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Childbearing postponement and child wellbeing in the U.K.

Reconciling and integrating different perspectives

Alice Goisis

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Declaration of Authorship

I certify that the thesis I have presented for examination for the MPhil/PhD degree of the London School of Economics and Political Science is solely my own work other than where I have clearly indicated that it is the work of others (in which case the extent of any work carried out jointly by me and any other person is clearly identified in it).

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I confirm that Chapter 3 was jointly co-authored with Dr. Sigle-Rushton and I contributed 60% of this work.

Alice Goisis

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Abstract

The demographic literature has tended to interpret the postponement of childbearing, experienced in developed countries over the past three decades, as beneficial for families. As women who postpone their first birth accumulate resources before they become mothers, an increasing maternal age at first birth is expected to be positively associated with children's wellbeing. Existing evidence is only partially able to support these arguments, primarily for two reasons. Firstly, the demographic literature has been mainly preoccupied with the social aspects of postponement, ignoring that, as showed by the medical literature, older childbearing may involve health complications and result in worse outcomes for children. Indeed, the link between postponement and child wellbeing may depend on how late the birth occurs. Secondly, the "weathering" hypothesis literature argues that the link between maternal age and child wellbeing is heterogeneous for population subgroups. Ethnic minority women may have fewer opportunities to acquire resources even if they postpone childbearing. Because of the disadvantage and racism they endure, they may experience a more rapid deterioration of their health, which implies that their children's wellbeing might worsen, rather than improve, with increasing maternal age at birth. The original contribution to knowledge of this thesis is that of investigating the way childbearing postponement is associated with family and child wellbeing by integrating and reconciling different perspectives on maternal age, which have so far been developed and applied relatively independently.

The research focuses on the U.K. context, on first births and compares (children born to) Black and White mothers. The results, on average, support the arguments of the demographic literature as first born children of older mothers (30+) fare significantly better than children of younger mothers, although, consistent with the medical literature, the benefits cease to accumulate at particularly advanced maternal ages. However, consistent with the "weathering" hypothesis literature, the results suggest that when analysed separately for Black and White mothers, the association between maternal age and child wellbeing varies across these groups. Indeed, Black/White gaps in child low birth weight widen with increasing maternal age at first birth. The results also reveal that when Black mothers delay childbearing to older ages, they do not experience the same accumulation of resources as White mothers do, suggesting that childbearing postponement may reflect qualitatively different processes for these groups.

To my parents, for all their love and support

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Glossary, acronyms and abbreviations

ART	Assisted Reproductive Technologies
ASFR	Age Specific Fertility Rates
BAS	British Assessment Scale
E&W	England and Wales
HSE	Health Survey for England
IUD	Intra Uterine Device
LBW	Low Birth Weight
LS	Longitudinal Study
MCS	Millennium Cohort Study
NVQ	National Vocational Qualification
OECD	Organization for Economic Co-operation and Development
ONS	Office for National Statistics
PAA	Population Association of America
SDQ	Strength and Difficulty Questionnaire
SDT	Second Demographic Transition
SEU	Social Exclusion Unit
TFR	Total Fertility Rate
UNICEF	United Nations Children's Fund
UK	United Kingdom
US	United States
VLBW	Very Low Birth Weight

Chapter 1 Introduction

1.1 Setting the scene: a changing (fertility) context

This research is inspired by the changes in fertility behaviours which occurred across the developed world over the past three decades. Remarkable transformations, described in what follows, have occurred both at the macro and micro levels, where individuals' behaviours and attitudes have been shaped by the rapidly changing socioeconomic context. One important change has been the postponement of key life transitions. The early signs of these changes began to emerge around the second half of the 1960s, when individuals gradually started to leave the parental home, (eventually) marry and having children at older ages compared to previous generations (Billari & Liefbroer, 2007; Lesthaeghe, 2010; McLanahan, 2004; Schmidt, Sobotka, Bentzen, & Nyboe Andersen, 2012).

Throughout Europe and most of the developed world, a historic transformation of fertility patterns has occurred over the last century (Mills, Rindfuss, McDonald, & te Velde, 2011). Decreasing fertility rates have been recorded since the 1930s (with the exception of the baby boom period during the 1950s-1960s) across the developed world. This process has been particularly rapid in some European countries and some East-Asian countries such as Japan, where, since the 1990s, a decline of the total fertility rate (TFR) to "very-low" (below 1.5) and "lowest-low" (below 1.3)[1], has been recorded (Billari & Kohler, 2004). Within the demographic literature, there is widespread consensus that changes in the timing of childbearing constitute a major component of decreasing levels of period, and possibly even cohort, fertility in developed countries (Billari & Kohler, 2004; Goldstein, Sobotka, & Jasilioniene, 2009; Rindfuss & Brauner-Otto, 2008). Childbearing postponement may affect period fertility levels because when the transition to parenthood is progressively delayed to older ages (Frejka & Sobotka, 2008), in a given period, the TFR is temporarily deflated, even if completed cohort fertility is unaltered. But childbearing postponement may also impact cohort fertility rates since delaying leaves less time for subsequent births; to the extent that postponement dominates recuperation, completed fertility may be reduced as a consequence of postponement. This phenomenon is referred to in the literature as the tempo-quantum interaction (Berrington, 2004). Since prolonged levels of very-low fertility, in the absence of in-migration, bring about a series of

[1] Below replacement fertility rates in the developed world correspond to a Total Fertility Rate (TFR) below 2.1. The TFR is defined as "the average number of children a woman would bear if she survived through the end of her reproductive life span and experienced at each age a particular set of age specific fertility rates" (Preston, Heuveline, & Guillot, 2001 p. 95).

demographic, economic and social consequences (such as declining and ageing populations together with increased per capita health and pension expenditures), childbearing postponement and its determinants have received a lot of attention and are considered a particularly relevant area of research amongst contemporary demographers (Frejka & Sobotka, 2008).

Studies that consider demographic trends over the past three or even four decades have argued that, on average, across the developed world individuals began forming (smaller) families later in life in response to changes in the surrounding socioeconomic context (for a comprehensive review, see Mills et. al (2011)). These changes include the diffusion of the contraceptive pill, the expansion of tertiary education, new employment opportunities, diverse partnership patterns but also the diminished availability and affordable housing and changes in values and social norms across the population (Frejka & Sardon, 2006; Mills et al., 2011; Ní Bhrolcháin & Beaujouan, 2012). Men and, especially, women started spending more time in education than in the past, some choosing to invest in their jobs/careers and aiming at economic independence before leaving the parental home or starting a family. The existing literature sees women's career planning as a strong component behind the postponement of childbearing (Balbo, Billari, & Mills, 2012). In other words, the opportunity cost of (an early age at first) childbearing, especially for highly educated women, began to significantly rise (Billari, Liefbroer, & Philipov, 2006; Joshi, 1998; Lesthaeghe & van de Kaa, 1986; Martin, 2000; Sobotka, 2004). An increase in women's average educational and earning levels, together with rising gender equality (McDonald, 2000; Mills et al., 2011), have made the decision about the timing of childbearing more difficult because involving competing tasks (Schmidt et al., 2012). These arguments have been summarized by Schmidt et al. (2012) by arguing that "having children later in life is a rational strategy from an economic and career perspective" (p.35).

Transformations in behaviours are inextricably linked to changing attitudes and social norms. The simultaneous diffusion of new attitudes and demographic behaviours across a population has been identified by the proponents of the so-called "Second Demographic Transition" (SDT) (Lesthaeghe, 1995, 2010). The SDT framework relied upon the assumption that important changes in attitudes towards the family were occurring and that the power of the family as an institution was weakening over time. The main proponents of the SDT theory, van de Kaa and Lesthaeghe, identified the increase in divorce rates (which began to rise, especially in Scandinavia and in the U.S. during the 1950s (Lesthaeghe, 2010)) as the first manifestation of this transition. Along similar lines, changing attitudes

towards abortion, increasing rates of cohabitation (in particular in Nordic countries), the decline in high order births and the availability of modern contraceptives (especially the pill since the 1960s) in some countries, were also included into the SDT theoretical framework (Lesthaeghe & van de Kaa, 1986; Schmidt et al., 2012; van de Kaa, 2002). In particular, the use of modern contraceptives and more liberal abortion legislation gave the way to other features of the SDT, namely the postponement of marriages and births (Frejka, 2008). New forms of partnership and family behaviours were followed by the spread of new social norms on childbearing and demographic behaviours more in general (Frejka, 2008). In general, the SDT sees the emergence of new demographic behaviours, since the mid-1960s in particular, as a consequence of individual autonomy, individual freedom and personal choice, not only for what concerns childbearing behaviours, but more generally in terms of demographic decision-making.

1.2 Past and present trends in childbearing at older ages

At the macro level, childbearing postponement is a term generally used to refer to the increase in the mean age at first birth documented in developed societies over the past three decades (Balbo et al., 2012). The spread of this demographic phenomenon has been so marked that Kohler, Billari and Ortega (2002) introduced the term "postponement transition", which reflects the fact that the remarkable increase in childbearing postponement witnessed in many developed societies is linked to social dynamics in the population: when some individuals start having children at older ages, others in the population are likely to follow such that a long-lasting "bandwagon" effect is observed (Goldstein et al., 2009).

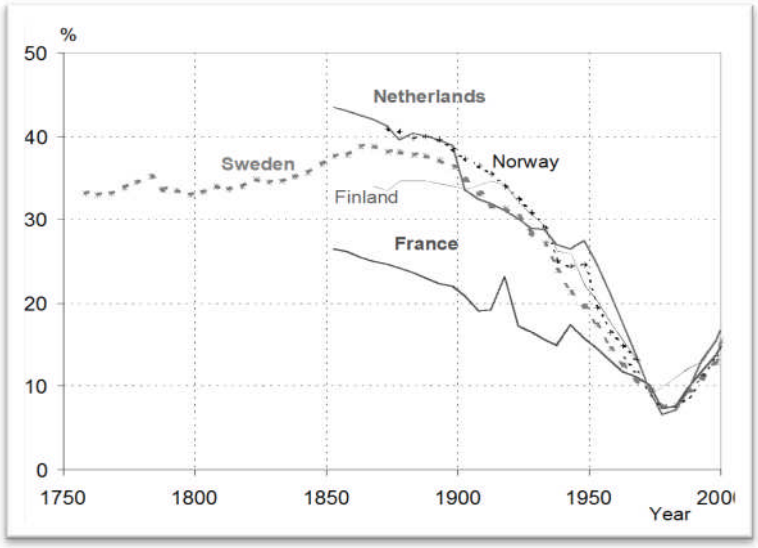
While childbearing postponement is a relatively new phenomenon that has emerged over the past three decades, childbearing at older ages is not. For example, in the 19th century childbearing at older ages was not uncommon and it was typically experienced by women having high order births (i.e. third order births and above). This is shown[2] in Figure 1 revealing trends in the proportion of the Total Fertility Rate (TFR)[3] attributed to the

[2] Throughout the dissertation, Figures and Tables are numbered by including, in front, the Chapter's number followed by the Table/Figure number.
[3] The average number of children a woman is expected to have provided that she survives until age 50 and experiences the current set of ASFRs.

aggregate Age Specific Fertility Rates (ASFR[4]) per woman at ages 35 and above in five European countries (Finland, France, Netherlands, Norway and Sweden) over the past two centuries. Figure 1 shows that during the 19th century and early 20th century, with some cross-country variation and with the exception of the baby boom period, the proportion of births at ages 35 and older decreased across the five countries analysed. This is also shown in Figure 2, where I have replicated the analyses for England and Wales (which, as will become clear in section 1.5, is the geographical focus of this thesis) for the period 1938-2009.[5] The drastic decline in fertility rates at the oldest ages was linked to the overall decline in family size which was associated, amongst other things, to the introduction of traditional and then modern contraceptives (e.g. pill, IUD, sterilization) (Prioux, 2005), which enabled women to control more efficiently the timing of childbearing and avoid unintended pregnancies. This was a time when family building (marriage, the birth of the first child as well as completed fertility) occurred at particularly young ages and fertility at older ages declined (Pollock, 1996). As shown in Figure 1 and 2, in all six countries, during the 1970s, the contribution of older childbearing to total fertility was less than 10% and childbearing at older ages seemed destined to disappear (Prioux, 2005). On the contrary, childbearing at older ages has not disappeared and a reversal of the long-lasting decline in fertility levels amongst older women, as Figure 1 and 2 show, occurred around the 1980s. The reversal was not, however, related to a resurgence of the large family model, but rather to a postponement of childbearing as part of a wider pattern of delayed transition to adulthood (Prioux, 2005). In contrast with the past, in contemporary developed settings childbearing at older ages occurs primarily at low parities, mainly first and second order births (Billari, Kohler, Andersson, & Lundstrom, 2007). The focus of this dissertation, as will become clear in the following sections, is on the postponement of first births in developed countries.

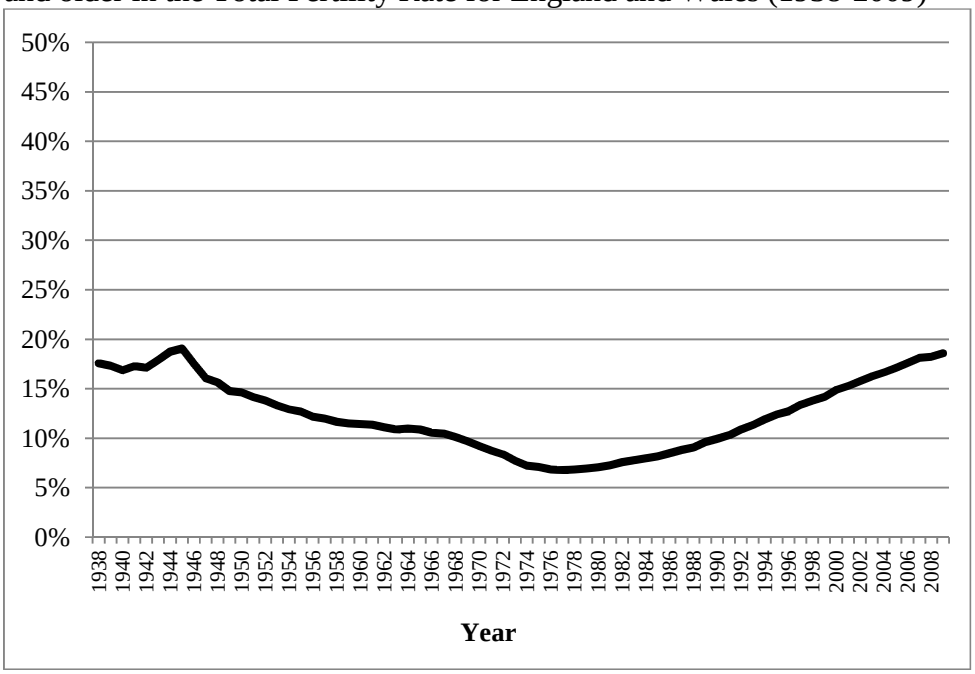
[4] ASFRs are defined as the number of live births in a year to females in one age group divided by the total number of females in that age group.
[5] In vital registration data, age of mother was not collected until 1938.

Figure 1.1 The proportion of the aggregate Age Specific Fertility Rates of women aged 35 and older in the Total Fertility Rate (Finland, France, Netherlands, Norway and Sweden)



Source: Prioux (2005)

Figure 1.2 The proportion of the aggregate Age Specific Fertility Rates of women aged 35 and older in the Total Fertility Rate for England and Wales (1938-2009)



Source: own tabulations based on the Human Fertility Database[6]

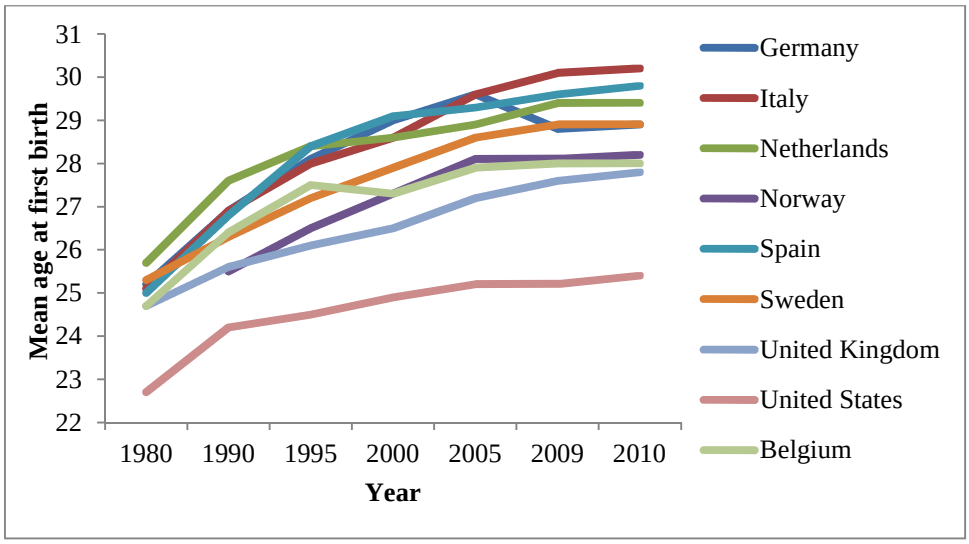
Figure 1 and 2 show that, from around the 1980s, at least some developed countries have experienced a "new" rise in fertility at older ages. As argued in the previous paragraph, this has been triggered by a postponement of the transition to parenthood (Mills

[6] http://www.humanfertility.org/cgi-bin/country.php?country=GBRTENW&tab=si&t1=1&t2=2

et al., 2011). To show that the rising trend in childbearing is linked to a postponement of first births and is common to different countries and institutional settings, Figure 3 reveals trends in the mean age at first birth for a group of selected developed countries. I choose 1980 as the beginning of this narrower time frame by using Figure 1 and 2 to identify what seems to be a turning point in childbearing behaviours at older ages. The temporal choice is also supported by Sobotka (2004) who, in Table 3.3 (p. 53), shows that the onset of postponement has started, across Europe, between the 1970s and 1980s (but 1990s for Eastern European countries). Figure 3 shows that the overall trend is positive as the mean age at first birth has increased between 1980 and 2010. Notwithstanding the fact that all countries have experienced an increasing trend in mean age at first birth, there are some differences reflected both in different starting levels (in 1980) and in the rate of increase. The U.S., for example, shows both a lower mean age at first birth in 1980 and a smaller rate of increase compared to other countries. We know, however, that in this country there is a lot of heterogeneity in fertility behaviours across groups of the population as ethnic minorities (African American women in particular) tend to have children at younger ages compared to White women (McLanahan, 2004). But even within Europe, the rate of increase has been more marked in some countries than in others. For example, although Germany, Italy and Sweden and the U.K. show similar starting values in the mean age at first birth in 1980, they experience different rates of increase over time and, in particular, the U.K. stands behind the rest of the countries. Similarly but less dramatically than what is documented for the U.S., in the U.K. fertility at young ages (20 and below) has remained relatively high compared to other European countries (Sigle-Rushton, 2008) and this is likely to play an offsetting effect on the rise in the mean age at first birth. But the U.S. and the U.K. are countries where first births occur relatively frequently not only at younger but also at older ages. Indeed, Sobotka (2004) shows that, between 1980 and 2000, the U.K.[7], the U.S. and Ireland are the countries showing the most pronounced polarization of childbearing behaviours (measured trough the interquartile range of the most typical ages at childbearing). Interestingly, in Germany the mean age at first birth has decreased between 2005 and 2009/2010, and some have hypothesized that this could be, at least partially, linked to the current economic crisis (Sobotka, Skirbekk, & Philipov, 2010).

[7] The analyses refer to E&W

Figure 1.3 Mean age at first birth in selected developed countries (1980-2010)



Source: UN statistical database and CDC for the U.S.[8]

By comparing past and present trends, one could argue that there is scope for childbearing at older ages to increase from current levels, which are below their "potential" shown by the levels reached in the 19th century (Prioux, 2005). Moreover, as contemporary fertility trends are characterized by increasing and hard to change delays (given that they occur in response to the changing socioeconomic conditions), childbearing at older ages is expected to continue rising over the coming decades. This hypothesis is supported by research arguing that current low period fertility levels may be a temporary phenomenon, as they could be the result of *tempo* effects i.e. distortions due to shifts in the timing of childbearing (Frejka & Sobotka, 2008). Differently from what was argued by Kohler et al. (2006), Goldstein et al. (2009) claim that the era of lowest-low fertility, at least in Europe, may be coming to an end because measures of completed cohort fertility suggest a recuperation of fertility rates, although most countries are still well below replacement levels (2.1 in developed settings). This might suggest that, as people are postponing but not forgoing births, childbearing at older ages could further rise as (cohort) fertility is recuperated.[9]

[8] http://www.cdc.gov/nchs/data/nvsr/nvsr61/nvsr61_01_tables.pdf#I01

[9] Research looking at (period and cohort) fertility has been complemented by work on fertility intentions. Existing research reveals that, over the past few decades, the divide between average intended and achieved fertility has increased such that some have argued that this gap is a reflection of an "unmet need for children" and one of the possible causes of low fertility (Iacovou & Tavares, 2011; Liefbroer, 2009; Morgan & Rackin, 2001). However, research has argued that fertility intentions about the number of children are a poor predictor of the actual number of children as they are subject to variation over the life course (Iacovou & Tavares, 2011; Quesnel & Morgan, 2003).

1.3 Maternal age and child wellbeing

Alongside research documenting macro level trends in childbearing postponement and their determinants, there exists research discussing the importance of and analysing, at the micro level, the association between maternal age at (first) birth and child wellbeing. A considerable amount of research, summarized and discussed in the following section, has been conducted in developed societies (in the U.S. and the U.K. in particular (Bonell, 2004)) to investigate the association between an early age at (first) birth and child wellbeing. Conversely, less research has been conducted to analyse the direct association between the postponement of childbearing and child wellbeing (McLanahan, 2004). Indeed, the demographic research has focused on postponement primarily because of its (negative) impact on fertility rates (Schmidt et al., 2012). I hypothesize, and explain in what follows, that there might be an underlying reason explaining why the extant literature, when thinking about the wellbeing of children, has devoted much more attention, and preoccupation, to young rather than older maternal ages at (first) birth.

Before I begin summarizing the literature on maternal age and child wellbeing, it is necessary to establish what is meant by an early and older age at (first) birth. While doing so and throughout the thesis more in general, it is important to highlight that as much as chronological age reflects a biological concept, it is also heavily socially constructed. This idea has been formalized by the proponents of the life course paradigm (Billari et al., 2010; Neugarten, Moore, & Lowe, 1965; Settersten & Hagestad, 1996) who conceptualize the life course and its social roles as at least partially organized on the basis of age.

By following the definition given by UNICEF, "teenage pregnancy is defined as a teenage girl, usually within the ages 13-19, becoming pregnant".[10] This is a quite standard definition in the literature. Although one should be careful at overgeneralizing as pregnancies and births occurring between the ages 13-19 are not necessarily homogenous (Kohn, 2013; Phipps & Sowers, 2002), Hobcraft and Kiernan (2001) and Francesconi (2008), while looking at the U.K. context, reveal that the disadvantage experienced later in life by teen mothers may extend to the early twenties and choose births occurring before age 23 as the relevant cut-off in their analyses. Hence, throughout this thesis (which is situated in the U.K. context) I will refer to teenage childbearing when the mother gives birth between the ages of 13-19 and, more generally, to early childbearing when the mother

[10] http://www.unicef.org/malaysia/Teenage_Pregnancies_-_Overview.pdf

gives birth before the age of 23. There is far less consensus when it comes down to define how, at the individual level, the process of childbearing postponement can be defined and measured. Billari et al. (2010) argue that studies concerning childbearing at older ages and postponement have tended to refer to discrete age categories (e.g. 5-years age categories), although the adopted thresholds vary depending on the outcome measured and across disciplines. For example, scholars, when describing fertility levels, have referred to childbearing postponement as the diminished propensity, across successive generations, to have children below a certain age – say, for example, 25 or 30 (Sobotka, 2004). Alternatively, researchers have looked at the increased propensity to have children after a certain age – say, for example, 35, 40 or even 45 (Billari et al., 2007; Prioux, 2005). When describing child outcomes, the social scientific literature has tended to refer to age 30 as the relevant cut-off (Hawkes & Joshi, 2011; Pollock, 1996) and a minority of studies has looked at outcomes occurring to mothers giving birth after age 40 (Saha, Barnett, Buka, & McGrath, 2009; Weiser et al., 2008). In contrast, the medical literature often refers to 35 and 40, or even 45, as threshold ages for pregnancy outcomes (Cleary-Goldman et al., 2005). One plausible explanation of the discrepancy between the demographic and medical literature could be the fact that postponement, at least originally, involved a change in the average age at first birth from the early to the late 20s, namely to ages that are more relevant from a social rather than a biological perspective. Moreover, the mean age at first childbearing has only in recent years, and in selected countries, reached 30, which might explain why the social scientific literature has tended to focus on 30 as the relevant cut-off. Indeed, some studies looking at the association between maternal age and child outcomes have chosen this cut-off given the paucity of first births occurring after age 30 in the survey analysed (Fergusson & Woodward, 1999; Pollock, 1996). Throughout this thesis, I will refer to childbearing postponement when the mother delays her first birth until after age 30. In some instances (i.e. Chapter 2), I will distinguish between those mothers who delay their first births until after ages 30, 35 and 40.

