intentions								
Baseline: fertile and intend on children								
Infertile/ fertility status unknown	-0.94	0.00	-1.34	0.00	-0.98	0.00	-1.53	0.00
Fertile and don't intend on children	-1.83	0.00	-1.34	0.00	-1.84	0.00	-1.77	0.00
Fertile and don't know intentions	-0.68	0.00	-0.34	0.01	-0.47	0.01	-0.60	0.00
Current relationship status								
Baseline: in some form of relationship								
Not in any form of relationship	-1.02	0.00	-0.89	0.00	-0.96	0.00	-0.74	0.00