1.3.1 Teenage childbearing and child wellbeing

There is an extensive literature documenting the association between early childbearing and child wellbeing, mostly because an early age at childbearing began to be considered as a cause of concern. Indeed early and teen pregnancy became to be defined,

in the U.S. context in particular, as a social problem around the 1970s (Vinovskis, 1988). The public concern towards teen pregnancies coincided with the uprising of the societal shifts in marriage and childbearing discussed in the previous sections and, in particular, with the rise of the mean age at first birth occurring across virtually all developed countries. Namely, what distinguishes past and present trends in teenage childbearing is the fact that it currently often occurs outside of marriage (Duncan, 2007; Kohn, 2013). As Ellwood and Jencks (2004) argue "all groups are postponing marriage, but not all are postponing parenthood". And those groups that do not postpone parenthood tend to be unmarried and the least advantaged segment of society and thus, early, teenage in particular, childbearing has tended to be perceived as a cause of concern.

At least initially, teenage childbearing was associated with detrimental outcomes for mother, children and for society at large (Geronimus, 1997). The literature tended to interpret this association as causal suggesting that an early age at first birth would directly lead to worse child/mother outcomes at birth and over the life course. Subsequently, later studies suggested that the problem of teenage childbearing might have been exaggerated and highlighted the importance of accounting for selection (Kearney & Levine, 2012). Teenage mothers are not a random sample of the population and systematically differ from mothers who postpone childbearing to older ages not just because of the age at which they experience the transition to parenthood, but in other important ways as well. To the extent that younger mothers are more likely to come from disadvantaged families and backgrounds (Hobcraft & Kiernan, 2001), which are detrimental conditions for family wellbeing, at least part of the negative association between early childbearing and mother/child wellbeing should be attributed to background factors rather than maternal age per se (Ermisch & Pevalin, 2003; Hoffman, Foster, & Furstenberg, 1993). By adopting a "natural" experiment approach[11], different studies showed that increasing a woman's age at first birth would not necessarily alter the disadvantaged conditions which characterize teenage mothers and their children. For example, Geronimus and Korenman (1992) compare pairs of sisters where one became teenage mother and the other one did not. By employing family fixed effects, the authors revealed that there were little differences in the educational and economic outcomes between teenage who had babies and their sisters who delayed. Furthermore, even these modest differences could reflect selection as the sister who experiences teenage childbearing is likely to be negatively selected compared to the

[11] This includes, but is not limited to, analyses comparing sisters/cousins/twins who have children at different ages, mothers who miscarry and those who have successful teenage pregnancies etc.

sister who does not (Kearney & Levine, 2012). Hotz et al. (1997) estimate the effect of delaying childbearing by looking at the outcomes of teenagers who became pregnant but experienced a miscarriage and those who ended up giving birth. They reveal no significant differences between teen childbearing and later life outcomes. Notwithstanding some of the limitations involved when using estimation techniques such as siblings fixed effects and others that aim to control for selection bias (for an interesting commentary of how these techniques may tend to make the estimates too small, see Hoffman (1998)), the results of these studies show evidence which is consistent with the hypothesis that the negative short and long term consequences of teenage childbearing have been overestimated (Hoffman, 1998). However, some studies reveal that accounting for selection bias reduces the negative consequences of teenage childbearing but does not eliminate them (Chevalier, Viitanen, & Viitanen, 2003; Ermisch & Pevalin, 2003; Grogger & Bronars, 1993). For example, Ermisch and Pevalin (2003) find that having a teenage birth has a small effect on the woman's later outcomes in terms of education and occupation, but it increases the chances of having a partner who is poorly educated and unemployed. At present, there is still an on-going debate in the literature as to whether teenage childbearing, *all else equal*, results in detrimental outcomes for mothers and their children. Nonetheless, the overall consensus is that at least part of the negative correlation between teenage childbearing and family wellbeing should be attributed to the characteristics of those mothers who have children at early ages (Kearney & Levine, 2012).

Notwithstanding this evidence, teenage childbearing has often been seen as a wide social problem and a target of public policy interventions (Kohn, 2013). For example, President Clinton in his 1995 State of the Union address declared that teenage pregnancy is the most serious social problem in the U.S. (Hoffman, 1998). Similarly to the U.S., teenage pregnancy has been framed as a social problem in the U.K. Tony Blair in his forward to the Social Exclusion Unit[12] said:

> *"Some of these teenagers, and some of their children, live happy and fulfilled lives. But far too many do not. Teenage mothers are less likely to finish their education, less likely to find a good job, and more likely to end up both as single parents and bringing up their children in poverty. The children themselves run a much greater risk of poor*

[12] The U.K. Government (10 years) Teenage Pregnancy Strategy was introduced in 1999 with the aim of halving the number of pregnancies under 18 years olds in the U.K. (Duncan, 2007)

health, and have a much higher chance of becoming teenage mothers themselves. Our failure to tackle this problem has cost the teenagers, their children and the country dear" (Duncan, Edwards, & Alexander, 2010 p. 308; SEU, 1999 p. 4)

1.3.2 Childbearing postponement and child wellbeing

Compared to the body of literature analysing the association between teenage childbearing and wellbeing, less research has been conducted to investigate the association between childbearing postponement and child wellbeing. Nonetheless, the demographic literature, on average, has tended to implicitly interpret the postponement of childbearing as a beneficial process in terms of family and child wellbeing (Martin, 2004; Schmidt et al., 2012). Children are expected to benefit from this process as parents who postpone childbearing may be starting a family after they have accumulated more resources and they may be more able to raise children in stable environments (Hardy, Astone, Brooks-Gunn, Shapiro, & Miller, 1998). This perspective is implicitly incorporated in the "diverging destinies" framework, which was introduced by McLanahan in her 2004 presidential speech at the annual meeting of the Population Association of America (2004). The tenet of the "diverging destinies" framework is that heterogeneity in contemporary family patterns can be linked to different and opposing trajectories for the children involved. Mothers of one group of children follow a trajectory characterized by gains in resources which may derive from childbearing postponement and rises in maternal employment (in career-type occupations); conversely, another group follows a trajectory characterized by a lack of gain in resources associated to teenage childbearing, low education and employment investments and risk of parental dissolution, which tend to reduce the level and stability of parental resources. The "diverging destinies" is a U.S. framework that has been put forward by a prominent demographer. But the idea that individuals follow diverging trajectories which exacerbate inequalities has also been discussed in the U.K. context. The narrative here has been on the idea that people follow "fast" and "slow" tracks to adulthood (for a general discussion and some references see: Graham and McDermott (2005) and Duncan (2007)). The "fast" lane is characterized by people with poorer backgrounds, poor job prospects and security and high chances of early parenthood (Graham and McDermott, 2005). Conversely, the "slow" lane is characterised by people who are already middle-class and who, by investing in education and postponing

childbearing, retain their relatively advantaged position (Graham and McDermott, 2005). Although the focus in the U.K. is not as explicitly demographic and with less explicit implications for the wellbeing of children as in the U.S., the narratives proposed in these two contexts overlap in many ways and suggest that changes in the sequencing and timing of life transitions between different groups have resulted in widening gaps between them.

One (plausible) hypothesis explaining why the existing literature lacks a solid evidence base that can support the argument that childbearing postponement is a beneficial process for children's wellbeing is that research on maternal age and child wellbeing has tended to adopt, although not explicitly, a developmental perspective. Namely, (maternal) age variables are conceptualized as reflecting a biological and psychosocial developmental process and parental maturity (Geronimus, 2004) such that an increasing maternal age at birth is expected to benefit children's wellbeing and development. As discussed in the previous paragraph, a lot of preoccupation and consequently research has been devoted to study the wellbeing of children of mothers in age groups that are considered to be "problematic", namely those being conceived at younger, in particular teenage, ages. Children of mothers who postpone childbearing have received less attention than those of younger mothers. This is, possibly, because the former are expected to fare better than the latter. In other words, I argue that the idea that childbearing postponement is expected to be "good" for the mother and child might be a somewhat logical consequence of the argument that being a teenage/young mother is "detrimental". This might reflect a tendency of modelling things the way we are used to think about them (based on life experiences), searching for one plausible explanation rather than investigating multiple underlying and more complex processes, something discussed in the following section and throughout the thesis more in general.

1.1 Why we should know more on the consequences of childbearing postponement on child wellbeing?

As discussed in the previous sections, a rising trend in the mean age at first birth, i.e. childbearing postponement, has been documented in advanced societies over the past few decades (Mills et al., 2011). Given that the extant literature argues and shows that socioeconomic incentives (such as increased education) have acted as the trigger (Ní

Bhrolcháin & Beaujouan, 2012), it is unlikely that we'll observe a decline in childbearing at older ages in the future. Moreover, by comparing current levels of childbearing at older ages to those observed in the 19th century, there appears to be scope for it to increase in the future. In other words, childbearing at older ages is a contemporary phenomenon that is likely to remain prominent in the near and longer-term future. For this reason, it is important to know how children of mothers who postpone their first births in contemporary developed contexts are faring.

Building on the idea that individuals and mothers who postpone childbearing tend to be socioeconomically advantaged, the demographic literature has not given the same amount of attention to analyse the wellbeing of children of older mothers as to children of younger ones. There are two main reasons why it would be useful to further explore this issue. Firstly, the demographic literature in developed countries has been focussing on the social aspects of postponement (i.e. reflecting accumulation of socioeconomic resources and improving parenting practices) giving little consideration to the fact that childbearing at older ages may involve health complications for mothers and children, as discussed more in detail in Chapter 2 of this thesis. The demographic literature has considered the health component of maternal age when discussing its link to lower completed fertility because of reduced fecundity at advanced ages (Abma & Martinez, 2006; Billari et al., 2007), but it has given little attention to the fact that the medical literature identifies age 35 (sometimes 40) a threshold age for poorer health outcomes for mother and children (Bewley, Davies, & Braude, 2005). The medical evidence could indicate that the (possibly positive) association between an older maternal age at birth and child wellbeing may vary depending on how late the birth occurs. The second reason, conceptually more complex that the first one, is that the "weathering" hypothesis literature (Geronimus, 1996) argues and provides evidence consistent with an idea that the link between maternal age and child wellbeing should be conceptualized as heterogeneous for population subgroups. In particular, this literature, which originated in the U.S., argues that for African American women an older maternal age at birth should be conceptualized as a marker of disadvantage rather than one of resource accumulation. Possibly as a result of stress accumulation and exposure to social inequality, the health of African American women deteriorates faster than the one of White women, which could then translate into worse, rather than better, outcomes for their children with increasing maternal age at birth. This suggests that there are other (social) aspects of childbearing postponement that demographers have paid less attention to.

The arguments and evidence presented by the medical and "weathering" hypothesis literatures offer a nuanced perspective on the way maternal age and childbearing postponement may relate to child wellbeing. Namely, while the evidence presented by the medical literature highlight that maternal age reflects health processes in addition to social ones (as discussed in the demographic literature), the "weathering" hypothesis literature underscores that the interaction between these social and health components may vary across subpopulation groups. These arguments suggest that there might be a more complex relationship in the way childbearing postponement is associated with (improved) wellbeing for families and children, which needs to be acknowledged and addressed further. The crux of the original contribution of this thesis is therefore that of integrating and reconciling different perspectives concerning maternal age, childbearing postponement and the way they may be associated with family and child wellbeing.

1.2 This Thesis

This research project is inspired by the increase in childbearing postponement (i.e. mean age at first birth) witnessed in Western countries over the past three or four decades and by the fact that it represents a marked departure from previous patterns of family formation. While a considerable amount of research has been conducted on the determinants and macro-level issues involved with childbearing postponement, limited attention has been devoted to document the wellbeing of children of mothers who delay childbearing to older ages. As the previous section highlights, however, there are grounds for further investigating this link.

This thesis aims to critically assess the link between maternal age at first birth, postponement and family/child wellbeing. The focus of this research is on age at first birth, consistent with the idea of documenting the costs and benefits of childbearing postponement (thereby distinguishing it from higher order births that occur at older ages, a demographically distinct phenomenon). In addition to providing knowledge on the overall association between maternal age and child wellbeing, this research aims to reveal whether the process and consequences of childbearing postponement may vary across subgroups of the population. This is accomplished by first analysing the association between maternal age and family/child wellbeing following the implicit perspective of the existing demographic literature, namely that postponement is expected to be positively associated

with families' and children's wellbeing, while revealing whether this association may depend on how late the birth occurs. Then, by reflecting on the "weathering" hypothesis framework, the research investigates whether looking at the issue from this angle may not reflect the experiences of all groups of women who have children at older ages.

It is important to highlight that this thesis focuses on a selected sample of live births and women/mothers who experienced miscarriages and stillbirths are excluded. In light of the aims of this research project, this is important to consider since existing work documents that conceiving at older ages is associated with increased risks of miscarriages and stillbirths (Huang, Sauve, Birkett, Fergusson, & van Walraven, 2008; Stein & Susser, 2000). Namely, I am only partially considering the health and medical risks involved with conceiving at older ages since the analyses exclusively focus on women whose children were born alive and (in some of the analyses) who survived until age 5. Table 1, which reports 2009 data from a report by the Royal College of Obstetricians and Gynaecologists (2013), shows that the risk of stillbirths and, to some extent, neonatal deaths increases from age 35 onwards.

Table 1.1 Prevalence of stillbirths and neonatal deaths by maternal age at birth in the U.K. (data from 2009)

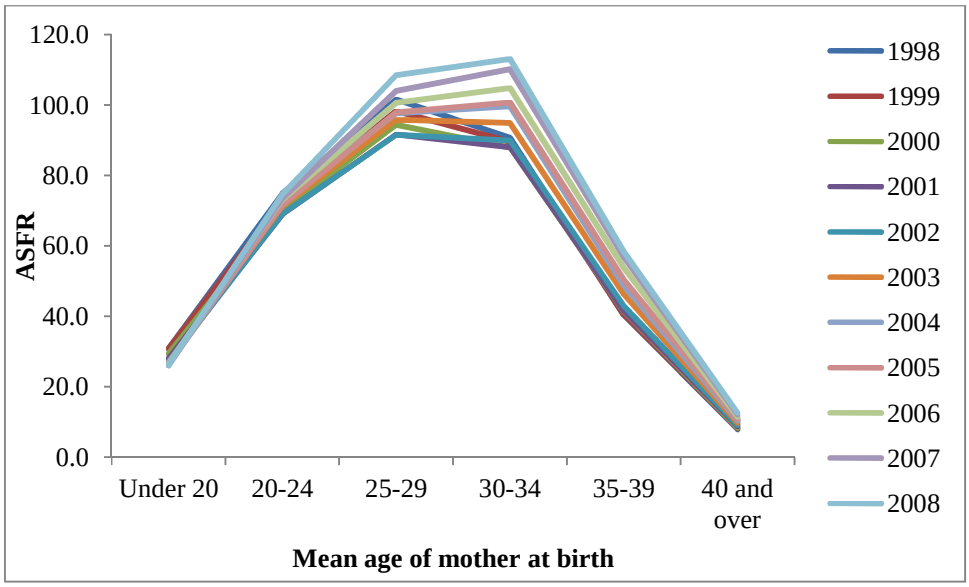
	Stillbirths			**Neonatal death**		
	Rate	**Lower CI**	**Upper CI**	**Rate**	**Lower CI**	**Upper CI**
25-29	4.6	4.3	4.9	2.9	2.7	3.2
30-34	4.7	4.4	5	2.6	2.4	2.8
35-39	5.5	5.1	5.9	2.9	2.6	3.1
40+	7.6	6.6	8.7	3.8	3.1	4.6

Note: data provided in the report by the RCOG (2013)

The research focuses on the U.K. context, a relevant country where to conduct this research. The country, as shown in Figure 2, has experienced a postponement of childbearing behaviours over the past few decades. In addition, Figure 4 shows that over the period 1998-2008, Age Specific Fertility Rates (ASFRs) in age groups below 20 and 20-24 have decreased while they have increased for ages 25 and above (the figure refers to England & Wales, which comprises 85% of the U.K. population). In particular, the rise in ASFRs at ages 30 and above has been particularly pronounced. Figure 5 provides a cohort perspective and shows that for those women who were born between 1950 and 1990, although not entirely monotonic, there has been a gradual decline in births at younger and

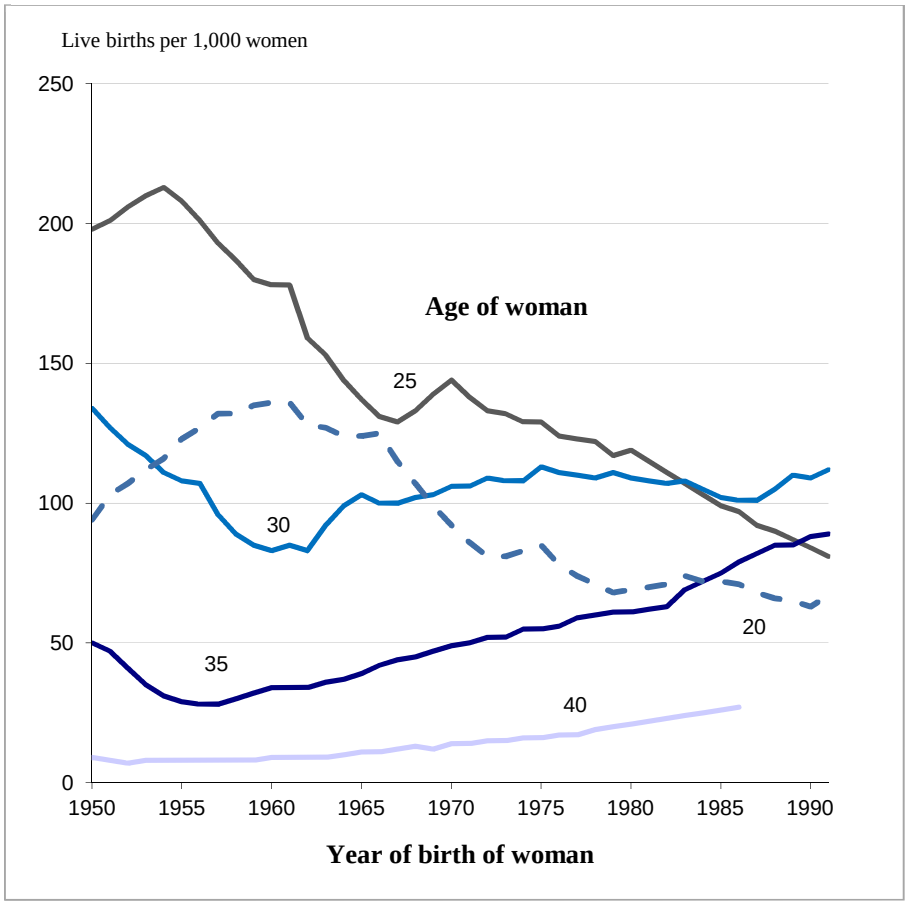
middle ages and a gradual increase in births at older ages. The evidence presented in these Figures is in line with research on fertility intentions documenting that in E&W for women aged 33-35 the mean number of children intended at older ages increased by five times between 1979-1991 (0.07) and 2001-2002 (0.36) (Smallwood & Jefferies, 2003).

Figure 1.4 ASFRs in England and Wales 1998-2008 (Period)



Source: Own tabulations based on ONS data.

Figure 1.5 Age-specific fertility rates at selected ages, by year of birth of woman, 1960 to 1991 (Cohort)



Source: Own tabulations based on ONS (2013)

The fact that childbearing has been increasingly postponed in the U.K. is a necessary but not sufficient justification to focus the research on this context. Indeed, a lot of other countries have experienced a rise in the mean age at first birth and some of them, as shown in Figure 3, to a greater extent than the U.K. The following four reasons make the U.K. an appropriate, interesting and perhaps even unique setting where to conduct this research:

1. As mentioned earlier, the U.K. is characterized by a marked "social polarization" of fertility behaviours (Sigle-Rushton, 2008). By social polarization I mean that the context is characterized by heterogeneity in fertility behaviours across demographic and social groups of the population (Rendall, Ekert-Jaffé, Joshi, Lynch, & Mougin, 2009). As a matter of fact, in the U.K. certain sub-groups of the population are characterized by early childbearing and high(er) fertility levels: these include low(er) educated people and some first/second generation immigrant groups. Other subgroups, in contrast, are characterized by low(er) fertility, childbearing postponement and high rates of childlessness: within this group we particularly find high(er) educated women, especially those occupying managerial positions. As the social polarization of fertility is also associated with the timing of childbearing (Berrington, 2004; M. Rendall et al., 2005), postponing childbearing to older ages is more common among more advantaged mothers while earlier childbearing is more common among less advantaged ones. As the implicit argument of the demographic literature is that childbearing postponement is expected to be positively associated with child wellbeing because it is experienced by individuals who have accumulated resources before they become parents, the marked social polarization which currently characterizes the U.K. makes it a context where it is possible to empirically explore this argument. Chapter 2 investigates whether older mothers are a (positively) selected group of the population and whether their (improved) socioeconomic characteristics are (positively) associated with child outcomes. While doing so, the analyses, taking account of the arguments and evidence presented in the medical literature, explore whether the association between increasing maternal age at first birth and child wellbeing depends on how late the birth occurs.
2. Differences and similarities between Black and White mothers make the U.K. a particularly appealing and relevant context where to reflect on the arguments posited by the "weathering" hypothesis literature. Black and White mothers in the U.K., differently from the U.S., have similar first birth fertility schedules and have engaged into childbearing postponement to a similar extent (Robson & Berthoud,

2006). In addition, both groups have invested in education, tend to be employed (Dale, Lindley, & Dex, 2006) and have access to universal health care, suggesting that we should not expect the health of the former to deteriorate faster than the health of the latter or at least not as much as it is observed in the U.S. context. However, we also know that minority groups experience a lot of discrimination and racism in the U.K. (Muennig & Murphy, 2011) which might suggest that Black mothers, even if they postpone childbearing, may not be able to accumulate resources and enjoy the benefits derived from their investments in education and human capital to the same extent as White mothers (Pearson, 2008). This pattern might be reinforced by the higher propensity of Black mothers than White mothers to have un-stable relationships. In other words, although Black and White mothers delay childbearing to older ages to a similar extent, the process and outcomes of postponement might be rather different for these two groups. Chapter 3 builds on the similarities (propensity to postpone and to invest in education) and differences (exposure to discrimination and wealth accumulation) between Black and White mothers in the U.K. to explore whether the association between increasing maternal age at first birth and child wellbeing, consistently with the "weathering" hypothesis literature in the U.S., is more complex than (implicitly) acknowledged in the demographic literature.

3. Importantly, the U.K. has high quality data that enables this research to be conducted. In particular, this thesis makes use of two secondary data sources, the Millennium Cohort Study and the ONS Longitudinal Study, which are described in the thesis' Chapters. The former is used in Chapters 2, 4 and 5, while the latter is used in Chapter 3 (and partially in Chapter 4). The Health Survey of England is also used in Chapter 4.
4. Finally, the U.K. is a context where some of the issues raised by (and the results of) this research project are likely to hold some policy interest and relevance for two main reasons. First of all, as mentioned earlier, the U.K. Government has expressed concerns about teenage childbearing, which have led to policy interventions such as the Teenage Pregnancy Strategy Unit.[13] But the tendency to see teenage mothers as social threats and victims (Duncan, 2007) has been questioned by Duncan and

[13] The Teenage Pregnancy Strategy was officially launched in 1999 with the aim of halving, by 2010, the rates of teenage pregnancies in the country. The strategy didn't turn out to be entirely successful as a reduction of 13% (rather than 50%) was achieved. Nonetheless, teenage conception and births are at their lowest level for over 20 years. The Government strategy for beyond 2010 is following similar guidelines.

colleagues (2010). One of the main criticisms of this stream of research is the persistence of a stereotyped and taxonomic image of teenage mothers, which masks heterogeneity according to class, ethnicity and location (Duncan, 2007). The results of this thesis, by revealing whether the benefits of postponement are uniform for Black and White mothers living in the U.K., can contribute to these on-going debates by presenting a new perspective that might contribute to conceptualize the meaning of age as group/context dependent rather than an unvarying one. Second of all, this research holds some policy relevance given the Government's concern about child wellbeing and child poverty, which has resulted in initiatives directed at increasing children's wellbeing (e.g. tax credit schemes, raising Child Benefit, Sure Start, the Children's Fund, the National Childcare Strategy, better maternity and paternity leaves, Every Child Matters, An Anatomy of Economic Inequality in the U.K. etc.). Because social and health advantages/disadvantages are thought to begin early in life, unfolding the relevant trade-offs faced by children of mothers who postpone childbearing and whether those vary for Black and White groups is therefore well placed to contribute to debates about how best to promote good outcomes in children.

1.3 Structure of the thesis

The structure of the thesis reflects the chronological "route" that I, as a researcher, undertook over the course of my Ph.D. After reading and analysing the existing demographic literature on childbearing postponement during the first year of the Ph.D., I was persuaded to approach the issue by adopting a "developmental" perspective as implicitly reflected in the "diverging destinies" framework. Based on evidence suggesting that older first-time mothers tend to be socioeconomically advantaged, I intended to show that, despite the increased medical risks, children of mothers who postpone childbearing to older ages are faring better because of their advantageous/selected characteristics. The underlying idea was that of integrating these social and health perspectives to contribute to understanding the consequences of childbearing postponement for child wellbeing in contemporary Britain, highlighting potential biosocial trade-offs. It was only later in the Ph.D. that I came across the "weathering" hypothesis literature. It will become clear throughout the thesis why this literature has not so far been referred to and integrated with

other frameworks by demographers and other social scientists working on maternal age and childbearing postponement. While, at first, I struggled to understand whether and why both frameworks, i.e. “diverging destinies” and “weathering” hypothesis, could contribute to my thesis, I believe that one of the most important contributions of this research project is that of having managed to understand how they can be integrated and ultimately inform each other. Rather than substitutes, I see these perspectives as important complements to each other.

In addition to the introduction (Chapter 1) and the conclusion (Chapter 6), this thesis consists of three substantive Chapters (2, 3 and 5) that are of publishable quality and have been written in a format that is appropriate for publication in scientific journals. The Chapters include additional material and text which have been or will be omitted from the papers for publication due to journals’ restrictions on length. The aim of Chapter 4 is that of supporting some of the evidence provided in Chapter 3 and to provide motivation for Chapter 5.

Chapter 2 Childbearing postponement and child wellbeing: a social vs. health trade-off?

Abstract

Over the past few decades, childbearing has been increasingly delayed in Western countries. To the extent that women with high socioeconomic status are the most likely to delay their first births, the literature has tended to view childbearing postponement as beneficial in terms of child wellbeing. The demographic literature has tended to focus on the social aspects of postponement, largely ignoring that numerous medical studies have showed that giving birth at older ages puts the mother and child at higher risk of poor pregnancy and birth outcomes. This suggests that postponing first births to older ages may involve a social vs. health trade-off, which warrants closer attention in light of the fact that first births are increasingly often postponed to advanced ages. Using data from the Millennium Cohort Study (U.K.), this paper investigates the consequences of childbearing postponement on child wellbeing by comparing health, cognitive and behavioural outcomes for first born children of older and younger mothers. In the unadjusted analyses, results reveal that first born children of older mothers do not fare significantly worse in terms of health outcomes than children born to younger mothers, but fare significantly better in terms of cognitive and behavioural outcomes. However, the advantages of postponement seem to diminish around the mid-late 30s as first born children to mothers 40 and over do not appear to have significantly different cognitive and behavioural outcomes from those of mothers giving birth during the mid-twenties. Controlling for socioeconomic, demographic and health behaviours variables almost entirely eliminates the age gradient, suggesting that the positive child wellbeing-maternal age association is largely attributable to the social process associated with childbearing at older ages.

2.1 Introduction

Over the past few decades, important changes have occurred in the timing of demographic behaviours in developed countries (Mills et al., 2011). In particular, as revealed in the introduction of the thesis, the mean age at first birth has increased significantly since the 1980s (Sobotka, 2004). Differently from earlier periods, such as the 19th century where childbearing at older ages primarily occurred at high parity births in large families, in contemporary developed societies older childbearing increasingly often occurs because individuals postpone their first births (Prioux, 2005). To the extent that older first-time mothers have, on average, relatively advantageous (socioeconomic) profiles and are better prepared to take on the responsibilities of parenthood (Powell, Steelman, & Carini, 2006), the demographic literature has tended to interpret the postponement of childbearing as a beneficial process in terms of family and child wellbeing (Martin, 2004; McLanahan, 2004). The demographic literature, by giving pride of place to the social aspects of postponement, has tended to ignore that the medical literature documents that older childbearing may involve health complications for both mother and children (Bewley et al., 2005).

The arguments and evidence presented by the demographic and medical literatures indicate that maternal age reflects both social and health processes. Although these perspectives have rarely been considered and discussed together (but see, for example, Stein and Susser (2000), Martin (2004) and Ventura and Hendershot (1984)), the social and health components of maternal age may interact with each other and influence its link with child wellbeing. Importantly, with increasing maternal age at first birth, the trade-off between the social and health components might sharpen. Namely, despite the socioeconomic advantages associated with childbearing postponement, at relatively advanced ages the health component of maternal age may dominate and an increase in maternal age at first birth may no longer be positively associated with child wellbeing.

As first births are being increasingly delayed to older ages in developed countries, it is important to investigate what the consequences of childbearing postponement are for the wellbeing of children by integrating social and health perspectives on maternal age. This paper contributes to this aim by revealing if, on average, children benefit from their mothers' increased age at first birth, but also whether the extent to which childbearing postponement is positively associated with child wellbeing depends on how late the birth

occurs. Then, in order to contribute to investigate the potential social vs. health trade-off involved when births are postponed to older ages, the paper aims to unpack the differential that is (possibly) revealed in the unadjusted analyses and to explain it by investigating what is the influence of health, socioeconomic and demographic factors on the association between maternal age and child outcomes. The study is situated in the U.K. context and uses the Millennium Cohort Study (a U.K. cohort study) to analyse the wellbeing of first born children of older mothers based on a measure of child health at the time of birth (i.e. low birth weight) and children's cognitive and behavioural outcomes measured at age 5.

2.2 Background

This section reviews different streams of research and discusses how the present paper intends to build and expand on them in order to reveal how children of first-time older mothers are faring in a contemporary developed context and to unpack (if any is documented) age differentials based on mothers' and children's socioeconomic, demographic and health characteristics.

The literature documents that parents, mothers in particular, who, in a contemporary developed context, postpone childbearing to older ages tend to have advantageous profiles in terms of socioeconomic status and health behaviours. The literature reveals that mothers who experience the transition to parenthood at an older age tend to be highly educated and employed in professional occupations (Bray, Gunnell, & Davey Smith, 2006; Carolan, 2003; Hawkes, Joshi, & Ward, 2004; Ventura & Hendershot, 1984). Mothers who delay childbearing are also found to have more marked earning trajectories (Hofferth, 1984; Martin, 2004). They also tend to seek prenatal care earlier and they have healthier life styles (Aldous & Edmonson, 1993; Hansen, 1986; Lampinen, Vehvilainen-Julkunen, & Kankkunen, 2009; Tough et al., 2002). For example, there is evidence that mothers giving birth at ages 30 and over are less likely than younger mothers to smoke during pregnancy (Aldous & Edmonson, 1993; Fertig, 2010).[14] There is (albeit not conclusive) evidence that older mothers are more likely to be partnered. In a qualitative study (n=45) interviewing Canadian women, Benzies et al. (2006) reveal that the need to have a stable relationship

[14] The study by Fertig looks at all parities while the study by Aldous and Edmonson focuses on first births only. The study by Fertig also reveals that relationship between mother's age at birth and propensity to smoke during pregnancy has changed substantially over time, in line with the hypothesis that the process of postponement has become more selective of advantaged mothers.

and to reach (financial) independence were key factors in explaining women's decision to postpone childbearing. Moreover, Bornstein et al. (2006) reveal that older mothers are more likely to receive support from the baby's father, which can be considered a proxy for relationship status. First born children of older mothers are also more likely to be planned (Bornstein et al., 2006), which has been found to be positively associated with child outcomes (Carson et al., 2011). In addition to a socioeconomic argument, the literature mostly indicates a positive effect of delaying childbearing on parent-child relationships, especially in early childhood (see Martin (2004) for a review). Older parents can be more mature and may adopt better parenting styles (Cooney, Pedersen, Indelicato, & Palkovitz, 1993; Kalmijn & Kraaykamp, 2005; Lampinen et al., 2009), which may be (at least partially) linked to their advantageous socioeconomic profiles (Philliber & Graham, 1981). For example, Bornstein et al. (2006) argue that argue that "older parents tend to possess more life experience and information, and may feel more psychologically ready to assume the responsibility of childbearing" (p.877 citing Cowan and Cowan (1998)). A small scale study (n=69) by Garrison et al. (1997) reveals that, on average, families in which the mother had her first child at age 35 and over were more satisfied, less stressed and reported better family dynamics than parents who didn't delay (Benzies, 2006). However, the positive association between childbearing postponement and parent-child relationships are not entirely consistent across the literature as other studies have revealed less positive outcomes. For example, Rossi (1980) finds that older mothers were feeling distance from their children, who were reporting lack of intimacy when they reached adulthood. Evidence in this respect is not conclusive as many of these studies have relied on non-random samples, but Martin (2004) argues that the literature mostly reveals positive findings.

Demographers, by building on the evidence that older mothers tend to be advantaged/better prepared, have implicitly tended to see postponement as a beneficial process for children. Namely, to the extent that the resources available to parents increase with their age at first birth, so does the transmission of (economic, cultural and social) resources to their children (Mare & Tzeng, 1989; Powell et al., 2006) who benefit from them. For example, Mclanahan (2004 p.209) states that "an increase in maternal age is seen as an increase in parental resources", which are positively associated with parenting quality and, in turn, with children's cognitive and social development. Although less explicitly than Mclanahan, Sobotka, in the paper he co-authors with Schmidt et al. (2012) and for which he is responsible for the demographic section, argues that "..delayed

parenthood..has some positive consequences and implications. It is associated with a more stable family environment, higher socioeconomic position, higher income and better living conditions, as well as better parenting practices" (p. 35). Similarly, Martin (2004) argues that "parents who delay childbearing may be starting families at an age when they have more resources to pass on to their children" (p. 84). These arguments mostly build on evidence suggesting that mothers who postpone are positively selected; conversely, less attention has been given to inspect the direct link between postponement and child wellbeing and/or to discuss existing evidence on parental age and child wellbeing that may or may not support empirically the argument that postponement is a beneficial process in terms of child wellbeing.

The association between maternal age and child wellbeing is not a topic that has been neglected in social science research. Different studies (belonging to the developmental, epidemiological and psychological literatures) have analysed the association between parental age and children's and young adults' wellbeing in developed contexts, some in relatively more recent birth cohorts than others.[15] Many of them reveal that, on average, children of older mothers tend to fare better on a range of cognitive (Berryman & Windridge, 2000; Fergusson & Lynskey, 1993; Fergusson & Woodward, 1999; Hawkes & Joshi, 2011; Kalmijn & Kraaykamp, 2005; Pollock, 1996; Saha et al., 2009; Sutcliffe, Barnes, Belsky, Gardiner, & Melhuish, 2012; Zybert, Stein, & Belmont, 1978) and behavioural outcomes (D'Onofrio et al., 2009; Fergusson & Lynskey, 1993; Hawkes et al., 2004; Pollock, 1996; Sutcliffe et al., 2012; Wakschlag et al., 2000). But there are also studies that question the positive association between increasing maternal age and child/young adult wellbeing (Myrskylä & Fenelon, 2012; Saha et al., 2009; Weiser et al., 2008). The study by Myrskyla (2012) and the one by Saha (2009) are less relevant as they use data that refers to a period where the process of postponement hadn't started yet and childbearing at older ages occurred in very different circumstances than what it does today.[16] Weiser et al. (2008), by using more recent Israeli data,[17] reveal that sons of older

[15] The literature discussing the association between parental age and child wellbeing is vast. The studies that are discussed in the Chapter do not include research that analyses the association between parental age and child wellbeing in historical periods (for a review of some of these studies see (Liu, Zhi, & Li, 2011) and (Myrskylä & Fenelon, 2012). For example, some studies have mentioned that an advanced parental age may be negatively associated with child wellbeing as it reduces the likelihood that both parents survive until the offspring reaches adulthood (Myrskylä & Fenelon, 2012). However, this not highly relevant when discussing the consequences of childbearing postponement in contemporary contexts where mortality is relatively low in young adult ages (Schmidt et al., 2012).

[16] The study by Myrskyla looks at men born between 1951 and 1976 and the study by Saha looks at births that occur between 1959 and 1969.

mothers and fathers (40 and over) have poorer social functioning (a precursor to developing schizophrenia) than children of younger mothers. The authors however conclude that "the effect is relatively small and is probably not clinically relevant" (p.1045). Therefore, the message revealed from this body of the literature is generally optimistic as children seem to benefit from their parents/mothers older age at birth; however, the extent to which the findings of these studies can be used to effectively discuss the argument (implicitly posited by the demographic literature) that the postponement of first births is a beneficial process for child wellbeing is limited for different reasons. For example, the studies by Berryman (2000), Wakschlag (2000) and Bornstein (2006) are based on non-representative samples, which make generalizability difficult. The study by Pollock (1996) and Sutcliffe (2012) reveal the association between maternal age and child wellbeing only when adjusted by a range of family characteristics, preventing to assess actual disparities in children based on their mothers' age at (first) birth. The majority of these studies analyse the association between childbearing at older ages and child wellbeing looking at all parity births (Fergusson & Lynskey, 1993; Hawkes & Joshi, 2011; Sutcliffe et al., 2012), but, as mentioned in the introduction of the Chapter and of the thesis, older mothers giving birth to first vs. higher order births are likely to be demographically distinct groups thus making generalization difficult. Finally, the existing literature has given limited attention to first births occurring to mothers older than age 30. In some of the studies the maternal age range is divided into discrete age categories and age 30 is chosen as the upper age cut-off (Fergusson & Lynskey, 1993; Hawkes & Joshi, 2011; Pollock, 1996). This choice has usually been justified by the fact that the number of (first) births occurring after age 30 was too small to enable this group to be analysed separately (the study by Sutcliffe et al. (2012) constitutes an exception as the age range stretches until age 40, but it focuses on all order births). But as first births, in contemporary and developed contexts, are increasingly often postponed beyond age 30 (Billari et al., 2007), there is need to pay closer attention to the entire maternal age range when discussing the consequences of childbearing postponement in terms of child wellbeing. This argument is supported by evidence provided by the medical literature, which reveals that giving birth at older ages, where age 35 is identified as a cut-off point, is associated with poorer health outcomes at birth for both mother and child (Hansen, 1986; Jacobsson, Ladfors, & Milsom, 2004). Part of the medical literature has expressed concerns by

[17] The paper does not mention which birth cohorts the analyses are based on, but given that it uses data from the military I expect it to be based on relatively recent data.

claiming that the optimal age for childbearing, in terms of pregnancy outcomes, remains the age range 20-35 (Bewley et al., 2005). Evidence suggests that with increasing maternal age at birth, the risks of antepartum, intra-partum and post-partum complications increase. Risks have to do, for example, with high blood pressure, preeclampsia, gestational diabetes, chromosomal abnormalities, and low birth weight (Aldous & Edmonson, 1993; Carolan, 2003; Fretts, Schmittdiel, McLean, Usher, & Goldman, 1995; Hansen, 1986; Lampinen et al., 2009). These negative outcomes at birth such as low birth weight may result in increased risks of infant mortality and also in worse outcomes later in life, such as school readiness (Reichman, 2005). These risks are more often discussed in reference to all order births, but there is also evidence that they apply to first births (Yuan et al., 2000). Based on the argument and evidence presented by the medical literature, one could argue that the association between maternal age and child wellbeing could be curvilinear: positive and increasing up the mid-30s and declining afterwards. However, when considering first births in contemporary contexts the extent to which this occurs might be modified by the advantageous characteristics of mothers who postpone. Despite being worrying, it is now an empirical question the extent to which the evidence presented by the medical literature applies to contemporary mothers who postpone their first births: some of the studies are based on data which is now 25-30 years old (Carolan & Frankowska, 2011). In fact, the relatively advantageous profiles of older first-time mothers in developed contexts (as discussed at the beginning of this section) could (more than) compensate for the health risks (Carolan & Frankowska, 2011; Stein & Susser, 2000; Ventura & Hendershot, 1984). Moreover, some of the negative consequences of older childbearing may be potentially remediable if women have access to modern obstetric care, which is more likely to occur when they are socioeconomically advantaged. Those consequences that are not remediable (like Down's syndrome, congenital malformations etc.), have over time become more easily identifiable (Cunningham & Leveno, 1995; Resnik, 1990) due to prenatal screening (Myrskylä & Fenelon, 2012) and to the fact that older mothers utilize prenatal care earlier (Ales, Druzin, & Santini, 1990; Menacker, Martin, MacDorman, & Ventura, 2004). As Carolan (2003) states it "women who give birth after age 35 face increased risks, but these risks are largely manageable with modern obstetric care" (p. 23). The medical literature has, more recently, also raised concerns for the wellbeing of children born through assisted reproductive technologies (ART), a procedure which is often resorted to by older parents because of their decreased fecundity (Andersen et al., 2009). Research shows that children born through ART are at increased risk of having

worse health outcomes at the time of birth, but evidence is less well established for their cognitive development. Recent evidence provided by Carson et al. (2009), using data from the Millennium Cohort Study, suggests that children born after ART appear to perform better on cognitive tests than other children. After adjusting for confounding (maternal age, social class etc.) and mediating factors (birth weight, preterm etc.), the advantage is reduced and is not statistically significant. The authors posit that children of mothers who undergo fertility treatments tend to fare better as these women are, on average, highly educated and socially and economically advantaged. In sum, there are grounds to expect that the "average" mother who today gives birth to her first child at older ages is at lower risk of adverse health outcomes than she was twenty years ago (Myrskylä & Fenelon, 2012) because of her characteristics and advancements in obstetric care and screening. However, caution is needed as this argument cannot be generalized to births that occur at particularly advanced ages. While evidence seems to suggest that rates of adverse perinatal outcomes rise with age, the increase is modest for births occurring between ages 35-39. In contrast, births occurring at ages 40 and above are still of concern in terms of child wellbeing (Carolan & Frankowska, 2011).

To summarize, the literature reveals that mothers who postpone their first births to older ages tend to be advantaged and the demographic literature implicitly argues that their children are likely to benefit from this process. The existing literature on maternal age and child wellbeing is only partially able to support this argument, not least because studies often look at all parity (rather than only first) births and do not differentiate mothers who give birth after age 30. This may raise issues as the medical literature documents increased health risks for children of mothers giving birth after age 35 and, in particular, 40. Given that different mechanisms, i.e. social advantages vs. health risks, may potentially affect if and how increasing maternal age at first birth relates to child outcomes, analysing the association between childbearing postponement and child wellbeing would benefit if both perspectives were considered and integrated. By building and expanding on existing evidence, the aim of this Chapter is to describe the selection process into postponement, to document actual differences in child wellbeing based on maternal age at first birth and to reveal what is the role of social and health factors on the association between childbearing postponement and child wellbeing.

2.3 Study contribution

The overarching contribution of this study is that of providing evidence of how children of older first-time mothers fare in a contemporary developed setting compared to those of younger mothers. The overarching research question this study aims to address is whether and to what extent children benefit from their mothers' older age at first birth when looking at outcomes reflecting different dimensions of child wellbeing. In doing so, attention is given to births that occur at particularly old ages as the medical literature documents that health risks rise for mothers giving birth after age 35 and, in particular, after age 40. The study also contributes to understanding the link between the postponement of first births and child wellbeing by integrating social and health perspectives on maternal age by assessing whether and to what extent the unadjusted differentials reflect health and social processes. This is done by investigating the relative influence of socioeconomic, demographic and health factors on the unadjusted association between maternal age at first birth and child wellbeing.

In order to assess whether and to what extent children benefit from their mothers' increasing age at first birth, I regress child health at the time of birth and cognitive and behavioural outcomes measured at age 5 on maternal age at first birth. Looking at indicators which measure different aspects of child wellbeing contributes to provide a more complete picture on the potential benefits of postponing the first birth and to highlight social and health trade-offs that might arise at older ages. In particular, looking at child health at the time of birth enables the medical literature argument (i.e. childbearing at older ages involves increased risks for child health) to be assessed empirically when looking at first births in a contemporary developed context. In turn, looking at children's cognitive and behavioural outcomes measured at age 5 contributes to go beyond the time of birth and health outcomes. It is relevant to look at outcomes other than health ones as, while on one side the relatively advantaged characteristics of older first-time mothers may result in improved children's cognitive and behavioural outcomes (as they compensate or more than compensate the increased risks of adverse health outcomes), on the other, the extent to which this occurs may depend on how old the mother is at the time of first birth.

The analyses go on to explore the relative role of health, socioeconomic, and demographic factors on the association between maternal age and child outcomes. In order to investigate the "health" process associated with increasing maternal age at first birth, I

begin by inspecting how the association between maternal age at first birth and children's cognitive and behavioural outcomes varies as the analyses control for child health at the time of birth. The aim is to assess whether and to what extent the negative association, documented in the existing medical literature, between older maternal age and child health is relevant for the one with cognitive/behavioural children's outcomes (i.e. non-health ones). If child health at the time of birth plays a role, I expect the positive (or lack of one) association between childbearing postponement and children's cognitive and behavioural wellbeing to become larger (or positive) when accounting for child health at the time of birth. Following this, the other aim is to unpack (if any is observed) the differentials by age at first birth that are documented in the unadjusted analyses and to explain them on the basis of socioeconomic, demographic and health behaviours variables. This enables the analyses to investigate the "social" process associated with increasing maternal age at first birth. As mothers who postpone their first birth have, on average, advantageous (socioeconomic, demographic and health behaviours) profiles which may result in a positive association between maternal age and child wellbeing, controlling for these variables may partially or largely explain this positive association (or lack of a negative one). If this is the case, I expect the positive association (or lack of one) between childbearing postponement and child wellbeing to become smaller (or negative) when accounting for these variables.

The analyses focus on first births and exclude higher order births, for reasons outlined in the background section. The geographical focus of this study is the U.K. Looking at this context is pertinent to address the research questions for different reasons. The primary reason is that the U.K. possesses a unique dataset, the Millennium Cohort Study (described in the following section) which enables the consequences of childbearing postponement for child wellbeing to be analysed in a contemporary setting. The second reason is that in the U.K. conception rates of women aged 35 and over have increased by more than 70% over the period 1990-2010 (ONS, 2012). This means that first births at older ages may be sufficiently common to enable their child outcomes to be analysed. Finally, the U.K. is characterized by a marked socioeconomic polarization of childbearing behaviours. That is, least advantaged women tend to have children early while the most advantaged tend to postpone their first births to older ages (Ekert-Jaffe, Joshi, Lynch, Mougin, & Rendall, 2002; Hawkes, Joshi, & Ward, 2004; Sigle-Rushton, 2008). On one side, this is a desirable feature as it enables to assess if and to what extent first born children of older mothers benefit from their relatively advantageous profiles and therefore to discuss the argument

that childbearing postponement is positively associated with child wellbeing. On the other, it also suggests that the U.K. is a peculiar setting and the findings might be generalizable only to countries which present a similarly marked socioeconomic polarization of childbearing behaviours such as the U.S. (McLanahan, 2004; Rendall et al., 2010).

2.4 Data & Method

2.4.1 The Millennium Cohort Study

The study uses data from the Millennium Cohort Study (MCS), which is a U.K. national cohort study tracking over 18,000 children who were born in the U.K. in 2000-2001. The first wave was collected when the children were 9 months old and subsequent waves were collected at intervals of roughly two years (ages 3, 5 and 7). Some wards were sampled to over-represent areas of high child poverty, areas characterised by concentration of ethnic minorities and the three smaller countries of the UK - Scotland, Wales and Northern Ireland (Hansen, 2008). For this reason, weights are used in the analyses in order to rebalance the survey and in order to account for its complex structure. The MCS questionnaires include a series of questions on the child, which are intended to reveal information about his/her birth, and about his/her development over time not only in terms of health, but also concerning different cognitive and behavioural aspects. At the same time, extensive information is available on the cohort member's family: demographic characteristics (age, partnership status), socioeconomic background (educational level and occupational status) and health. In the great majority of the cases, the mother is interviewed as the main caregiver and, where present, her co-resident partner is also interviewed (who may or may not be the biological father). The analyses focus on those cohort babies for whom the mother is the main interviewee. This is done in order to have a complete record of the mother's characteristics and health behaviours during pregnancy which are considered, as explained below, crucial to the child development and highly related to the mother's age at first birth.[18] The analyses focus on first births[19], which

[18] Conversely, the analyses do not account for father's age at the birth of the child. While advanced maternal age has been an important topic of research for a long time (ESHRE Capri Workshop Group, 2005), advanced paternal age has only recently received more attention from researchers. Although this represents a prominent area of future research and much of the issues discussed in relation to mothers' age at birth in this study also apply to fathers (Bray et al., 2006), this issue is not considered within the scope of this paper. This

correspond to around 40% of the MCS sample. The survey is contemporary as it records births which occurred around the year 2000 such that the analyses are informative of the link between childbearing postponement and child wellbeing.

2.4.2 Child outcomes

The association between maternal age at first birth and child wellbeing is investigated looking at four outcome variables: one measure of child health at the time of birth, two measures of cognitive development and one measure of behavioural wellbeing measured when the cohort member is 5 years old.

Child health at the time of birth is measured through low birth weight (LBW), a binary indicator which takes the value 1 when the child's birth weight is below 2.5 kg. Low birth weight is a widely used marker of infant health at birth primarily because of its documented close association with infant mortality, but also because existing work has documented that it is related to later life outcomes (Dalton & Bennett, 2000) such as health, development and education (Reichman, 2005; McCormick, 1992). However, LBW is also considered a controversial outcome. Firstly, although LBW is an extremely powerful prediction of a baby's chance of survival, groups with a larger proportion of LBW babies are not uniformly at greater risk of infant mortality. In the literature, this has been referred to as the LBW paradox and has, for example, been found to apply to children of mothers who smoke during pregnancy, babies born at high altitude and twins (Hernández-Díaz et al., 2006; Wilcox, 2001). This paradox might lead to hypothesize that the consequences of LBW vary for different subpopulation groups. Along similar lines, previous work has suggested that disparities in low birth weight might reflect biological differences across groups. For example, maternal height has been found to be an important determinant of a child's birth weight and this might explain why some ethnic minority groups (who vary in statures) experience higher rates of LBW but not necessarily higher infant mortality rates than others. A counter argument is that maternal height should not be

is mainly because the father's age correlates strongly with the mother's age and it is available only for a part of the sample (e.g. if the father lives in the household or a proxy interview has been conducted). In the sample of analysis used in this study (first births in Sweep 3 of the MCS), the age of the father would be missing for 1000 observations (around 19% of the sample).

[19] First births are identified by using a direct question in the second wave of the MCS. For those mothers who are not present at the second wave, first births are identified by combing information on the presence of older children in the household at the time of interview and non-resident ones.

uniquely interpreted as a biological marker but also as reflecting complex biosocial pathways involving interactions amongst multiple factors (Spencer and Logan, 2002). Kelly et al. (2009), for example, reveal that birth weight differences in the U.K. largely reflect socioeconomic and cultural factors. Indeed, the argument of whether differences in birth weight across ethnic groups are pathological or physiological is still subject to debate in the current literature. The second controversy around LBW involves the fact that evidence is not conclusive as to what it indicates about children's life chances. Low birth weight is not randomly allocated in the population as LBW children are selective in many ways which are also likely to be associated with later life outcomes (Gorman, 2002). Moreover, some of the studies that argue for a causal effect of LBW are based on siblings fixed effects models where birth weight could still represent a proxy for unmeasured time-variant family dynamics (Conley & Bennett, 2000) and others are based on twins raising issues of generalizability to single births (Black, 2007). Along similar lines, two studies reveal that although birth weight may have some effect on later outcomes, social risk factors are more important than early health endowments to determine developmental outcomes in childhood (Boardman, 2002; Gorman, 2002). For example, the study by Gorman (2002) reveals that within educational groups, heavier children appear to do better, but the relative difference in test scores by parental education is maintained regardless of birth weight. Finally, other studies argue and reveal that, amongst LBW children, VLBW (birth weight <1.5 kg) ones are at particular high risk of developmental disabilities (Boardman, 2002). LBW children are not a homogenous group and MLBW/VLBW children experience qualitatively different developmental trajectories.

Notwithstanding its controversial nature and limitations, LBW is widely used in the literature, partly because it is often collected in surveys and precisely recorded. It is used in this Chapter as an indicator of child health at birth because it is available and precisely recorded in the MCS, and because it is associated with maternal age at first birth (Aldous and Edmonson, 1993). Getting into the complexities of the (heterogeneous) meanings and consequences of LBW goes outside the scope of this Chapter. Nonetheless, the above discussion suggests that the evidence (based on LBW) that this Chapter provides about the health consequences of childbearing postponement is partial. This is acknowledged as a limitation in the conclusion section of the Chapter and provides motivation for considering other outcomes in future work. For the time being, as robustness check, the analyses have been replicated by looking at a continuous measure of birth weight and whether the child is born preterm and the results (shown in the appendix) are similar to those for LBW. In the

MCS, birth weight is self-reported by the main respondent at Sweep 1 and it is accurate when compared to administrative birth registration data (Tate, Dezateux, Cole, & Davidson, 2005). Because of issues of statistical power, I have not been able to replicate the analyses for VLBW as it is recorded to occur for less than 1% of the sample.

Child outcomes at age 5 are measured using two indicators of cognitive wellbeing and one of behavioural wellbeing. To measure cognitive development, I use two scores of the British Ability Scale (Second Edition): BAS Naming Vocabulary which assesses the spoken vocabulary of the child (Hill, 2005) and the BAS Picture Similarity which assesses the child's ability in problem solving.[20] These are validated tools to assess children's cognitive development in the British population. I expect the BAS naming vocabulary to exhibit a steeper gradient by maternal age at first birth. This is because verbal scores are found to be particularly susceptible to the family's socioeconomic status (Noble, McCandliss, & Farah, 2007; Schoon, Jones, Cheng, & Maughan, 2011). Thus, if, as expected, older mothers have higher SES profiles than younger mothers, a verbal measure of cognitive ability should rise with increasing maternal age at birth more steeply than a non-verbal score. The child's behavioural assessment is based on the Strengths and Difficulties Questionnaire (SDQ), which is part of the self-completion module of the questionnaire. The SDQ is a behavioural-screening questionnaire for 3 to 16 years olds and a highly validated tool for screening psychiatric disorders. The SDQ consists of the main respondent's report of 25 items grouped into 5 categories which measure the child's conduct problems, hyperactivity, emotional symptoms and pro-social behaviour. Each of the 25 items is rated by the main respondent using a scale from 0 to 2 (not true, certainly true and somewhat true) and details of the five scales are provided in the Appendix at the end of the Chapter. A summary score, or total difficulty score, for each child is obtained by adding up the scores of the first four scales (Goodman, 1997, 2001), which is the outcome used throughout the analyses.[21] Cognitive and behavioural outcomes are analysed according to standard deviation units[22] and the scores have been rescaled in a way that a

[20] The analyses have been replicated looking at the BAS pattern construction score and the results are similar to the BAS picture similarity score.

[21] For additional information on how to construct and interpret the SDQ score, please refer to: http://www.sdqinfo.com/py/sdqinfo/c0.py.

[22] Age standardized scores (with reference to the external standardization sample used in developing the assessment) for the BAS verbal score are provided in MCS Sweeps 2, 3 and 4 (Hansen, 2008). To construct a standardized SDQ score, I used population parameters for the British population available at http://www.sdqinfo.com/g0.html (mean=8.6 and sd=5.7). The standardized scores provided in the MCS have a mean of 50 and a standard deviation of 10. In order to make the results easily comparable across the two

higher score corresponds to a better outcome. The main difference between the two scores is that the BAS vocabulary score is administered by the survey interviewers to the child, while the SDQ test is administered to the parents and may therefore be subject to biases, something that I discuss while commenting the results. The analyses looking at the cognitive and behavioural outcomes focus on Sweep 3 of the MCS, which is collected when the cohort children are around 5 years old. I focus on Sweep 3 as the sample of first births for the outcomes analysed is less affected by attrition than Sweep 2 and Sweep 4[23] are. Although you would expect Sweep 3 to be more affected by attrition than Sweep 2, Hansen (2008) explains this contradictory finding by arguing that the response rate on the cognitive scores is higher for those tested at age 5 rather than 3. Running the analyses on Sweep 3 means that they are based on a larger number of first births, which is desirable as first births become relatively less common with increasing age at first birth. The analyses have been replicated on child outcomes measured in Sweeps 2 and 4 (which have similar outcomes than Sweep 3) and the results (not shown) are very similar to those obtained from Sweep 3.

2.4.3 Health, socioeconomic and demographic variables

The main variable of interest, mother's age at first birth, is categorized as follows: 14-22, 23-29, 30-34, 35-39 and 40 and over. The decision to divide the maternal age range this way has been taken by looking at the mean age at first birth in E&W between 1989 and 2009, a temporal interval which includes past and future years with respect to the time in which the MCS survey was first collected (2000). The mean age at first birth has risen from 25.4 in 1989 to 27.6 in 2009 (ONS, 2011). Therefore, age 23 is chosen as the upper cut-off for births occurring at 'younger' ages, as it is well below the mean age at childbearing over this time period. Moreover, Hobcraft and Kiernan (2001) reveal that social and economic disadvantage extends beyond teenage mothers. The middle age group refers to births occurring between ages 23 to 29. Age 30 has been chosen as the lower cut-off for the 'older' age category as it is well above the mean age at first birth. However, differently from previous studies, first births occurring at ages 30 and above are divided

scores, I have standardized the BAS naming vocabulary and picture similarity scores to have a mean of 0 and a standard deviation of 1. The results are almost identical regardless of the BAS standardized score that I use.

[23] For example, for the cognitive score on first births used in the analyses, Sweep 2 has 5156, Sweep 3 5944 and Sweep 4 5068 observations, respectively.

into the three groups in a way to reveal whether the benefits for child wellbeing, if any, of an older age at first birth continue to accumulate or rather start diminishing after a certain age. The models include controls for the child's gender, as the birth weight and the developmental process of girls may differ from that of boys (Burman, Bitan, & Booth, 2008; Hintz et al., 2006). Ideally, models should be estimated separately for boys and girls, but given the small sample size in the older age groups, this wouldn't be a sensible strategy to pursue. Models also control for whether the child is a twin[24] as giving birth at an older age is associated with increased probability of multiple births, which is in turn associated with complications at birth (Corsello & Piro, 2010).

After investigating the unadjusted (or bivariate) association between maternal age and child wellbeing (controlling for the child's gender and whether he/she is a twin), the next step is to consider the role of health, socioeconomic and demographic factors in order to reveal whether and to what extent the unadjusted maternal age/child wellbeing association reflects health and social processes. The analyses investigate the role of child health on the association between children's cognitive and behavioural outcomes and maternal age at first birth by including in the regression models child health variables that the medical literature documents to be a function of maternal age at birth (Tough et al., 2002) and which might also be likely to be associated with the cognitive and behavioural wellbeing of the child: whether the child is low birth weight (which therefore serves as a dependent and independent variable throughout this chapter) and born preterm (Caravale, Tozzi, Albino, & Vicari, 2005; Dalton & Bennett, 2000; Hack, Klein, & Taylor, 1995).

In order to investigate the "social" process that the literature documents to be associated with childbearing postponement, I include in the regression models a set of variables that are found or expected to be associated with the timing of first birth and child outcomes. These "explanatory" variables (which are labelled this way as they are meant to "explain" the positive (if any is documented) association between an increasing maternal age at first birth and child wellbeing) are divided into 3 main groups: socioeconomic/demographic characteristics, health behaviours during pregnancy/birth and parenting styles. In terms of socioeconomic/demographic characteristics, models include controls for the mother's ethnicity (White, Indian, Pakistani and Bangladeshi, Black), as the timing of childbearing in the U.K., as well as child outcomes, are expected to vary across ethnic groups. Models control for mother's education at the time of birth of the child

[24] In case of twins, the first child recorded in the MCS is used in the analyses. Triplets are dropped from the sample.

as I expect higher education to be associated to both childbearing postponement and better child outcomes. Education is grouped according to NVQ levels: no education, NVQ 1/2, NVQ 3 and NVQ 4/5. This categorization is based on a derived variable in the dataset which groups respondents according to National Vocational Qualifications (NVQ), which includes both academic and vocational qualifications. For respondents with both vocational and academic qualifications, NVQ level is assigned using the highest of these. I have coded the categories NVQ 1/2 (primary/secondary education or relevant vocational qualifications), NVQ 3 (GCSE and A-levels or relevant vocational qualifications), NVQ 4/5 (higher degree or relevant vocational qualifications) and no education when the respondent does not have any of these qualifications. Analyses suggested that those respondents with overseas qualifications should be grouped into the NVQ 3 category. Models also control for family structure at birth namely whether the mother is married, cohabiting (with the biological father of the cohort child) or not living with a partner.[25] Married couples are distinguished from cohabiting couples as research shows that the risk of relationship instability and dissolution is lower for married couples than for cohabiting couples with children (Amato, 2005). I expect that those children who are born with married biological parents to be less likely to be LBW (Reichman, Hamilton, Hummer, & Padilla, 2008) and to score higher on cognitive and behavioural tests than children born into other family structures. The main reason why I control for family structure at birth rather than at age 5 even when children's cognitive and behavioural wellbeing is analysed is to avoid issues of reverse causality as poorer child outcomes could be conducive to relationship problems among parents. As a robustness check, models analysing children's cognitive and behavioural outcomes have also been estimated controlling for family structure at age 5 and the results are essentially unchanged. Finally, models control for net annual household income, which is provided by the main respondent using a banded show card. Income is divided into low (less than £10,400), medium (above £10,400 and below £31,200) and high (above £31,200). As for family structure, the analyses use a measure of income collected at Sweep 1 rather than at Sweep 3. This is because the former may be more likely to reflect the (relatively advantaged/disadvantaged) environment in which the child has grown up between birth and age 5.[26] Again, as a robustness check, models have

[25] The non-cohabiting category includes respondents who are separated, divorced, closely involved with partner, just friends or not in any relationship.

[26] To the extent that income reflects whether the cohort child mother is (back) working when the child is 9 months and her employment status may be related to the child health (i.e. if the child is born with health problems the mother may decide not to work), this could be a potentially endogenous variable to include.

been estimated by controlling for household income measured at Sweep 3. Consistent with this argument, children's cognitive and behavioural outcomes at age 5 are (slightly) more strongly associated with family income measured at Sweep 1 rather than at Sweep 3 but the sign and magnitude of the effect are very similar and the overall results are essentially unchanged. In terms of health behaviours, I control for mothers' smoking behaviours during pregnancy as it is found to be related to mothers' age at birth (Fertig, 2010) and because of its documented association with poorer birth outcomes and development process of children (Coles et al., 1991; Horta, Victora, Menezes, Halpern, & Barros, 1997; Julvez et al., 2007; Weitzman, Gortmaker, & Sobol, 1992). For the models analysing children's cognitive and behavioural outcomes, I control for the number of months after birth the mother has breastfed (divided into 3 categories: less than 2 months, between 2 and 4 and more than 4 month), as breastfeeding has been found to be positively correlated with maternal age (McDowell, Wang, & Kennedy-Stephenson, 2008) and child outcomes (Kramer et al., 2008). The models control for whether the pregnancy was intended as the literature documents it to be associated with better child outcomes and with an older age at first birth (Bornstein et al., 2006; Carson et al., 2011). Finally, models analysing cognitive and behavioural outcomes also control for parenting styles, namely whether the mother reads to and plays (indoor) with the child (several times a week, sometimes or rarely). I expect more frequent reading and playing to be associated with improved child outcomes and with an older age at first birth, consistent with what the literature argues in terms of parenting styles of parents who postpone childbearing (Kalmijn & Kraaykamp, 2005).

There are two issues that need to be discussed when these health, socioeconomic and demographic variables are included into the models. The first one is that the variables used to investigate the "health" processes that may be associated with postponement may also reflect the selected characteristics of mothers who delay their first births. The socioeconomic characteristics and health behaviours of mothers who postpone childbearing to older ages, which may be positively associated with child health, may compensate for the biological risks associated with an advanced maternal age at first birth. In addition, prenatal screening may remove some of the negative consequences of conceiving and giving birth at an older maternal age at birth (Myrskylä & Fenelon, 2012). The extent to which the unadjusted age gradient in LBW reflects older mothers' selected

During the interview mothers are asked the reasons why they are not working and very few mothers (n=14) declare that they aren't working because of their child poor health. Nonetheless, in order to reduce endogeneity issues but still be able to capture selection into age at first birth, I have decided to control for income and not for mothers' working status.

characteristics will be, at least partially, revealed by the model regressing LBW on mothers' socioeconomic and demographic characteristics. While this is something to keep in mind while interpreting the results, even if child health variables are "socially" patterned, looking at how the unadjusted association between maternal age and children's cognitive/behavioural outcomes changes when they are included into the model is still useful to investigate whether there is an underlying (even if small) health process involved.

The second issue is that socioeconomic variables reflect selection into postponement, but an increasing age at first birth may also influence socioeconomic status. For example, older mothers may have higher incomes both because of their selected characteristics and because increasing age at first birth might, *all else being equal*, lead to higher income. Miller (2011), for example, shows that postponing motherhood by one year at the age of 21-34 is associated with a 9% increase in earnings (through increases in hours worked and wages). The effect varies across subgroups of the population and college educated women receive the greatest rewards from postponing. Evidence is however not conclusive in this respect as Hawkes et al. (2004), by looking at the MCS, show that there are little advantages of postponing births past the age 30 in terms of, amongst other things, income and occupation. Education may also be endogenous to age at first birth for the younger mothers as, for example, 17 years old mother have not had the chance to finish their education. The fact that these socioeconomic variables may reflect social processes that go beyond the selected characteristics of mothers who postpone is not a limitation for this study. This is because its aim is not that of revealing the "causal" effect of (an older) age at first birth on child wellbeing as if (older) mothers were randomly allocated to the age at which they give birth to their first child. If this were the aim, controlling for socioeconomic variables that may be influenced by age at first birth (such as income) would produce age parameters that are biased downwards. However, the interest for this study does not lie in the "unbiased" parameter per se because its aim is rather to describe the selection process into postponement, to document actual differences in child wellbeing based on maternal age at first birth and to reveal whether and to what extent the unadjusted analyses reflect social processes associated with postponement (i.e. the substantive interest is rather in how the unadjusted parameter varies as these variables are included in the models). I therefore use the term "social process" while referring to factors that may reflect the selected characteristics of parents who postpone, but also to those that are associated with postponement above and beyond the characteristics of parents who experience it.

2.4.4 Method

The first part of the analyses presents descriptive statistics of mothers' characteristics and child outcomes by maternal age at first birth (divided into 5 discrete categories as outlined above). The descriptive analysis informs whether older mothers (grouped into the three age categories 30-34, 35-39 and 40 and over) in the U.K. have, as argued by the existing literature, advantageous characteristics in terms of SES, health behaviours and parenting styles than younger mothers. As LBW is a binary variable, I use logistic regression to analyse its association with maternal age at first birth (measured in discrete groups with 23-29 as the reference category). As both measures of cognitive and behavioural outcomes are continuous, I use ordinary least square regression (OLS) models to analyse their association with maternal age.

The descriptive and regression model results are weighted (through the command option SVY in Stata) to account for the complex survey design of the MCS and for attrition/non response.[27] In the subsample of analysis (first births where the cohort child's mother is the main interviewee) LBW is missing in less than 1% of the sample and measures of children's cognitive and behavioural outcomes are missing for less than 2% and 3% of the cases respectively. Missing values on the controls variables are negligible with the exception, not surprisingly, of income, which is missing in 7% of the subsample. The regression models presented in the next section attempt to assess whether children whose mothers do not report income levels differ (in terms of LBW and cognitive and behavioural scores) from children whose mothers report them.

As a robustness check and to "visually" inspect the maternal age and child outcome association, I run a cubic B-spline regression which is more flexible (than a parametric model such as OLS) in describing this association. This is because it makes no assumption on the shape of the child outcomes and maternal age association (non-parametric part), while the other control variables (parametric part) are entered as in a "normal" regression. The unadjusted model and the one including all control variables are estimated through this semi-parametric model and their age gradients are plotted in a graph and compared. All models are estimated with the software Stata (12.0).

[27] Unit non-response is when a family does not take part in a Sweep. To account for that, weights that are the inverses of the predicted probability of participating in a Sweep were estimated and combined with the sampling weights.

2.5 Results

2.5.1 Descriptive analyses

Table 1 and 2 present descriptive statistics of the dependent and control variables included into the models. Results are presented by mother's age at first birth and for the overall sample (last column to the right). The row at the bottom of Table 1 shows the (weighted) percentage and number of first births across the maternal age categories. While a relatively large number of first births occur to mothers aged 30-34 (n=1292) and 35-39 (n=494) respectively, a much smaller number (n=43) occurs to mothers aged 40 and above. Because the medical literature argues that outcomes of children born to mothers aged 40 and over are of particular concern, births at ages 40 and above are not merged with those occurring to mothers aged 35-39. Nonetheless, results for this last age group need to be interpreted cautiously. LBW is collected at Sweep 1, while cognitive and behavioural outcomes at Sweep 3. Because of attrition the sample at Sweep 3 is smaller than the one at Sweep 1. For consistency throughout the analyses, LBW is analysed on the same (reduced) sample used for analysing cognitive and behavioural outcomes. Running the analyses on LBW on the larger sample (i.e. Sweep 1) does not substantively alter the results.

Table 1 shows that the child outcomes analysed vary across maternal age categories. The BAS vocabulary score increases and then decreases with maternal age at first birth, showing the highest score in the age group 30-34 and declining afterwards. The BAS picture similarity score also increases with maternal age at first birth but less markedly than the BAS vocabulary one. Mothers giving birth after age 30 show higher scores than the younger ones, but those giving birth at ages 35-39 show lower scores than those giving birth at ages 30-34 and 40 and over. The SDQ score shows a similar pattern to the BAS vocabulary score, but it is the age group 35-39 showing the highest score. The prevalence of LBW tends to increase with maternal age, but the age gradient is not as marked as the one observed for cognitive and behavioural outcomes.

Table 2 shows that, not surprisingly, older mothers tend to be more likely to give birth to twins than younger ones. Preterm does not show a clear and increasing age gradient as mothers having the first child at ages 30-34 are the most likely to have a preterm baby. In terms of socioeconomic/demographic characteristics, older mothers tend to have relatively advantageous profiles. Educational attainment is quite markedly polarized by age at first

birth. The youngest age group is the one with the largest proportion of mothers holding none or NVQ 1 or 2 qualification levels, while those giving birth to their first child in the middle or older age groups are more likely to hold NVQ 3 and NVQ 4 or 5 qualification levels. In line with the argument that those women who are particularly likely to postpone childbearing do so because of investments in education (Mills et al., 2011), mothers having first births from ages 35 and onwards are the most likely to hold NVQ 4/5 qualification levels. Relationship status at the time of birth also shows a quite marked age gradient. Mothers having first births at ages 30 and over are the most likely to be married and cohabiting at the time of birth and the least likely to be non-partnered. Mothers giving birth between ages 30-34 are more likely than those having first births at ages 35 and over to be married and less likely to be cohabiting. In the youngest age group, we see the highest (amongst all groups) proportion of mothers who are non-partnered at the child's birth and the lowest proportion who are married. The middle age group is between the extremes of the younger and older age groups. More than 90% of the sample analysed is White and this is observed for all the age groups but the oldest one. Finally, consistent with an argument that older mothers are more affluent, those having their first births at ages 30 and above are more likely than younger ones to have high levels of household income. Mothers giving birth at ages 40 and above are the most likely to belong to the "high income" group, but they are more likely than those having first births between ages 30-39 to belong to the "low income" group.

In terms of health behaviours during pregnancy/around the time of birth, older mothers also tend to have improved characteristics. As has already been documented for mothers in the MCS (Fertig, 2010), the propensity of a mother to smoke decreases monotonically with age at first birth. Older first-time mothers are the group with the highest proportion of women breastfeeding for a period longer than 4 months and mothers aged 40 and above show the highest percentage. Interestingly, older mothers' breastfeeding behaviours look quite polarized: almost half of them breastfeeds for less than two months and the other half breastfeeds for more than 4 months. Conversely, for the great majority of youngest mothers, breastfeeding lasts less than 2 months and the figure for the middle age group is, again, somewhere in between the youngest and oldest age groups.

As expected, older mothers are by far the group showing the highest rates of intended pregnancies. Mothers having first births between ages 30-39 show the highest percentage of intended births and those having births at ages 40 and above the second highest. In terms of reading/playing with the child, differences by mother's age at first birth are less

marked compared to the other control variables. Nonetheless, mothers giving birth between ages 30-39 are the most likely to be reading "a lot" to the child and the least likely to be reading "rarely". Mothers having first births between ages 23-29 and 40 and over have similar profiles. In terms of playing activities, there is not a considerable amount of variation across age groups in the proportion of mothers playing "a lot" with the child. Interestingly, however, mothers having first births at ages 40 and above are considerably more likely to be playing "rarely" to the child compared to younger age groups. A possible interpretation could be that first-time mothers aged 40 and over have less energy than younger mothers and may therefore be less likely to engage into recreational activities (Bray et al., 2006).[28]

This set of results confirms that older first-time mothers in the U.K. are a selected group of the population. They have, on average, advantageous socioeconomic characteristics as shown, in particular, by their increased educational and income levels, by the fact that they are more likely to be partnered at the time of birth and by their improved health behaviours before and after the birth of the child. While children of older first-time mothers are more likely to be planned, differences in parenting styles (measured in terms of reading and playing to the child) are not characterized by marked age differences. On average, there are some differences between mothers having first births after age 30, but these are less marked compared to the differences with the younger age groups.

[28] Kalil et al. (2012) reveal that highly educated mothers are not only more likely to spend time with their children, but they are also more likely, as the child gets older, to shift the composition of the time they spend together in ways that benefit child's development. When children are aged around 5 years, the literature suggests that teaching activities (reading, helping with home works and problem solving) are the most beneficial for child development. The authors reveal that, when children are aged 5 years old, highly educated women are the most likely to be engaged in teaching activities, while all mothers are similarly likely to be playing with their children. However, using a measure of teaching rather than playing activities, does not change the results.

Table 2.1 Descriptive table of child outcomes by maternal age at first birth

	Maternal age					
	<23	23-29	30-34	35-39	40+	Average
Outcomes	mean/(sd)	mean/(sd)	mean/(sd)	mean/(sd)	mean/(sd)	mean/(sd)
BAS Vocabulary (z- scores)	-0.118	0.327	0.556	0.540	0.233	0.280
	(0.030)	(0.027)	0.032	(0.048)	(0.160)	(0.022)
BAS Picture Similarity (z-score)	-0.182	0.055	0.187	0.155	0.161	0.033
	(0.038)	(0.03)	(0.032)	(0.051)	(0.173)	(0.021)
SDQ (z-scores)	-0.262	0.058	0.157	0.220	0.139	0.010
	(0.030)	(0.020)	(0.025)	(0.036)	(0.118)	(0.02)
	%	%	%	%	%	%
Low birth weight	7.65%	8.05%	7.71%	8.12%	9.44%	7.87%
% of Births	27.52%	37.40%	25.07%	9.21%	0.81%	100%
Number of births	1476	2006	1345	494	43	5363

Note: the results are weighted in order to account for the complex survey design

Table 2.2 Descriptive table of maternal and children's characteristics by maternal age at first birth

	Maternal age					
Controls	<23	23-29	30-34	35-39	40+	Total
Child's characteristics	%	%	%	%	%	%
Twin	0.56%	1.48%	2.16%	2.67%	3.05%	1.52%
Girl	48.93%	49.46%	48.60%	49.46%	55.35%	49.15%
Child Health						
Preterm birth	6.98%	8.09%	8.47%	7.00%	7.60%	7.78%
Education						
None	18.30%	4.20%	2.26%	2.58%	5.55%	7.48%
NVQ 1/2	54.82%	32.72%	28.12%	22.26%	21.32%	36.63%
NVQ 3	20.50%	21.08%	14.15%	15.74%	15.49%	18.65%
NVQ 4/5	6.38%	42.00%	55.47%	59.42%	57.64%	37.24%
Partnership						
Married	12.24%	59.42%	75.27%	71.44%	71.33%	51.53%
Cohabiting	42.72%	30.87%	19.74%	22.15%	22.78%	30.49%
Non-partnered	45.03%	9.72%	4.99%	6.41%	5.89%	17.97%
Ethnicity						
White	92.72%	93.41%	96.38%	95.29%	86.97%	94.08%
Black	1.61%	1.26%	1.23%	3.05%	14.63%	1.62%
Pakistani & Bangladeshi	3.90%	2.44%	0.93%	0.47%	0.00%	2.26%
Indian	1.14%	2.45%	1.22%	1.02%	0.00%	1.63%
Income						
High	2.16%	24.27%	45.59%	52.21%	56.34%	26.36%
Medium	38.64%	63.23%	48.26%	42.31%	31.35%	50.53%
Low	59.20%	12.50%	6.15%	5.48%	12.31%	23.11%
Smoke during pregnancy	38.97%	16.62%	11.32%	11.03%	9.39%	20.91%
Breastfeeding						
0-2 months	82.23%	59.58%	43.52%	41.75%	28.46%	59.93%
2-4 months	7.87%	14.20%	19.44%	17.54%	24.90%	14.16%
4 months or more	9.90%	26.22%	37.05%	40.71%	46.64%	25.91%
Planned pregnancy	21.65%	65.94%	77.58%	77.66%	70.95%	57.71%
Read to the child						
Several times a week	81.52%	88.41%	92.28%	94.59%	88.52%	88.04%
Sometimes	14.06%	8.91%	6.01%	4.84%	8.99%	9.24%
Rarely	4.41%	2.67%	1.70%	0.57%	2.49%	2.72%
Play with the child						
Several times a week	61.91%	62.57%	64.76%	60.84%	60.49%	62.76%
Sometimes	27.31%	28.30%	27.78%	30.65%	19.21%	28.03%
Rarely	10.78%	9.13%	7.46%	8.52%	20.30%	9.21%
Number of births	1476	2006	1345	494	43	5363

Note: the results are weighted in order to account for the complex survey design

2.5.2 Regression analyses

The first aim of the regression models is to show the unadjusted association between maternal age at first birth and child wellbeing, the aim of which is to reveal whether children benefit from their mothers' increasing age at first birth and, in particular, how children of older mothers are faring while looking at births that occur to mothers aged 40 and over. In other words, the models begin by showing actual disparities in children's wellbeing based on mothers' age at first birth. The second aim of the regression models is to show whether and to what extent the unadjusted association reflects health and social processes; this is done by looking at how it varies as health, socioeconomic and demographic variables are progressively added to the models. In order to assess what is the relative role played by these variables, I compare the magnitude and significance of the age coefficients before and after the progressive inclusion of the control variables. Table 3 presents logistic regression models for LBW, while Tables 4, 5 and 6 present OLS regression models for children's cognitive and behavioural outcomes measured at age 5.

Model (1) of Table 3 reveals that there are no statistically significant differences in the odds of giving birth to a LBW child amongst mothers having first births between ages 23-29 (the reference group) and those at younger or older ages. The odds of giving birth to a LBW child are just above 1 for mothers having the first child below age 23 and above age 40, while they are just below 1 for mothers giving birth between ages 30-39. Once controls for mothers' characteristics are progressively added to the Model, the odds of giving birth to a LBW child increase for older (30 and over) mothers and decrease for younger (less than 23) ones. Although the coefficients fail to reach statistical significance once the controls are included into the Model, the results could indicate that older mothers' selected characteristics are able to more than compensate for the health risks that rise with maternal age at birth. The analyses have been replicated by looking at birth weight measured on a continuous scale and for preterm. The results, shown in the Appendix, reveal similar findings. In light of what the medical literature argues and reveals for the association between child health and maternal age at birth (i.e. that the risks increase with maternal age), the fact that the age coefficients (even the one associated with giving birth at ages 40 and above) fail to reach statistical significance is a substantively important result. However, any conclusive statement is warranted as the results could differ if the analyses

were replicated using a larger sample of births occurring in the age groups 35-39 and, especially, 40 and over.

Table 4 shows the results for children's cognitive wellbeing as measured through the BAS naming vocabulary score. Model (1) in Table 4 reveals that giving birth to the first child at ages 30-34 and 35-39, as opposed to between ages 23-29 years (the reference group), is positively and significantly associated with verbal ability at age 5. Controlling for whether other languages are spoken at home (in addition or rather than English) does not change the results substantively. More precisely, giving birth to the first child between ages 30-39 is significantly (at the 1% level) associated with an increase of about a fifth of a standard deviation in verbal outcomes. In line with the descriptive analyses, the 35-39 age coefficient is smaller than the 30-34 one, but the difference between the two coefficients is small and fails to reach statistical significance. Conversely, giving birth to the first child at ages 40 and above is negatively associated (but not significantly) with the verbal score. Finally, giving birth to the first child at ages 22 and below is negatively and significantly (at the 1% level) associated with children's verbal cognitive wellbeing. The negative coefficient associated with giving birth at an early age as opposed to doing so at ages 23-29 is, in absolute terms, considerably larger (i.e. almost half of a standard deviation) than those associated with giving birth at older ages. Previous research by Feinstein (2003) using the 1970 BCS has revealed that a cognitive score (obtained using a range of cognitive tests which include the British Ability Scale) measured at 22 and 42 months is found to be associated with educational outcomes at age 26. This suggests that the disparities revealed in Table 4 based on maternal age at first birth are relevant for children's future wellbeing. Moreover, when compared to other studies (Iacovou & Sevilla, 2013; Myrskylä, Silventoinen, Tynelius, & Rasmussen, 2013) using standardized test scores an increase/decrease of about 0.2 of a standard deviation in IQ and cognitive score has been considered relevant in terms of longer term wellbeing.[29] Model (2) adds controls for child health indicators LBW and preterm, which may be relevant for the association between child cognitive wellbeing and maternal age. The two variables are correlated and a chi-square test reveals that there are significant differences between them ($p<0.000$), but controlling for the two variables separately does not change the results. Compared to

[29] As an alternative interpretation, I have also computed differences in mean BAS scores as months of developmental delay (Carson et al., 2009; Hansen, 2008). Children born to mothers in the reference group are 8.4 months ahead of children born to younger mothers, 3.9 and 3.2 months behind children born to mothers aged 30-34 and 35-39 respectively and 4.7 months (although the analyses reveal not significantly) ahead of children born to mothers aged 40 and over.

Model (1), changes in the coefficients size and significance are small. This is consistent with the finding in Table 3 i.e. LBW (and preterm birth/birth weight) does not significantly vary across maternal age categories. The only noticeable difference is that the 40 and over coefficient becomes larger (closer to zero), but still remains insignificant. This might indicate that part of the negative association between cognitive wellbeing and giving birth in the oldest age group could "channel" through the increased health risks associated with giving birth at ages 40 and above. However, any conclusive statement about this group is warranted because of its small sample size. When controls for mothers' socioeconomic/demographic characteristics are included in Model (3) of Table 4, the positive coefficients associated with giving birth at older ages decrease both in magnitude and significance level. The coefficients associated with giving birth at ages 30-34 and 35-39 are halved and the significance level of the latter drops to 10%. The age coefficient associated with giving birth at ages 40 and above is very limitedly reduced but goes from being not-significant to being significant at the 10% level. While remaining significant at the 1% level, the coefficient associated with giving birth at age 22 and below is halved. This pattern is even more marked in Model (4), which adds a control for family income.[30] The 30-34 coefficient is reduced in size and significance level (now 5%) and the 35-39 is reduced in size and loses statistical significance. The 40 and over coefficient becomes larger and increases in statistical significance (5%) and the 22 and below is halved in size. Model (5) shows that controlling for mothers' health behaviours during pregnancy/close to the time of birth reveals a similar pattern, but changes in coefficients are less marked than in Model (3) and (4). Finally, Model (6) shows that controlling for parenting behaviours leaves the age coefficients almost unchanged, a pattern consistent with the descriptive analyses showing little variation in parenting behaviours by mothers' age at first birth. When all the control variables are included in the model, differences between the reference group and mothers giving birth to their first child at ages 22 and below and between ages 30-34 are reduced but not entirely eliminated. But while children of mothers giving birth to their first child between ages 35-39 are not significantly better off than children belonging to the reference group, children of mothers aged 40 and over are significantly worse off.

[30] In order to assess whether the fact that income is missing for 7% of the sub-sample raises concerns (i.e. that those children whose family income is missing are systematically different for the rest of the sample), I have run Model (1) on the full sample (including those for whom the income variable is missing) including a binary indicator which takes the value 1 if income is missing and zero otherwise. The control fails to reach statistical significance (P>0.700).

Table 5 shows the results for cognitive wellbeing measured through the BAS picture similarity score. Model (1) in Table 5 shows that giving birth to the first child at ages 30-34 and 35-39 is significantly associated with this measure of cognitive wellbeing. However, differences (both in magnitude and significance levels) are less marked than those shown in Table 4. The 30-34 and 35-39 coefficients are significant (at the 1% and 10% levels respectively) which suggests that their scores are higher than the one of the reference group (23-29), while the 40+ coefficient is positive but not significant. As in Table 4, the 30-34 and 35-39 coefficients are not statistically different from each other. This model reveals that there is evidence that increasing maternal age at first birth is associated with improved children's outcomes when measured in the BAS picture similarity, but differences are much smaller than those revealed when looking at the BAS naming vocabulary score. This is consistent with previous research showing that verbal abilities are more strongly linked to the family socioeconomic status (Schoon et al., 2011) and, therefore, to maternal age at first birth. When controls for child health are included, changes in the coefficients are more difficult to interpret than in Table 4. The age coefficients decrease (in both size and significance level) for the 30-34 and 35-39 groups. Nonetheless, as in Table 4, the 40+ coefficient becomes larger, which could indicate that there is an underlying health process involved for children born at very old maternal ages. When socioeconomic and demographic variables that are expected to "explain" the association between maternal age and child wellbeing are included into the model specifications, we observe a pattern similar to the one observed in Table 4. Disparities based on maternal age at first birth are further reduced as controls are progressively added to the model. The largest changes in the age coefficients are observed in Model (3) and (4), while little (or no) differences are observed when controls for health and parenting behaviours are included into the model.[31] In Model (6), the only age coefficient that remains significant (at the 10% level) is the one for mothers giving birth at ages 23 and below. But differently from Table 4, both the coefficients associated with giving birth at ages 35-35 and 40 and over are negative, although they fail to reach statistical significance.

Table 6 shows the results for the behavioural scores measured through the SDQ test. Model (1) in Table 6 shows that giving birth to the first child at ages 30-34 and 35-39, as opposed to ages 23-29, is positively and significantly (at the 1% level) associated with

[31] As for the BAS naming vocabulary outcome, I have run Model (1) including a binary indicator which takes the value 1 when household income is missing and zero otherwise. The control fails to reach statistical significance (P>0.300).

improved children's behavioural outcomes at age 5. Similarly to what is observed in Table 4, the 40 and over coefficient is (this time positive but) not significant and the 22 and below one is negative and significant (at the 1% level). Moreover, in line with the descriptive analyses, in Table 6 the 35-39 coefficient is marginally larger than the 30-34 one. These coefficients are not, however, significantly different from each other. The interpretation of this result is that children born to older mothers have significantly lower chances of having mental health disorders at age 5 (and developing in later life), while the opposite is true for children born to younger mothers. This interpretation is supported by existing research (Goodman & Goodman, 2009) documenting that there is no evidence of threshold effects for the SDQ at either high or low scores and that the odds of disorders increase constantly across the age range.[32] Model (2) includes controls for child health variables, namely whether the child is born preterm and LBW. Again, changes in the coefficients are very small. This time, however, the coefficient associated with having the first birth at ages 40 and above becomes smaller (rather than larger) but the coefficient fails to reach statistical significance. As controls that are expected to "explain" the association between behavioural scores and maternal age at first birth are progressively included in the models, we observe a similar pattern to what is documented in Table 4 and 5. The 30-34 and 35-39 coefficients are reduced in size and eventually lose statistical significance, the 40 and over coefficient (albeit really small) becomes negative (but does not reach statistical significance) and the 22 and below is reduced in size and loses statistical significance. Moreover, the largest changes in the age coefficients are observed in Model (3), (4) and (5), while little differences are observed when controls for parenting behaviours are included into the model.[33] Differently from Table 4, however, when all the controls are included into the regression model, differences in children's behavioural outcomes based on mothers' age at first birth are eliminated as none of the coefficients is statistically significant.

Although the main focus of the analyses is on documenting the association between age at first birth and child outcomes, it is nonetheless of interest to mention some of the results concerning the covariates included into the models. Increased odds of giving birth

[32] A one point increase in SDQ score is associated with 1.28 increased odds of disorder at the time of interview for the parent administered SDQ (A. Goodman & Goodman, 2009).
[33] As for the cognitive outcomes, I have run Model (1) including a binary indicator which takes the value 1 when household income is missing and zero otherwise. The control fails to reach statistical significance (P>0.300).

to LBW child are associated with having twins, having a baby girl, with mothers' lower levels of education and not being married at the time of birth. Increased odds of LBW are also associated with being an ethnic minority mother (not statistically significant for Black), to smoke during pregnancy and with having planned the birth. Better children's cognitive and behavioural outcomes are, generally and with some differences between the three outcomes (in particular, a lot of the coefficients are not significant for the BAS picture similarity score), associated with mother's higher educational status, higher family income, not belonging to a minority ethnic group (this is mainly observed for the BAS vocabulary score), being married at the time of birth, not smoking during pregnancy, with longer breastfeeding, with mothers' engaging into reading and playing activities with the child and with the cohort child being a single birth (this only holds for the cognitive scores) and a girl (this mainly holds for the behavioural score). Having planned the pregnancy is not (with the exception of the BAS picture similarity score), when controlling for a range of factors, significantly associated with child outcomes at age 5. The coefficient is positive and statistically significant when included into a model regressing children's cognitive and behavioural outcomes on the age coefficients only. The fact that the "planned pregnancy" coefficient loses statistical significance when other controls are included into the regression model might indicate that having planned a pregnancy is a proxy or highly correlated with other aspects of family characteristics, such as SES.

The analyses fail to reveal the existence of an age gradient in LBW while they reveal that there are significant differences in children's cognitive and behavioural outcomes based on mothers' age at first birth. They also reveal that socioeconomic and demographic factors play an important role in explaining differentials in the way maternal age is associated with cognitive/behavioural outcomes, while child health variables do not seem to play any particular role. Hence, although the lack of an age gradient in LBW and of the role of health variables is a substantively important finding, what follows discusses more in details the results for the cognitive and behavioural outcomes and the role of "explanatory" variables. Figure 1, 2 and 3 show how the magnitude of the age coefficients varies as mothers' characteristics are added to the regression models. While the overall pattern is similar, there are a few differences between the results documented for the cognitive and behavioural scores. However, since the BAS vocabulary/picture similarity test are administered to the child by the interviewer while the SDQ test is administered to the child's parent, the magnitude of the results of the cognitive and behavioural tests are only partially comparable. To see whether there might be an administrative effect for the SDQ

results, I have run the models by controlling for whether the mother is depressed in MCS sweep 3, which show that the age coefficients do not vary to a substantial extent (both in magnitude and significance levels). While in Model (1) the age gradient is more marked for the BAS naming vocabulary score compared to the other ones, the Figures show what is common to all three outcomes is that controlling for mothers' socioeconomic/demographic characteristics reduces the age coefficients the most, while controlling for parenting behaviours reduces the coefficients the least.

The results of the semi-parametric analysis are shown in Figures 4, 5 and 6; the semi-parametric regression is estimated for Model (1) and Model (6) for the cognitive and behavioural outcomes. The shape of the age gradients looks consistent with the age coefficients estimated in the OLS regression models. Namely, in Model (1) the predicted score increases for both cognitive and behavioural outcomes with maternal age, but not monotonically. For the BAS naming vocabulary score, there is quite marked evidence that the gradient starts to decrease after (roughly) age 35 while for the BAS picture similarity and SDQ scores there is only a minor change in the shape and this occurs towards the end of the 30s. In line with the OLS results, when comparing the gradients between Model (1) and Model (6), which includes controls for the full set of mothers' characteristics, differences in child wellbeing based on maternal age at first birth are largely reduced. Moreover, Figure 5 and 6 show that differences in BAS picture similarity and SDQ scores are almost entirely eliminated when all the controls are included into the model as the age gradient is almost flat.

Taken together, the bivariate results reveal that first born children of older mothers are not significantly more likely to be born LBW and tend to perform significantly better on the cognitive and behavioural tests analysed. Therefore, the postponement of first births is, on average, positively associated with children's wellbeing at age 5 and this confirms the implicit argument posited in the demographic literature (McLanahan, 2004). However, the benefits associated with an older age at first birth seem to diminish around the mid-late 30s as children born to mothers aged 40 and over do not appear to fare significantly better than first born children of mothers aged 23-29 (the reference group). Namely, the results suggest that notwithstanding the fact that mothers giving birth from ages 30 and above are similarly "selected" (as revealed by the descriptive analyses), the developmental advantages experienced by children of older mothers diminish around the mid-late 30s. While on one side this suggests that there is need to go beyond the idea that postponement

is beneficial because it reflects social processes, on the other the analyses have not been able to reveal that this non-monotonic association can be explained by the increased health risks associated with giving birth at advanced maternal ages. The age gradient in LBW is almost flat and (therefore) including indicators of child health in the cognitive/behavioural models does not substantively alter the age gradient for the cognitive/behavioural scores. When socioeconomic and demographic variables are included in the model regressing LBW, the age coefficients change (albeit not significantly so) in a way that suggests that the characteristics of older mothers more than compensate for the increased health risks, although the coefficients associated with giving birth at older ages fail to reach statistical significance. Hence, one interpretation of the results is that increasing maternal age at first birth might be an indicator of underlying health problems but is not a marker of poor health per se. The characteristics of older mothers and access to modern obstetric care could (more than) compensate for the biological risks. Another possible interpretation is that the analyses have only considered LBW and preterm as indicators of child health: looking at other ones (such as VLBW and others after the time of birth) might reveal different findings.

The results obtained when the models for the cognitive and behavioural outcomes progressively account for "explanatory" factors provide evidence in support to the hypothesis that the higher scores of first born children of mothers between ages 30-39 are largely the result of the social process associated with postponement. Including controls for mothers' characteristics diminishes disparities between children born in the reference group and those born to mothers aged 22 and below and between ages 30-39; conversely, including controls increases differences between the reference groups and children born to mothers aged 40 and above. This could indicate that the characteristics of those mothers who have their first births at the oldest ages and the social processes that may be associated with postponement are protective for child wellbeing. Conversely, the results provide very limited evidence that the association between an older maternal age at first birth and children's cognitive and behavioural outcomes reflects health processes. However, there are other variables that this study has not considered that could be relevant; for example, mothers giving birth at the oldest ages could differ in parenting styles and warmth in ways that the variables included in this study are unable to reveal. The results could also mask a bimodal distribution in the characteristics of mothers giving birth to their first child at ages 40 and above. The descriptive analyses, for example, reveal that mothers giving birth at ages 40 and above have a more polarized distribution across income groups (higher in the

extreme levels of income) than mothers giving birth between ages 30-39. The small sample size of the 40 and over group prevents from making conclusive statements, but as first births at ages 40 and above have been increasing over the past 20 years (ONS, 2012)[34] and are expected to continue rising, the results suggest that they should be monitored closely and through larger samples.

The age gradient which we observe after all the control variables have been included in the regression models (especially for the cognitive scores) may reflect unobserved heterogeneity. Should a more complete set of controls be employed or a regression technique that (fully) accounts for the unobserved heterogeneity, the age gradient could be entirely eliminated or become inverted with respect to Model (1), thus reflecting the biological component of maternal age, with child behavioural and cognitive outcomes worsening with increasing maternal age at first birth. However, as explained earlier, residual unobserved heterogeneity is not a concern for this study since assessing whether and how maternal age is associated with child wellbeing as if mothers were randomly assigned to the age at which they have their first child goes outside the contribution of this study. The aim and contribution of this study is that of describing actual disparities in different markers of child wellbeing based on maternal age at first birth and whether and to what extent these differences reflect health and social processes.

[34] In the U.K., the ASFRs of women aged 40 and over have increased by 60% over the 10 years period 1998-2008.

Table 2.3 Logistic regression results for Low Birth Weight

	(1)	**(2)**	**(3)**	**(4)**
	OR/se	**OR/se**	**OR/se**	**OR/se**
Below age 23 (*ref 23-29*)	1.053	0.783	0.800	0.838
	(0.171)	(0.142)	(0.154)	(0.162)
Age 30-34	0.906	1.009	1.024	1.008
	(0.141)	(0.157)	(0.162)	(0.162)
Age 35-39	0.914	1.020	1.041	1.022
	(0.191)	(0.222)	(0.222)	(0.219)
Age 40+	1.010	1.030	1.065	1.074
	(0.735)	(0.855)	(0.880)	(0.853)
Twin (*ref single birth)*	27.299***	30.552***	30.412***	30.043***
	(6.990)	(8.219)	(8.210)	(8.132)
Girl	1.365**	1.357**	1.358**	1.363**
	(0.165)	(0.168)	(0.169)	(0.170)
Education: none (*ref NVQ1/2*)		1.234	1.250	1.204
		(0.323)	(0.320)	(0.312)
Education: NVQ 3		0.611***	0.610***	0.620***
		(0.113)	(0.113)	(0.114)
Education: NVQ 4/5		0.738*	0.751*	0.773
		(0.120)	(0.124)	(0.128)
Partnership at birth: non-partnered (*ref married*)		1.436*	1.514*	1.710**
		(0.284)	(0.337)	(0.398)
Partnership at birth: cohabiting		1.432**	1.434**	1.523***
		(0.206)	(0.207)	(0.232)
Black (*ref White*)		1.586	1.597	1.716
		(0.832)	(0.847)	(0.888)
Pakistani or Bangladeshi		2.555***	2.609***	2.760***
		(0.868)	(0.903)	(0.973)
Indian		3.023***	3.035***	3.276***
		(0.941)	(0.947)	(1.063)
Income high (*ref income medium*)			0.894	0.900
			(0.139)	(0.141)
Income low			0.880	0.873
			(0.172)	(0.172)
Smoke during pregnancy (*ref not smoke)*				1.363**
				(0.197)
Pregnancy planned (*ref unplanned*)				1.404**
				(0.236)
Constant	0.065***	0.063***	0.065***	0.046***
	(0.008)	(0.010)	(0.011)	(0.010)
Number of observations			5,363	

Note: *** p<0.01, ** p<0.05, * p<0.1

Table 2.4 OLS regression results for BAS Naming Vocabulary test (z-scores)

	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
	β/se	**β/se**	**β/se**	**β/se**	**β/se**	**β/se**
Below age 23 (*ref 23-29*)	-0.463***	-0.463***	-0.209***	-0.162***	-0.157***	-0.159***
	(0.037)	(0.037)	(0.038)	(0.041)	(0.042)	(0.042)
Age 30-34	0.212***	0.211***	0.120***	0.093**	0.082**	0.082**
	(0.041)	(0.041)	(0.037)	(0.037)	(0.037)	(0.037)
Age 35-39	0.190***	0.191***	0.096*	0.058	0.042	0.040
	(0.053)	(0.053)	(0.050)	(0.050)	(0.050)	(0.050)
Age 40+	-0.215	-0.149	-0.209*	-0.249**	-0.269**	-0.260**
	(0.153)	(0.143)	(0.121)	(0.119)	(0.115)	(0.112)
Twin	-0.296***	-0.211*	-0.287***	-0.278***	-0.248**	-0.246**
	(0.104)	(0.109)	(0.096)	(0.098)	(0.098)	(0.098)
Girl	0.042	0.048	0.048	0.048	0.050*	0.049*
	(0.032)	(0.033)	(0.030)	(0.030)	(0.029)	(0.029)
Preterm		0.102*				
		(0.062)				
Low birth weight		-0.167**				
		(0.070)				
Education: none (*ref NVQ 1/2*)			-0.331***	-0.306***	-0.305***	-0.295***
			(0.062)	(0.062)	(0.063)	(0.064)
Education: NVQ 3			0.109***	0.103***	0.090**	0.087**
			(0.037)	(0.037)	(0.037)	(0.037)
Education: NVQ 4/5			0.342***	0.308***	0.276***	0.271***
			(0.036)	(0.036)	(0.035)	(0.035)
Partnership at birth: single (*ref married*)			-0.163***	-0.050	-0.051	-0.045
			(0.047)	(0.052)	(0.055)	(0.054)
Partnership at birth: cohabiting			-0.145***	-0.126***	-0.124***	-0.120***
			(0.038)	(0.036)	(0.039)	(0.039)
Black (*ref White*)			-0.713***	-0.678***	-0.724***	-0.697***
			(0.088)	(0.090)	(0.091)	(0.090)
Pakistani or Bangladeshi			-1.063***	-1.007***	-1.009***	-0.985***
			(0.109)	(0.104)	(0.103)	(0.102)
Indian			-0.601***	-0.594***	-0.608***	-0.594***
			(0.126)	(0.127)	(0.129)	(0.131)
Income high (*ref income medium*)				0.138***	0.131***	0.131***
				(0.037)	(0.037)	(0.037)
Income low				-0.162***	-0.165***	-0.167***
				(0.046)	(0.047)	(0.046)
Smoke during pregnancy (*ref not smoke)*					0.046	0.055
					(0.037)	(0.038)
Pregnancy planned (*ref unplanned*)					-0.007	-0.007
					(0.038)	(0.038)
Breastfeeding: 2-4 months (*ref 0-2 months*)					0.049	0.046

Table 2.4 continued

					(0.042)	(0.041)
Breastfeeding: 4 months or more					0.161***	0.157***
					(0.034)	(0.034)
Reading to the child: some (*ref a lot*)						-0.006
						(0.045)
Reading to the child: little						-0.157*
						(0.092)
Playing with the child: some (*ref a lot*)						0.005
						(0.029)
Playing with the child: little						-0.097*
						(0.052)
Constant	0.324***		0.277***	0.260***	0.225***	0.236***
	(0.032)		(0.040)	(0.041)	(0.052)	(0.056)
R squared	0.0815	0.0831	0.1649	0.1714	0.1761	0.1780
Number of observations				5,363		

Note: *** p<0.01, ** p<0.05, * p<0.1

Table 2.5 OLS regression results for BAS Picture Similarity test (z-scores)

	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
	β/se	**β/se**	**β/se**	**β/se**	**β/se**	**β/se**
Below age 23 (*ref 23-29*)	-0.239***	-0.254***	-0.112**	-0.089	-0.089	-0.090*
	(0.045)	(0.047)	(0.050)	(0.054)	(0.054)	(0.054)
Age 30-34	0.135***	0.122***	0.092**	0.040	0.040	0.040
	(0.041)	(0.042)	(0.040)	(0.041)	(0.041)	(0.041)
Age 35-39	0.103*	0.087	0.049	-0.019	-0.023	-0.023
	(0.056)	(0.056)	(0.056)	(0.056)	(0.056)	(0.057)
Age 40+	0.102	0.119	0.050	-0.043	-0.032	-0.031
	(0.174)	(0.192)	(0.176)	(0.193)	(0.190)	(0.190)
Twin	-0.232*	-0.162	-0.214*	-0.206	-0.214	-0.166
	(0.123)	(0.134)	(0.123)	(0.132)	(0.132)	(0.137)
Girl	0.116***	0.118***	0.117***	0.118***	0.114***	0.116***
	(0.035)	(0.038)	(0.034)	(0.036)	(0.036)	(0.036)
Preterm		0.042				
		(0.071)				
Low birth weight		-0.140*				-0.081
		(0.080)				(0.063)
Education: none (*ref NVQ 1/2*)			-0.183***	-0.177**	-0.167**	-0.166**
			(0.062)	(0.070)	(0.071)	(0.071)
Education: NVQ 3			0.089**	0.064	0.062	0.060
			(0.042)	(0.043)	(0.043)	(0.043)
Education: NVQ 4/5			0.237***	0.179***	0.174***	0.173***
			(0.038)	(0.041)	(0.040)	(0.040)
Partnership at birth: single (*ref married*)			-0.025	0.087	0.096*	0.098*
			(0.051)	(0.058)	(0.058)	(0.058)
Partnership at birth: cohabiting			-0.052	-0.014	-0.010	-0.007
			(0.039)	(0.040)	(0.039)	(0.039)
Black (*ref White*)			0.039	0.017	0.037	0.042
			(0.083)	(0.094)	(0.095)	(0.093)
Pakistani or Bangladeshi			-0.245**	-0.209**	-0.191*	-0.184*
			(0.096)	(0.099)	(0.098)	(0.100)
Indian			-0.234**	-0.222*	-0.207	-0.198
			(0.111)	(0.129)	(0.130)	(0.130)
Income high (*ref income medium*)				0.122***	0.123***	0.123***
				(0.042)	(0.042)	(0.042)
Income low				-0.060	-0.060	-0.061
				(0.054)	(0.053)	(0.053)
Smoke during pregnancy (*ref not smoke)*				0.031	0.037	0.038
				(0.043)	(0.043)	(0.043)
Pregnancy planned (*ref unplanned*)				0.060	0.062*	0.064*
				(0.037)	(0.038)	(0.038)
Breastfeeding: 2-4 months (*ref 0-2 months*)				0.109**	0.106**	0.105**

Table 2.5 continued

				(0.048)	(0.048)	(0.048)
Breastfeeding: 4 months or more				0.141***	0.137***	0.135***
				(0.038)	(0.039)	(0.038)
Reading to the child: some (*ref a lot*)					-0.045	-0.045
					(0.058)	(0.059)
Reading to the child: little					-0.155	-0.156
					(0.106)	(0.106)
Playing with the child: some (*ref a lot*)					0.062	0.062
					(0.038)	(0.038)
Playing with the child: little					-0.056	-0.057
					(0.058)	(0.058)
Constant	0.001	0.020	-0.080*	-0.182***	-0.188***	-0.183***
	(0.034)	(0.035)	(0.046)	(0.059)	(0.061)	(0.060)
R squared	0.0267	0.0419	0.0451	0.0492	0.0513	0.0517
Number of observations	5,363					

Note: *** p<0.01, ** p<0.05, * p<0.1

Table 2.6 OLS regression results for SDQ test (z-scores)

	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
	β/se	**β/se**	**β/se**	**β/se**	**β/se**	**β/se**
Below age 23 (*ref 23-29*)	-0.311***	-0.315***	-0.103**	-0.072*	-0.050	-0.053
	(0.038)	(0.038)	(0.043)	(0.043)	(0.042)	(0.041)
Age 30-34	0.104***	0.102***	0.054*	0.035	0.025	0.023
	(0.031)	(0.031)	(0.028)	(0.028)	(0.028)	(0.028)
Age 35-39	0.156***	0.155***	0.101**	0.073*	0.063	0.057
	(0.043)	(0.044)	(0.042)	(0.042)	(0.042)	(0.042)
Age 40+	0.014	-0.026	-0.009	-0.038	-0.053	-0.038
	(0.125)	(0.123)	(0.125)	(0.126)	(0.127)	(0.121)
Twin	-0.056	-0.007	-0.041	-0.035	-0.033	-0.019
	(0.095)	(0.096)	(0.099)	(0.099)	(0.097)	(0.094)
Girl	0.166***	0.170***	0.168***	0.167***	0.163***	0.162***
	(0.026)	(0.026)	(0.024)	(0.024)	(0.025)	(0.024)
Preterm		0.089				
		(0.056)				
Low birth weight		-0.191***				
		(0.054)				
Education: none (*ref NVQ 1/2*)			-0.296***	-0.280***	-0.261***	-0.239***
			(0.063)	(0.063)	(0.062)	(0.061)
Education: NVQ 3			0.127***	0.123***	0.103***	0.096***
			(0.032)	(0.032)	(0.033)	(0.032)
Education: NVQ 4/5			0.230***	0.205***	0.174***	0.164***
			(0.028)	(0.030)	(0.031)	(0.031)
Partnership at birth: single (*ref married*)			-0.211***	-0.138**	-0.096*	-0.087
			(0.045)	(0.054)	(0.056)	(0.055)
Partnership at birth: cohabiting			-0.065**	-0.052*	-0.025	-0.019
			(0.029)	(0.029)	(0.030)	(0.030)
Black (*ref White*)			-0.111	-0.088	-0.136	-0.090
			(0.092)	(0.091)	(0.095)	(0.086)
Pakistani or Bangladeshi			-0.249**	-0.212**	-0.246**	-0.200*
			(0.106)	(0.104)	(0.103)	(0.104)
Indian			-0.142	-0.138	-0.169	-0.142
			(0.103)	(0.103)	(0.106)	(0.107)
Income high (*ref income medium*)				0.101***	0.092***	0.091***
				(0.029)	(0.029)	(0.029)
Income low				-0.102**	-0.077	-0.078
				(0.049)	(0.049)	(0.048)
Smoke during pregnancy (*ref not smoke)*					-0.180***	-0.161***
					(0.034)	(0.035)
Pregnancy planned (*ref unplanned*)					0.030	0.029
					(0.028)	(0.028)
Breastfeeding: 2-4 months (*ref 0-2 months*)					0.047	0.041
					(0.034)	(0.034)

Table 2.6 continued

Breastfeeding: 4 months or more					0.057*	0.045
					(0.030)	(0.030)
Reading to the child: some (*ref a lot*)						-0.118***
						(0.046)
Reading to the child: little						-0.308***
						(0.101)
Playing with the child: some (*ref a lot*)						-0.021
						(0.026)
Playing with the child: little						-0.152***
						(0.051)
Constant	-0.022	-0.016	-0.084***	-0.098***	-0.102**	-0.062
	(0.025)	(0.026)	(0.031)	(0.030)	(0.041)	(0.043)
R squared	0.0613	0.0989	0.1031	0.1119	0.1213	0.1213
Number of observations	5,363					

Note: *** p<0.01, ** p<0.05, * p<0.1

Figure 2.1 BAS Naming Vocabulary age coefficients across the five Model specifications (reference group 23-29)

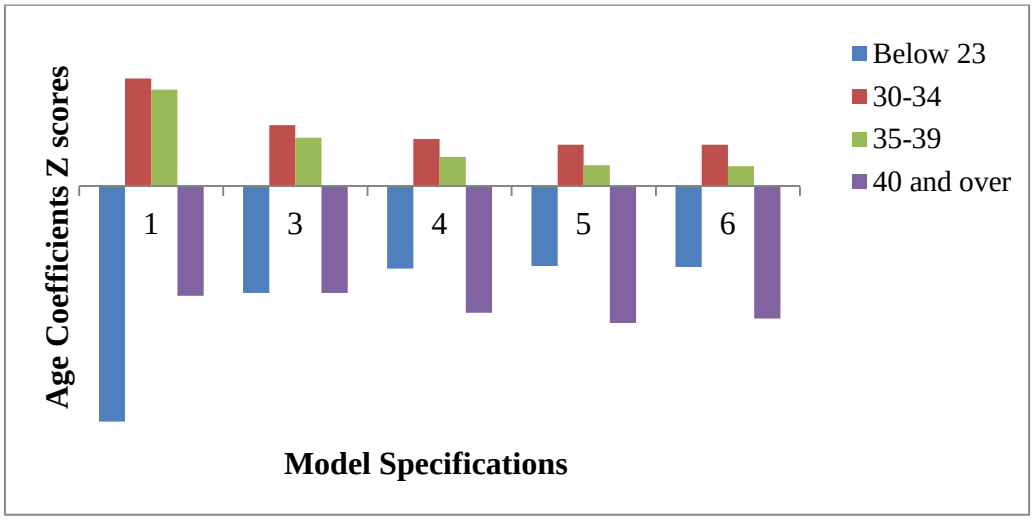


Figure 2.2 BAS Picture Similarity age coefficients across the five Model specifications (reference group 23-29)

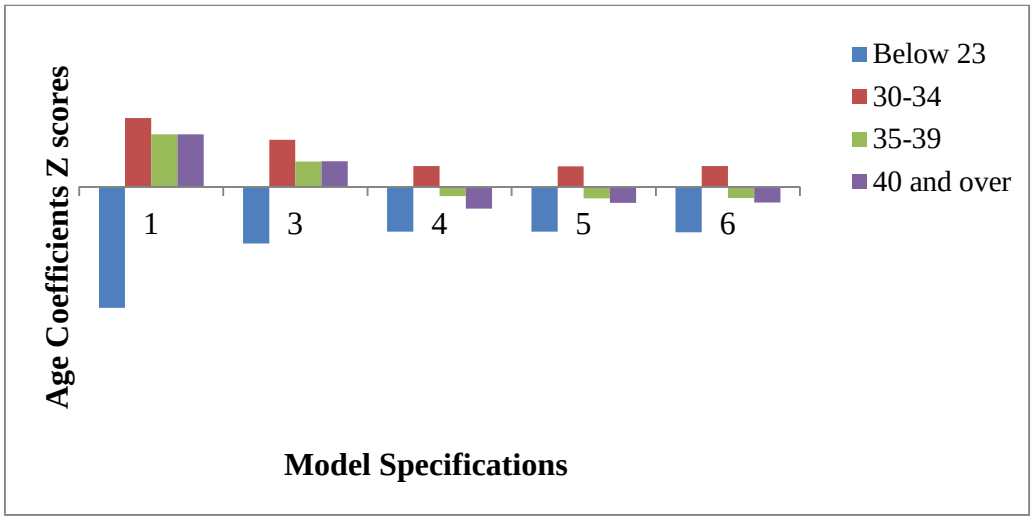


Figure 2.3 SDQ age coefficients across the five Model specifications (reference group 23-29)

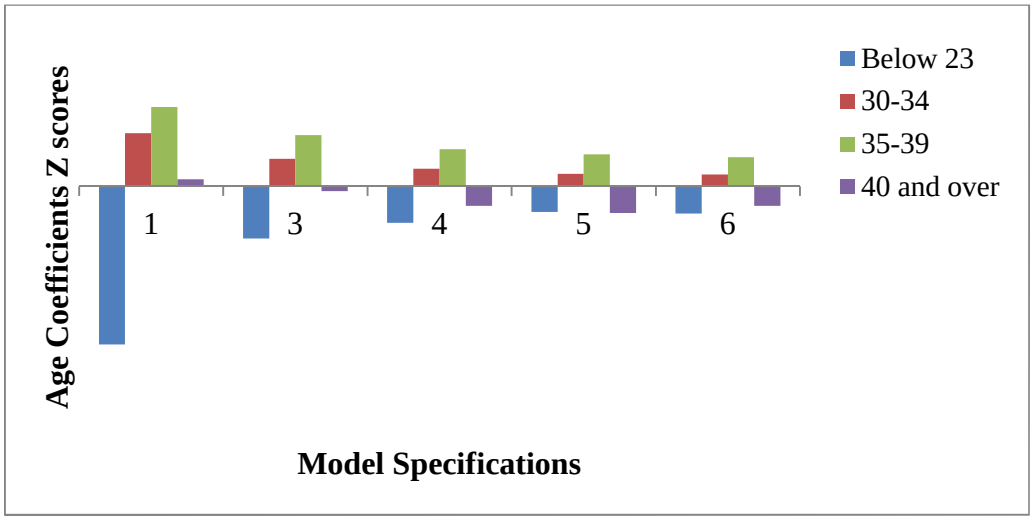


Figure 2.4 Results from Cubic B-Spline regression model for the BAS Naming Vocabulary test (z-score)

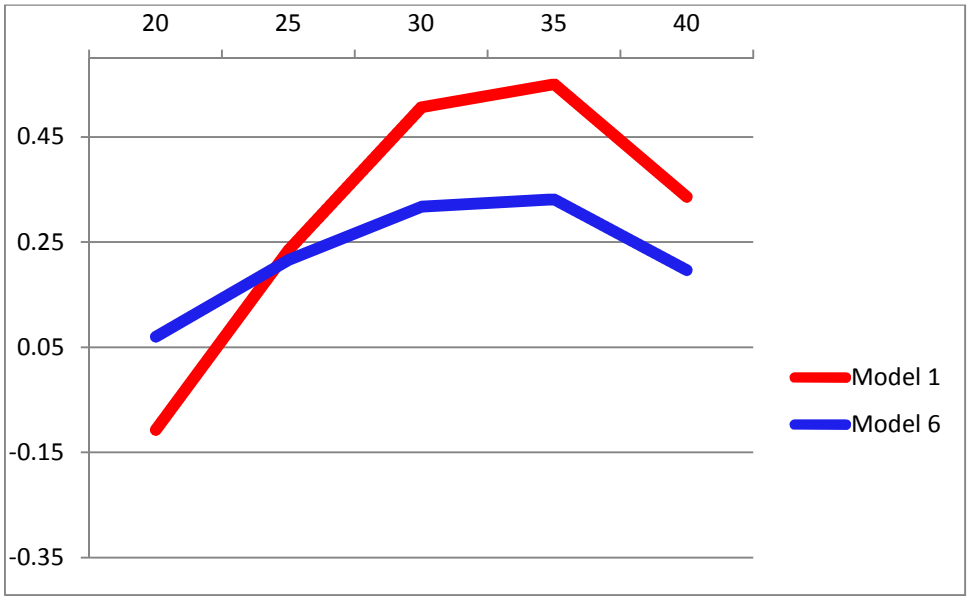


Figure 2.5 Results from Cubic B-Spline regression model for the BAS Picture Similarity test (z-score)

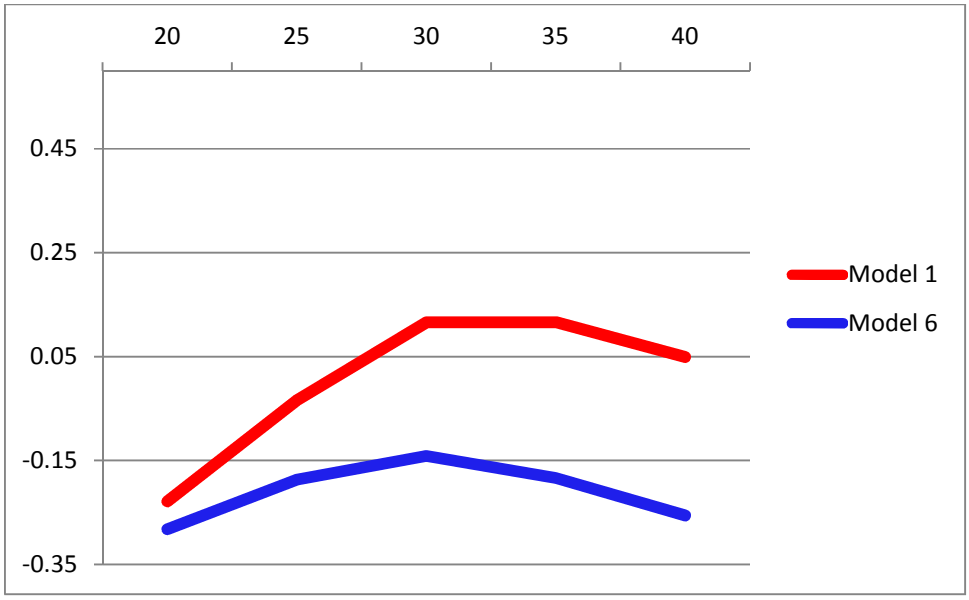
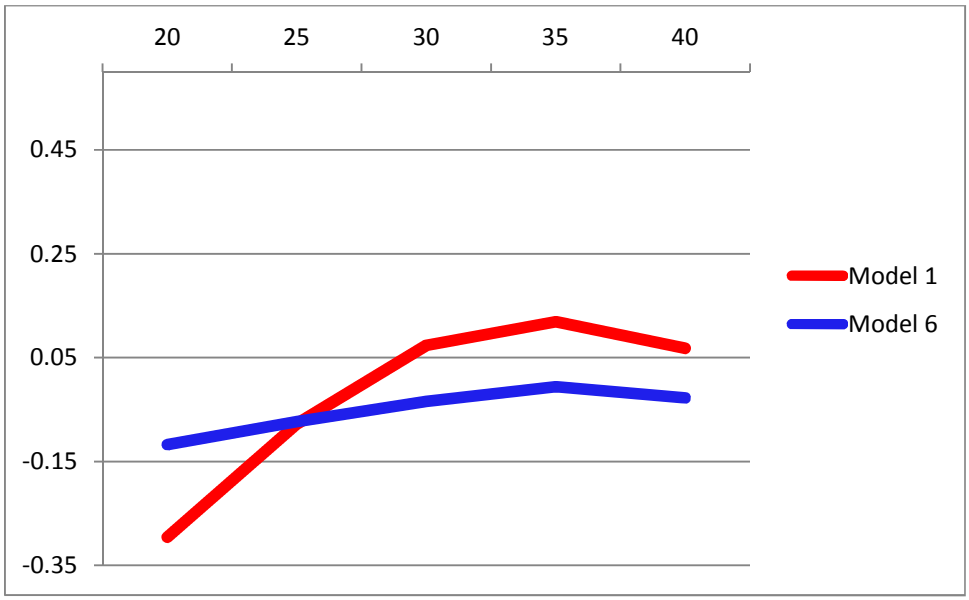


Figure 2.6 Results from Cubic B-Spline regression model for the SDQ test (z-score)



2.6 Discussion & Conclusion

Over the past decades there has been a considerable postponement of first births to older childbearing ages, but we still hold quite limited knowledge about its consequences for the wellbeing of children. In part, this is due to the fact that the demographic literature has tended to see this process as beneficial for families and children given that those women who postpone are selected and tend to have advantageous profiles. However, the medical literature documents that childbearing at older ages (where age 35 is identified as a relevant threshold) involves increased health risks for mother and children, which could suggest that the benefits of postponement may diminish at particularly advanced maternal ages. Given the potential social and health trade-offs involved when childbearing is postponed towards older ages, it is important to more closely investigate the link between increasing maternal age at first birth and child wellbeing. The overarching contribution of this Chapter is that of using contemporary, high-quality data to describe differences in children's outcomes based on mother's age at first birth across the entire age range and whether and to what extent these differentials reflect health and social processes. The analyses focus on first born children consistent with the idea of investigating the consequences of childbearing postponement for child wellbeing. The analyses focus on the U.K. because of both data availability (the MCS) and substantive reasons. Namely, births at older ages are relatively common in this context and there is a marked socioeconomic polarization of childbearing behaviours suggesting that childbearing postponement might be selective of more advantaged women (Sigle-Rushton, 2008).

The results support existing evidence by showing that mothers giving birth at ages 30 and above are relatively more advantaged in terms of socioeconomic status and health behaviours than younger mothers. While the results fail to reveal significant age gradients in LBW (preterm and birth weight), they reveal that children's cognitive and behavioural outcomes measured at age 5 are significantly associated with maternal age at first birth. First born children to mothers aged 30-39 score significantly better in terms of cognitive and behavioural wellbeing than those born to mothers in the reference group (23-29). Conversely, children born to younger mothers (ages 22 and below) score significantly worse. Controlling for mothers' characteristics largely reduces the age gradient. In contrast, children of mothers aged 40 and above do not have significantly different scores

than children born to mothers in the reference group and controlling for mothers' characteristics widens rather than reduces differences.

The results suggest that in a contemporary developed context like the U.K., where women who have their first child at older ages have relatively advantageous profiles, childbearing postponement does not seem to be detrimental from a child health perspective and results to be beneficial in terms of wellbeing measured at age 5. The results, on average, confirm the implicit argument posited in the demographic literature (McLanahan, 2004), namely that childbearing postponement is expected to have positive consequences for children. However, they also reveal that the association between maternal age at first birth and child wellbeing is not necessarily monotonic across the entire age range: the positive association between older maternal age at first birth and child wellbeing seems to depend on how late the birth occurs, providing at least some support to the arguments posited by the medical literature. In other words, the results reveal that postponement is positively associated with child wellbeing, but only up to a point suggesting that there is need to more closely integrate different perspectives (and literatures) on maternal age and its interrelated health/social processes. Even though the analyses are unable to reveal why the association between maternal age and child wellbeing varies at the very advanced maternal ages and provide only limited evidence that this is because of increased health risks, the overall message remains that there is need to adopt a nuanced perspective on childbearing postponement and child wellbeing.

This study has a number of limitations. Firstly, the subsample of mothers having a first birth at ages 40 and above is small and this prevents making conclusive statements about this subgroup and why the maternal age/child wellbeing association changes at the oldest childbearing ages. Whether this is something to do with other health risks involved with giving birth at particularly old ages and/or with the behaviours of this subsample of mothers/parents will need to be investigated using larger samples and different data. Along similar lines, while the analyses focus on maternal age gradients child health at the time of birth, they do not consider health outcomes measured at age 5. The analyses could be usefully expanded by, for example, inspecting maternal age gradients in the prevalence of child obesity and asthma. Looking at other health outcomes would contribute to provide a more comprehensive understanding of the consequences of childbearing postponement for child wellbeing and to expand the (medical) literature on the association between maternal age and health. Looking at other health outcomes would also be an appropriate extension for this research in light of the fact that, as discussed throughout the Chapter, what LBW

means and implies for later wellbeing is still subject to debate and empirical investigation. Secondly, while the results are informative of the link between childbearing postponement and child wellbeing at birth and childhood, they are not for what concerns adolescent outcomes. Research by Rossi (1980) (mentioned in Schmidt et al. (2012) and Powell (2006)) suggests that older parents may encounter more childrearing problems during their children's teenage years. In other words, the positive unadjusted association between maternal age and children's cognitive and behavioural outcomes may change when looking at outcomes measured later in the life course. Moreover, the findings of this study apply to a specific geographical context and time. In a context where the timing of childbearing is not as polarized as in the U.K. and where older mothers are not markedly more advantaged than younger mothers, the consequences of postponement in terms of child wellbeing might result to be different from those revealed in this study. For example, a report by Statistics Canada (2008) suggests that in this context older first-time mothers have socioeconomic profiles that are similar to those of mothers aged 25-29. In line with this finding, the report reveals that children of older mothers are not different, in terms of developmental outcomes, from children born to mothers in the reference category.

While the results are reflective of the overall association between maternal age and child wellbeing, they may be limited to represent the experiences and outcomes of specific groups of the population. The "weathering" hypothesis suggests that the association between maternal age and child wellbeing is heterogeneous across ethnic groups of the population (Geronimus, 1996). This is because for less advantaged groups (such as ethnic minorities) maternal age at birth could be an indicator of disadvantage rather than one of accumulation of resources. Therefore, by reflecting on the arguments and evidence presented by the "weathering" hypothesis, the rest of the thesis aims to investigate whether the association between maternal age and child wellbeing varies for Black and White mothers.

2.7 Appendix

Table 2.7 The 25 items of the Strengths and Difficulties questionnaire

Emotion Symptoms Scale	Complains of headaches/stomach aches/sickness Often seems worried Often unhappy Nervous or clingy in new situations Many fears easily scared
Conduct problems	Often has temper tantrums Generally obedient Fights with or bullies other children Can be spiteful to others Often argumentative with adults
Hyperactivity Scale	Restless, overactive, cannot stay still for long Constantly fidgeting Easily distracted Can stop and think before acting Sees tasks through to the end
Peer Problems	Tends to play alone Has at least one good friend Generally liked by other children Picked on or bullied by other children Gets on better with adults
Pro-social Scale	Considerate of others' feelings Shares readily with others Helpful if someone is hurt, upset or ill Kind to younger children Often volunteers to help others

Note: the possible answers to these questions are: "not true", "somewhat true", "certainly true" which count respectively 0, 1, 2 scores. The questions have been rescaled in a way that a higher score implies a better outcome.

Table 2.8 Logistic regression results for preterm

	(1)	(2)	(3)	(4)
	OR/se	**OR/se**	**OR/se**	**OR/se**
Below age 23 (*ref 23-29*)	0.899	0.843	0.917	0.940
	(0.136)	(0.155)	(0.180)	(0.188)
Age 30-34	1.009	1.011	1.028	1.022
	(0.161)	(0.162)	(0.170)	(0.170)
Age 35-39	0.843	0.862	0.883	0.878
	(0.193)	(0.201)	(0.207)	(0.207)
Age 40+	0.997	1.014	1.063	1.062
	(0.665)	(0.683)	(0.708)	(0.705)
Twin (*ref single birth)*	17.466***	17.934***	17.906***	17.697***
	(4.340)	(4.526)	(4.544)	(4.463)
Girl	0.891	0.878	0.877	0.876
	(0.108)	(0.107)	(0.106)	(0.106)
Education: none (*ref NVQ 1/2*)		0.909	0.959	0.959
		(0.220)	(0.227)	(0.229)
Education: NVQ 3		0.582***	0.573***	0.572***
		(0.108)	(0.107)	(0.106)
Education: NVQ 4/5		0.750*	0.766*	0.763*
		(0.114)	(0.115)	(0.115)
Partnership at birth: non-partnered (*ref married*)		0.937	1.172	1.249
		(0.206)	(0.256)	(0.285)
Partnership at birth: cohabiting		0.954	0.969	1.004
		(0.148)	(0.152)	(0.163)
Black (*ref White*)		1.047	1.096	1.092
		(0.417)	(0.440)	(0.438)
Pakistani or Bangladeshi		1.079	1.190	1.183
		(0.362)	(0.394)	(0.396)
Indian		1.325	1.354	1.359
		(0.517)	(0.534)	(0.542)
Income high (*ref income medium*)			0.839	0.836
			(0.141)	(0.142)
Income low			0.636**	0.645**
			(0.132)	(0.134)
Smoke during pregnancy (*ref not smoke)*				0.959
				(0.169)
Pregnancy planned (*ref unplanned*)				1.118
				(0.176)
Constant	0.084***	0.107***	0.113***	0.104***
	(0.009)	(0.016)	(0.018)	(0.021)
Number of observations			5,363	

Note: *** p<0.01, ** p<0.05, * p<0.1

Table 2.9 OLS regression results for birth weight (continuous)

	(1)	**(2)**	**(3)**	**(4)**
	β/se	**β/se**	**β/se**	**β/se**
Below age 23 (*ref 23-29*)	-0.051**	0.025	0.038	0.042
	(0.023)	(0.027)	(0.028)	(0.029)
Age 30-34	0.025	-0.003	-0.007	-0.008
	(0.024)	(0.022)	(0.023)	(0.023)
Age 35-39	-0.010	-0.036	-0.042	-0.043
	(0.029)	(0.030)	(0.031)	(0.031)
Age 40+	-0.085	-0.083	-0.088	-0.091
	(0.092)	(0.092)	(0.092)	(0.093)
Twin (*ref single birth)*	-1.043***	-1.057***	-1.056***	-1.059***
	(0.062)	(0.063)	(0.063)	(0.063)
Girl	-0.117***	-0.116***	-0.116***	-0.119***
	(0.018)	(0.019)	(0.019)	(0.019)
Education: none (*ref NVQ 1/2*)		-0.072*	-0.066*	-0.055
		(0.037)	(0.037)	(0.037)
Education: NVQ 3		0.080***	0.078***	0.070***
		(0.023)	(0.023)	(0.023)
Education: NVQ 4/5		0.057**	0.051**	0.040*
		(0.022)	(0.022)	(0.023)
Partnership at birth: non-partnered (*ref married*)		-0.105***	-0.074**	-0.065*
		(0.028)	(0.033)	(0.036)
Partnership at birth: cohabiting		-0.060***	-0.056**	-0.049*
		(0.023)	(0.024)	(0.026)
Black (*ref White*)		-0.191***	-0.182***	-0.203***
		(0.059)	(0.060)	(0.058)
Pakistani or Bangladeshi		-0.372***	-0.357***	-0.379***
		(0.051)	(0.053)	(0.053)
Indian		-0.475***	-0.472***	-0.490***
		(0.065)	(0.064)	(0.065)
Income high (*ref income medium*)			0.016	0.014
			(0.020)	(0.021)
Income low			-0.051	-0.037
			(0.031)	(0.031)
Smoke during pregnancy (*ref not smoke)*				-0.118***
				(0.025)
Pregnancy planned (*ref unplanned*)				-0.013
				(0.022)
Constant	3.384***	3.399***	3.400***	3.433***
	(0.016)	(0.024)	(0.025)	(0.030)
Number of observations			5,363	

Note: *** p<0.01, ** p<0.05, * p<0.1

Chapter 3 Childbearing postponement and child wellbeing: reconciling and integrating two perspectives

Abstract

U.S. fertility trends suggest a remarkable increase in childbearing postponement over the past few decades. The demographic literature, by adopting a socioeconomic perspective, has tended to interpret this trend as positive for families and children and suggests that the disadvantage experienced by certain groups would be reduced if they postponed their births. The "weathering" hypothesis literature, by adopting a biosocial perspective, challenges these arguments and posits that the costs and benefits of postponement may vary systematically across population subgroups. In particular, the "weathering" hypothesis literature argues that as a consequence of the unique experiences of racism and disadvantage of African American women, a more rapid deterioration of their health may offset and reverse any socioeconomic benefits of postponement. But because very few African American women postpone entry into parenthood, efforts to find compelling evidence to support the arguments of this perspective rely on a strategy of comparison that is problematic as a potentially selected group of older Black mothers are used to represent the costs of postponement. This might explain why the "weathering" hypothesis has, thus far, played a rather limited role in the way demographers conceptualize postponement and its consequences for wellbeing. In order to explore the potential of greater theoretical integration, we turn our attention to the U.K. where first birth fertility schedules are similar for Black and White women so that we can observe, rather than assume, whether the meaning and consequences of postponement vary across these population subgroups. The results, obtained using linked U.K. census and birth record data, reveal evidence consistent with the "weathering" hypothesis in the U.K. and support the argument that the demographic literature would benefit from integrating insights from this biosocial perspective.[35]

[35]ONS clearance number 30143. The permission of the Office for National Statistics to use the Longitudinal Study is gratefully acknowledged, as is the help provided by staff of the Centre for Longitudinal Study Information & User Support (CeLSIUS). CeLSIUS is supported by the ESRC Census of Population Programme (Award Ref: RES-348-25-0004). The authors alone are responsible for the interpretation of the

Declaration of authorship

A substantial portion of this Chapter is the result of joint work with Dr. Wendy Sigle-Rushton. All aspects of the paper were developed collaboratively. I wrote the first draft of the paper and we both contributed to edit and revise the paper.

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3.1 Introduction

Over the past four decades, as the mean age at first birth in the United States has steadily increased (Taylor, Cohn, Livingston, Wang, & Dockterman, 2010), a body of evidence showing an association between teenage childbearing and poor outcomes, both for mothers and their children, began to emerge. Seen as more than a symptom of disadvantage and poverty, maternal age was understood to reflect a biological and socioeconomic developmental process and parental maturity (Geronimus & Thompson, 2004), and evidence showing a negative association between teenage childbearing and family/child outcomes was often interpreted as causal. Consequently, early childbearing, teenage motherhood in particular, was increasingly perceived as a social problem (Nathanson, 1991). To the extent that older mothers are, on average, socially advantaged and better prepared and motivated to take on the responsibilities of parenthood, the literature has tended to see childbearing postponement as beneficial for families and children (Martin, 2004). This socioeconomic (sometimes referred to as "developmental") perspective permeates much of the demographic literature, where the heterogeneity in contemporary family patterns is often linked to "diverging destinies" for the children involved. Mothers of one group of children follow a trajectory characterized by gains in resources derived from childbearing postponement; conversely, another group follows a trajectory characterized by early (often unmarried) childbearing, low education and employment investments and a heightened risk of family instability (Martin, 2004; McLanahan, 2004). In particular, the "diverging destinies" framework suggests that the disadvantage experienced by the latter group would be reduced if, similarly to the more advantaged population, they postponed their (first) births.

In a somewhat separate body of literature, proponents of the "weathering" hypothesis (Geronimus, 1992, 1996), by giving pride of place to the interaction between the social and biological components of age, have offered an alternative conceptualization and interpretation of the relationship between childbearing postponement and wellbeing. Building on evidence that the health of disadvantaged African American mothers deteriorates faster than that of more advantaged White women and noting that the physiological demands of childbearing mean that at some point the biological costs will dominate any socioeconomic benefits of postponement, some researchers argued that this

turning point may be encountered at relatively younger ages for this ethnic minority group than in the wider (White) population (Geronimus & Thompson, 2004).

The "diverging destinies" framework, by arguing that the disadvantage experienced by certain groups would be reduced if they delayed childbearing, implicitly predicts that African American women would experience fewer disadvantages if they postponed their first births. The "weathering" hypothesis challenges this interpretation by arguing that the costs and benefits of postponement may vary across groups of the population. Patterns of delay that appear to be beneficial to more privileged White women may, for African American women, lead to worse rather than better (child) outcomes. Given that African American women tend to concentrate their births at younger ages than White women do, these divergent predictions relate to what would happen if African American women postponed. These arguments deal with an unobserved counterfactual problem: if an African American mother gives birth at a relatively early age, we do not observe what she would look like if she had postponed, namely her counterfactual. This is sometimes referred to as the Fundamental Problem in Causal Inference (Goldthorpe, 2001). A potential solution to this problem involves randomly allocating different individuals to treatment and control groups and comparing their average outcomes. However, this is often not feasible. For example, mothers cannot be randomly assigned to the ages at which they give birth to the first child. In other words, the arguments posited by the "diverging destinies" and "weathering" hypothesis frameworks cannot be conclusively tested with observational or experimental data.

It is perhaps not surprising that the "weathering" hypothesis literature has had little influence on the way demographers think about and conceptualize postponement. Given their persistently early fertility schedule, it is difficult to observe and assess how African American women and their children would have fared if only they had postponed their first births. As a consequence, we lack compelling evidence to support or refute the testable predictions of either of these two frameworks. Our aim in this paper is to explore whether the case for greater dialogue and integration can be made. We accomplish this aim by turning our attention to the U.K. where, because first birth fertility schedules are similar for Black and White women, we can observe, rather than assume, whether the meaning and consequences of postponement vary across these population subgroups. While looking at Black mother in the U.K., we do not argue that our results provide a test of what would happen in the U.S. if African American women postponed their first births. In other words, the aim of this Chapter is not that of testing the "weathering" hypothesis. Instead, we argue

that the patterns we observe in the U.K. can contribute to debates about whether delays in first births fertility schedules can be expected to be associated with similar levels of wellbeing for White/Black mothers and their children.

3.2 Background

The "weathering" hypothesis was presented and developed during the 1990s to explain why African American women continued to enter parenthood at young ages when overall fertility trends showed evidence of postponement. It adopts a biosocial (in contrast to a socioeconomic or developmental) perspective on (maternal) age, which is seen as reflecting interactions between biological and social processes. The starting point behind the development of the "weathering" hypothesis was that of questioning the idea that high rates of teenage childbearing amongst African American mothers were contributing to explain their higher than average rates of infant mortality. This perspective reflects, in the words of Arline Geronimus (1992), a key proponent of the "weathering" hypothesis, the idea that "maternal age variables measure a universal developmental process" (p. 208). Within the developmental paradigm, the immaturity of teenagers may impede them to experience healthy childbearing either because of their disadvantaged social conditions or because of engagement in unhealthy behaviours linked with their immaturity. The "weathering" hypothesis contradicts these statements by showing that pregnancy outcomes for teenage African American mothers are better than those observed when they are in their early 20s and 30s. Hence, contrarily to what a developmental model would predict, the risks experienced by (immature) African American teenage mothers are not superseded in early adulthood. The contribution of the "weathering" hypothesis framework has been that of bringing to the surface the paradox that worse pregnancy outcomes are observed amongst those who postpone to older ages, a group that should include women who are socioeconomically advantaged. This "irregularity" is motivated by Geronimus (1992) by introducing the idea that (maternal) age variables "need to be seen as reflections of the ways in which socioeconomic inequality, racial discrimination and race bias in exposures to environmental hazards may affect differentially the health of women who will become mothers, not only in absolute terms but also interactively with each other and cumulatively with age" (p. 210).

The "weathering" hypothesis presumes, for a variety of plausible reasons, that social inequality leads disadvantaged ethnic minority populations to experience a more rapid deterioration of their health compared to the more advantaged White population. African Americans often lack access to (high quality) health care, which in the U.S. is not a universal entitlement. In addition, patterns of residential segregation, which in the U.S. is also racial segregation, might expose ethnic minorities to environmental hazards (e.g. living in noisy areas and exposure to pollution) and racism which might accelerate health deterioration processes (Geronimus & Thompson, 2004). Furthermore, the more rapid health deterioration may be reinforced by behavioural responses to high levels of stress, such as smoking or drinking (Geronimus, Neidert, & Bound, 1993). Drawing attention to the cumulative effects of these processes, the "weathering" hypothesis conceptualizes more dramatically declining health as more a cause than (as a "diverging destinies" perspective might) a consequence of early childbearing. To the extent that an accelerated decline in health influences reproductive health and fetal development, an increasing maternal age at birth could be associated with worse, rather than better, birth outcomes – such as low birth weight – earlier in the mother's life course. The idea that individuals may age at different speeds and that there may be a discrepancy, across socioeconomic groups, between the chronological and estimated biological age, is not a new concept in the epidemiological and social science fields.[36] The original contribution of the "weathering" hypothesis has been that of, implicitly, applying this analytical framework to reproductive health and to reflect on differences in the timing of first births between African American and White women.

In general, a range of empirical evidence is consistent with the key tenets and predictions of the "weathering" hypothesis. Previous research in the U.S. shows that, compared to White women, the health of African American women deteriorates more rapidly as they age and they are reported to have higher levels of allostatic loads, which researchers have identified as the biological link between poverty and health deterioration (Geronimus, Hicken, Keene, & Bound, 2006)[37], at any age, but particularly from age 35 onwards (Chyu & Upchurch, 2011; Geronimus et al., 2006).[38] This includes an elevated

[36]This is a vast literature which has, broadly speaking, been referred to as "faster ageing". See for example: Kaczmarekm (2008) and Nilsson et al. (2003).

[37]"The allostatic load refers to the price the body pays for being forced to adapt to adverse psychosocial or physical situations and it represents either the presence of too much stress or the inefficient operation of the stress hormone response system" (McEwen, 2000: pp. 110-111).

[38]These reflect unadjusted differences. When the models include controls for poverty, differences are reduced but are not eliminated.

risk of developing with age health conditions such as hypertension, that can lead to complications which compromise fetal development (Geronimus, 1996; Rich-Edwards, Buka, Brennan, & Earls, 2003); indeed, there is evidence that Black/White gaps in neonatal mortality, low birth weight (LBW) and, to some extent, pre-term birth[39] increase with maternal age at birth (Geronimus, 1996; Holzman et al., 2009; Rauh, Andrews, & Garfinkel, 2001; Reichman & Pagnini, 1997; Rich-Edwards et al., 2003; Shmueli & Cullen, 1999).[40] Consistent with the hypothesis that social inequality is linked with differential health trajectories, a number of studies demonstrate that African American mothers exposed (as children and/or adults) to poorer environments experience a more rapid increase in rates of LBW with increasing maternal age at birth (Geronimus, 1996; Love, David, Rankin, & Collins, 2010; Rauh et al., 2001).

The "weathering" hypothesis was originally developed by linking the more rapid health deterioration which characterizes African American women compared to White women by, implicitly, resorting to an epidemiological framework which associates health deterioration to social processes (Mosley & Chen, 1984). Given that African Americans are an ethnic minority group that, on average, tends to be exposed to the disadvantaged conditions discussed in the previous paragraphs, the "weathering" literature, at least initially, referred to health differentials by both socioeconomic status and race, with the two conceptualized as a unique burden. Further work, however, has highlighted the importance of considering both dimensions separately and interactively as ethnic minority status might substantially reinforce the negative association between exposure to social inequality and health deterioration. This could occur because discrimination reduces access to employment opportunities, recognition of human capital investments such as education and access to institutions such as banks (Smith, Chaturvedi, Harding, Nazroo, & Williams, 2000; Williams & Mohammed, 2009), and leads to health deterioration (Johnston & Lordan, 2012). Race bias may affect medical care and prevention and exposure to racism can have a (direct) detrimental impact on health (Karlsen & Nazroo, 2002; Williams, 1999). Stress related to experiences of racism and discrimination could also contribute to unhealthy behaviours, which would in turn damage child health (Nuru-Jeter et al., 2009).

[39] Ananth et al. (2001) and Love et al. (2001) fail to find evidence of "weathering" when looking at preterm birth.

[40] The paper by Pagnini and Reichman (1997) shows that in the unadjusted analyses children born to mothers aged below 24 are at lower risk of LBW than those of mothers aged 25-29 (the reference category). However, differences in the unadjusted analyses are not significant. The analyses look at all order births and not just first ones. Since the risk of LBW is higher for first than other order births, in their analyses the effect of parity could be confounded with that of maternal age (Geronimus, 1991).

Therefore, the more rapid health deterioration of African American women could, at least in part, be attributed to the engagement in high effort coping strategies when negotiating with discriminatory institutions in, for example, the labour and housing markets (Pearson, 2008). Although only a few studies have attempted to tease out the role that exposure to disadvantage and ethnic minority status (separately and interactively) play on health deterioration processes, there is some evidence to suggest that it is the combined effects of racism and disadvantage that are especially marked. For example, White women who grew up and live as adults in low-income neighbourhoods are not found to experience a more rapid increase in rates of LBW with increasing maternal age at birth (Love et al., 2010). Moreover, Geronimus (1996), by looking at LBW, reports that for White mothers there is no sign of important interactions between socioeconomic status and maternal age.[41] On the other hand, Rich-Edwards and colleagues (2003), show that White mothers with a similar set of risk factors (living in a poor neighbourhood, smoking behaviours and receiving health insurance) experience a rise in the risk of LBW with increasing maternal age at birth that is similar to what is observed in the African American population, suggesting that it is disadvantage rather than its intersection with ethnicity which plays a decisive role.

There are other aspects of the "weathering" hypothesis that need further consideration and which future research may contribute to address. First of all, the "weathering" hypothesis literature has been more focused on discussing the indirect determinants (e.g. low SES, lack of health care, exposure to discrimination) rather than the mechanisms, or the proximate determinants, linking increasing maternal age to worse health outcomes for African American. Evidence (Geronimus, 1996; Geronimus & Bound, 1990) suggests that Black/White gaps in diseases such as hypertension and anaemia, which have been found to be associated with LBW, widen with increasing maternal age at birth over the childbearing years. Because for African American mothers age gradients in child and maternal heath are similar, the widening Black/White gap could be explained by the fact that child health reflects something about the mother's health. However, this argument is not conclusive as correlation does not necessarily imply that there is an underlying causal relationship. Evidence has also revealed that Black/White gaps in smoking behaviours increase with age (Geronimus et. al, 1993) and with maternal age at first birth (Geronimus, 1996). This might suggest that one potential pathway linking poor outcomes to increasing maternal age for African American mothers could be through their health behaviours that vary with age,

[41] These results are mentioned but not presented in the paper.

possibly as the result of stress, such as smoking and possibly diet, which have been found to be associated with LBW (Kramer, 1987). It is very likely that the observed patterns are linked to a cumulative series of processes, rather than being the outcome of a single one. Yet, research intended at unpicking some of the potential mechanisms behind the observed patterns has been limited so far.

Second of all, the "weathering" hypothesis literature has been largely focused on African Americans, but the extent to which the framework applies to disadvantaged White women and other ethnic minority groups, is still an empirical question as only a few papers have looked at "weathering" amongst Mexicans and the findings reveal mixed evidence (Khoshnood, Wall, & Lee, 2005; Powers, 2013; Sheeder, Lezottte, & Stevens-Simons, 2006; Wildsmith, 2002). Wildsmith (2002) shows that rates of neonatal mortality and hypertension amongst U.S. born Mexican women follow a curvilinear pattern with age and reach the lowest levels between 17 and 18. Powers (2013) also reveals that the Mexican/White gap in infant mortality widens with maternal age at birth. However, Powers also reveals that there is no evidence of a growing gap in infant mortality amongst U.S. born and migrant Mexican women, which would be consistent with the "weathering" framework as the former have been exposed to cumulative experiences of disadvantage for a longer time than the latter. Khoshnood et al. (2005) reveal that for African American and Puerto Ricans the risk of LBW increases with maternal age more markedly than for Mexican compared with White women. However, Sheederet et al. (2006) fail to find evidence of widening White/Hispanic gaps of small for gestational age babies at older ages (28-34).

Finally, another issue that needs further consideration is the "weathering" hypothesis argument that early fertility schedules might represent an "adaptive" reproductive behaviour for disadvantaged African American women. By "adaptive" the existing literature means that early childbearing ensures that at least some births occur before the mother's health deteriorates. This argument, however, has been criticized by Furstenberg (1992), who thinks that early childbearing is not predetermined by a rationale to maximize reproductive health. Furstenberg argues that relatively few of those who become parents during their teens think that having children at that age is desirable. Existing evidence related to these conflicting arguments is inconclusive. On one side, work by Meadows et al. (2009) looking at whether daughters' childbearing decisions are correlated with the health status of their mothers finds that young girls whose mothers declare to have worse health are at higher risk to experience a birth outside of marriage. This effect is, however,

contrary to what the "weathering" hypothesis would predict, stronger amongst non-Hispanic White respondents and adolescents of other race/ethnic status than amongst African American ones. On the other side, qualitative work undertaken by Geronimus (1996b) reveals that African Americans teen mothers (to be) express concerns about older parenthood with arguments related to physical limitations and early morbidity/mortality.

Although different aspects of the “weathering” hypothesis need further investigation and analysis, the extant literature provides good evidence that, relative to the overall White population, African American have poorer birth outcomes and at younger ages. The next section discusses how this paper intends to build and expand on this framework to investigate whether the arguments posited by the demographic literature would benefit from greater theoretical integration.

3.3 A first step towards reconciling and integrating the two perspectives

Despite the fact that the “weathering” hypothesis focuses on processes linking the timing of childbearing to wellbeing and suggests that we should be cautious in generalizing the benefits of postponement across population subgroups, it has exerted a rather limited influence on the way demographers have conceptualized the costs and benefits of childbearing postponement. The “diverging destinies” perspective, which is prominent in the demographic literature, suggests that African American women should delay childbearing to reduce their disadvantage by implicitly using (White) women who already postpone as the relevant counterfactual. The evidence presented by the “weathering” hypothesis challenges this assumption but the rare and likely select group of older African American mothers may not provide a relevant counterfactual either. Both perspectives are based on largely untestable assumptions about the relevant counterfactual: what African American women's outcomes would be if they began to postpone the transition to parenthood. One way to explore the potential and make the case for greater theoretical integration is to turn our attention to the U.K. and investigate whether we see evidence consistent with the “weathering” hypothesis in this context. Similarly to the U.S., Black women are subject to discrimination and racism. Researchers have demonstrated that Black people in the U.K. face substantial discrimination in the labour market (Muennig &

Murphy, 2011) and Bécares et al. (2012) suggest that Caribbean people in the U.K. tend to report more experiences of interpersonal racism (such as physical attacks, property damaged or being the victim of verbal abuses for reasons to do with their race or colour) than other ethnic groups. Furthermore, Black individuals are also more likely (than White and Asian people) to be stopped and searched by the police (Bowling & Phillips, 2003). Nonetheless, in the U.K., Black and White mothers have similar first birth fertility schedules (Robson & Berthoud, 2006) and, differently from the U.S., the two groups postpone first births similarly to each other. Therefore, the U.K. context allows us to observe, rather than assume, whether postponement reflects different processes across population subgroups.

To date, there has been virtually no research drawing on the "weathering" hypothesis in the U.K. Evidence reveals that Black women have, on average, worse health profiles than White women and a similar average Black/White gap in LBW than in the U.S. (Teitler, Reichman, Nepomnyaschy, & Martinson, 2007), but we do not know whether these disparities widen substantially with increasing (maternal) age. There are reasons to expect that given the characteristics of the U.K., what we know about socioeconomic differentials in health and the position of Black women in this context would narrow differences in the health trajectories of Black versus White women. First of all, in the U.K. there is universal health care via the National Health Service (NHS), which suggests a more protective health environment than in the U.S., particularly for disadvantaged and ethnic minority groups.[42] Secondly, while existing research documents health disparities by income levels, it also reveals that the magnitude of the gradient remains constant across age groups suggesting that disparities by income levels do not reflect stress accumulation and a compounding of disadvantage (Martinson, 2012) i.e. the mechanisms that, according to the "weathering" hypothesis, lead to early health deterioration. It is important to highlight, however, that the analyses in the paper are unable to disentangle age by cohort effects. Thirdly, differences in the educational/employment profiles of Black and White women are not marked (Hills et al., 2010; Lindley, Dale, & Dex, 2006). This is based on existing evidence documenting the educational and employment profiles of women and mothers (the focus of this research) by ethnicity in the U.K. For what concerns education,

[42] Equity in access to services has been poorly researched in the U.K. as it is assumed that there is not inequity in a service which is free at the point of delivery (Smith et al., 2000). Research reveals that ethnic minorities are not less likely to use GP services, but ethnic inequalities are documented for access to hospital services. This could reflect differences in thresholds of referrals by GPs (although evidence suggests that this is not the case) or ethnic disparities in the use of private hospital care, which White people are more likely to access (Nazroo, Falaschetti, Pierce, & Primatesta, 2009).

Lindley et al. report that in the 2000-2003 LFS, White, Black Caribbean and Black African women (aged 22-60) show a similar percentage of mothers with degree level qualifications. Similarly, Hills et al. (2010) reveal that in the 2006-2008 LFS White British, Black African and Black Caribbean women show a similar percentage of women (in the working age population) with (higher) degree level qualifications. Evidence from the Millennium Cohort Study (MCS) reveals similar findings when looking at White and Black mothers close to the time of birth (Jayaweera, Hockley, Redshaw, & Quigley, 2007). In terms of employment, while there is some evidence that Black women are more likely to be unemployed than White ones, the employment profiles of Black women are closer, compared to other ethnic minority groups, to those of White ones (Lindley et al., 2006). Sigle-Rushton and Perrons (2006) show differences in employment rates between Black and White mothers and their findings reveal that, on average, the predicted probability of being employed is higher for Black Caribbean than White mothers; while the predicted probability of being employed is lower for Black African than White mothers, for the former it is above the one of Pakistani and Bangladeshi mothers. But notwithstanding the protective U.K. context and relatively similar fertility profiles of White and Black women, we know that the latter are less likely to be married at the time of birth (Kiernan & Mensah, 2010) and we expect that racism and discrimination to have physiological consequences and to reduce returns to their human capital investments. Indeed, researchers have documented that despite small Black-White differences in investments in education in the U.K. there are, between the two groups, persistent differences in income, housing quality and occupational status (Hills et al., 2010; Muennig & Murphy, 2011; Peach, 2005).

For these reasons, we think the U.K. is a uniquely informative case study. It allows us to ask whether we find evidence consistent with the "weathering" perspective in a context where Black women postpone and, consistent with the logic of the "diverging destinies" perspective, accumulate more resources prior to becoming parents. If the answer is yes, ethnic minority status could represent, as some existing "weathering" studies seem to suggest, a unique risk to longer-term health and one with implications for birth outcomes. Such findings would also lend support to the hypothesized relationship between racial discrimination and more rapidly declining health.

This (implicit) comparison has not been considered until now as, in the U.K., the negative consequences of an early timing of childbearing have been assessed through a social class rather than ethnicity perspective, notwithstanding the fact that the U.K. is a

context characterized by high levels of racial segregation and disadvantage (Hills et al., 2010). The apparently negative consequences of teenage childbearing among (White) working class women in the U.K (showing the highest rates in Europe (Sigle-Rushton, 2008)) have been explored with reference to evolutionary theories. Interestingly, the tenets and arguments of life history theory, the stream of evolutionary theory which is concerned with how individuals allocate resources to different activities (Nettle, 2009), have a somewhat similar foundations with the ones posited by the "weathering" hypothesis (Lancaster & Hamburg, 1986). In particular, life history researchers have suggested that people living in poorer areas follow a "fast" life history given that they face increased risk of premature mortality and morbidity (Johns, Dickins, & Clegg, 2011; Nettle, 2010; Nettle, Coall, & Dickins, 2010) and adjust their life histories to the conditions and prospects they are exposed to. In reproductive terms, this means that disadvantaged groups would start childbearing at earlier ages in order to enhance reproductive outcomes (Belsky, Steinberg, & Draper, 1991; Johns, 2011; Nettle, 2009; Wilson & Daly, 1997). But while there is an overlap in the overall arguments of the "weathering" hypothesis and of life history theory, there are also some differences. Life history theory has focused more, than the "weathering" hypothesis literature has, on documenting the association between contextual conditions and the timing of childbearing. For example, Wilson and Daly (1997) reveal that the median age of women giving birth increases as life expectancy increases across Chicago neighbourhoods. Researchers looking at the U.K. context (Nettle, 2010; Johns, 2011; Nettle et al., 2011) report that living in deprived neighbourhoods, or in those where the mother perceives higher risks, and disadvantaged early life conditions are associated with an earlier age at first motherhood. In contrast, less attention has been devoted to analyse, similarly to what is done throughout the "weathering" hypothesis literature, reproductive outcomes for disadvantaged groups based on maternal age at first birth. In those few studies that do look at reproductive outcomes, the focus (explicitly or implicitly) is on evolutionary ones. Early childbearing is interpreted as a strategy that maximizes the chance of successful reproduction as "the more members a lineage has, the safer it is from extinction" (Liu & Lummaa, 2011 p.439). For example, this body of research has looked at the number of grandchildren an individual has.[43] This short review of the evolutionary

[43] There exist other U.K. theories that, by adopting a social class perspective, link exposure to poverty to childbearing behaviours. For example, a qualitative study by Askham (1975), while attempting to explain the higher fertility of working class families in the U.K., adopts a theoretical approach which recognizes that "social class behaviour is an adaptation to deprivation which is reinforced by a series of values, norms and beliefs arising from that deprived situation" (p. 8). However, this approach is not as explicit as evolutionary

literature has focused on studies that have looked at developed contexts such as the U.K. and the U.S. It is important to highlight that there is a wider evolutionary literature on these issues than what has been discussed here. Indeed, the idea that reproductive strategies may differ according to social and ecological conditions has, with reference to evolutionary theories, also been discussed while looking at other non-developed societies (see for example work by Sear (2006)).

3.4 Method

In this Chapter, we investigate whether patterns consistent with the "weathering" hypothesis are observed in the U.K. In order to do so, we analyse maternal age gradients in low birth weight (LBW) for children of Black and White mothers. LBW has been extensively used in the "weathering" hypothesis literature as a marker of child as well as mother's health (Geronimus, 1996), as discussed in the background section of this Chapter. While using this indicator fits well with our aim of exploring whether patterns consistent with this framework are observed in the U.K, looking at LBW also entails limitations. As discussed in the background section of this Chapter, the argument that LBW might (also) reflect something about the mother's health is not conclusive and needs empirical investigation. Moreover, as discussed in Chapter 2, the extant literature does not provide a conclusive answer as to what LBW means for the health and future wellbeing of children. Chapter 2 also mentions that the meaning and consequences of LBW might vary by ethnic groups. In this respect, however, recent research by Kramer et al. (2006) suggests that Black/White differences in LBW – the focus of this Chapter – are, at least to some extent, pathological, rather than physiological or biological. Nonetheless, there are still limitations involved when using LBW as a marker of child wellbeing especially since we do not know what the longer terms consequences of this marker of child health are for Black and White children. This is further discussed in the conclusion section of this Chapter.

The analyses begin with an examination of overall (i.e. unadjusted) Black/White differences in LBW in the U.K. context. Then, in order to assess whether ethnic minority status could represent a unique risk in the way maternal age relates to child wellbeing, we conduct a set of additional analyses isolating and intersecting socioeconomic disadvantage

theories in linking the age of the transition to parenthood (i.e. the age at first childbearing) to exposure to disadvantage, which is the focus of the "weathering" hypothesis and, to some extent, of life history theory.

and ethnic minority status. This is done by comparing age gradients for relatively disadvantaged and advantaged Black and White mothers. We examine the extent to which socioeconomic disadvantage, within ethnic groups, underpins (any) observed difference in age gradients in child health and the extent to which, across socioeconomic groups, ethnic minority status amplifies (any negative association between exposure to social inequality and) the risk of LBW.

3.4.1 Data

Most of the existing "weathering" hypothesis studies use vital statistics data, which in the U.K. do not provide information on the mother's ethnicity. For this reason, we use data drawn from the ONS Longitudinal Study (LS), a data set which contains anonymized census records for people living in England and Wales (E&W) which are then linked to vital registration data and so contains information about the prevalence and timing of deaths, births, emigration and cancer registrations. Individuals qualify as members of the LS if their birthday coincides with one of the four LS 'birthdates', which are anonymous, thereby representing about 1% of the population. Since 85% of the U.K. population lives in E&W (i.e. only 15% in Northern Ireland and Scotland) we refer to the U.K. as the context under study in this paper, although strictly speaking the analyses are only looking at E&W rather than the whole country. Losses to the sample occur because of LS members' death and out-migration, while the sample is maintained through addition of immigrants and new births with LS (confidential) 'birth dates'. LS members' demographic characteristics, including mothers' ethnicity, are retrieved from the census data (for censuses collected from 1971 to 2001), while information about their vital events (e.g. births) is retrieved via vital registration systems (Hattersley & Creeser, 1995). One of the clear advantages of the LS is that it provides many years of data such that we can obtain a large enough sample to carry out the analyses for Black and White mothers. The analyses focus on first births that occurred between 1989 and 2009, the last available year when this research was conducted. To carry out the second set of analyses, which make use of information about place of residence at the time of the census, we use a subset of births that took place closer to the enumeration date.

3.4.2 Measures

Child health is measured using low birth weight (LBW), a binary indicator which takes the value 1 when the child's birth weight is below 2.5 kg. The analyses focus on Black and White mothers. U.S. born Black people have a more similar lineage to the U.K. born Black Caribbean[44] (Muennig & Murphy, 2011; Peach, 2005), who have a less recent migration history than Black African (the latter a demographically mixed group). Ideally we would have restricted our attention to Black Caribbean mothers only or, alternatively, considered women of Black African and Caribbean mothers separately. However, sample size issues made this impossible and similarly to other studies (Muennig & Murphy, 2011), women of Black African and Caribbean origin are grouped into a single category. In relation to the variables that are relevant to this study, the Black Caribbean and African groups marginally differ on some aspects but also share other ones. Black African and Caribbean mothers are similarly and significantly more likely to give birth to a LBW child than White mothers (Kelly et al., 2009). Both groups face discrimination and their birth schedules and socioeconomic profiles do not differ substantially. The prevalence of teenage births in the U.K. has been found to be almost identical between White and Black African mothers; the prevalence of teenage births is higher for Black Caribbean than for White women, but differences are much smaller (across the entire fertility schedule) than between White and South Asian Muslim (Pakistani or Bangladeshi) mothers (Robson & Berthoud, 2006). In terms of educational and labour market outcomes, Black African women are more likely than Black Caribbean women to hold degree level qualifications but also to hold no qualifications at all (Jayaweera et al., 2007; Lindley et al., 2006; Sigle-Rushton & Perrons, 2006). As mentioned earlier, Black Caribbean mothers have higher employment rates than Black African mothers. Yet, differences between the two groups are not substantial. Moreover, grouping Black African and Caribbean mothers together is less problematic in the U.K. than it would be in the U.S. Indeed, evidence reveals that in the U.S. recent Black African migrants tend to live longer than the native White population, while they do not in the U.K. (Muennig & Murphy, 2011). Nevertheless, in order to minimize differences between the two groups, we restrict our attention to mothers who were born in England and Wales and to those who were born abroad but are registered in

[44] They migrated to the U.K. as part of post-World War II international recruitment policies that targeted low-skilled workers.

the LS by age 15.[45] This way, we exclude Black African mothers who have migrated at adult ages and are more likely to differ from the Black Caribbean (mostly U.K. born) ones.

The analyses focus on first births and exclude higher order births, consistent with our interest in the costs and benefits of childbearing postponement. Because fertility information in the LS is obtained through birth records, some higher order births may be misclassified as first births. This is primarily an issue for births to women who have ever lived outside of E&W and who are not married at the time of birth. When the child is born within marriage, the birth registration form includes information of whether the mother had any previous birth (live or still). Otherwise this information is not available (Hattersley & Creeser, 1995). Excluding LS members who are having their (apparent) first LS birth outside of marriage would cause serious problems of sample selection. We would disproportionately drop mothers giving birth at early ages (as they are more likely to give birth outside of marriage), which would compromise our analyses. Therefore, restricting our attention to E&W born mothers and to those who were born abroad but registered in the LS by age 15, although far from perfect, is a strategy that, in addition to reducing differences in the Black African and Caribbean group, also considerably reduces the probability of including into our analyses mothers having births rather than first order ones.

When, in the second set of analyses, we classify mothers as living in relatively advantaged/disadvantaged areas, we rely on both an area and individual level measure of advantage/disadvantage, both of which are only available in the census records. To look at area level advantage/disadvantage, we use the Carstairs Index of mothers' place of residence in either the 1991 or 2001 census. The Carstairs Index is an unweighted combination of four census variables measured at the ward level (average population is about 5000): unemployment, overcrowding, car ownership and low social (occupational) class (Morgan & Baker, 2006). In the LS data, wards are grouped into quintiles by ordering areas from least deprived to most deprived. We categorize individuals as relatively disadvantaged if living in the 20% poorest wards, i.e. lowest quintile, of E&W and as relatively advantaged if living in the 20% richest wards, i.e. highest quintile, of E&W.[46] We therefore exclude mothers living in the second, third and fourth (i.e. middle) quintiles. Because the Carstairs index relates to the mother's circumstances at the time of enumeration, in the analyses that make use of it, we restrict our sample to first births

[45] Registration into the LS occurs via registration to NHS.
[46] The most deprived quintile has a mean score of +6.70, while the least deprived quintile has a mean score of -3.30 (Morgan & Baker, 2006).

occurring at about the time the census data is collected (1991 and 2001). However, due to sample size issues we have to expand the temporal window a few years before and after 2001 (i.e. 1999-2004) and 1991 (i.e. 1989-1994). Looking at area level disadvantage is consistent with our aim to explore the existence of "weathering" patterns in the U.K., a framework about health deterioration and exposure to a disadvantaged environment. Research by Pattenden et al. (1999), using the LS, documents that the Carstairs index is related to LBW. However, racial residential segregation means that very few Black mothers live in the advantaged areas (i.e. highest quintile of the Carstairs Index) and we are unable to estimate age gradients in LBW for this subgroup. For this reason and to explore whether area-level and individual-level measures operate similarly, we examine age gradients in LBW by mothers' education.[47] We classify mothers as having low (less than A-levels) or high (A-levels and above) education. A-levels in E&W are studied over a two years period from around age 16-17 or 17-18, are the standard for assessing the suitability of students for progressing to higher education and are, under the international ISCED codes, categorized as above secondary education. For this reason, we categorize mothers having A-levels (or equivalent professional qualification) as "highly" educated, which in U.S. terms would refer to "some college". As for the characteristics of mothers' area of residence, information on mothers' level of education is not available on the birth record, but on the census. We construct the variable based on mothers' level of education in the 2001 census, the most recent census data point when this research was conducted. This means that for births that occur between 1989-2000 we categorize mothers as low vs. high educated based on a measure of education observed after they give birth. Conversely, for births that occur from 2002 onwards, we classify mothers based on a measure of education, which is observed before the time of birth. Details of how this is done are provided in the Appendix. In the absence of an exact measure of the mother's level of education at the time of birth, the results need to be interpreted cautiously. Table 1 summarizes the years and samples analysed.

[47] Social class based on fathers' occupation is useless for lone mothers and when based on mothers' social class is useless if they are temporarily out of work while on maternity leave. In addition, in the LS, parental occupation is recorded for a random 10% of all births, which would give rise to sample size issues (Pattenden, Dolk, & Vrijheid, 1999).

Table 3.1 Samples of analysis

	Births years	**Birth sample**
Overall Black/White age gradients in LBW	First births 1989-2009	Black (n=708) and White (n=45148) mothers
Age gradients stratified by area level advantage/disadvantage	First births 1989-1994 & 1999-2004	Advantaged White (n=3037), Disadvantaged White (n=7334) and Disadvantaged Black (n=260) mothers
Age gradients stratified by high/low education	First births 1989-2009 – excluding births that occur after 2004/2003 to mothers aged 13/14 in 2001	Low educated White (n=26511), Black (n=329), High educated White (n=13713) and Black (n=271) mothers

In order to investigate the existence of "weathering" in the U.K. context, we show the prevalence of LBW by maternal age using logistic models. In the regression models, maternal age is measured continuously and, for substantive reasons and with reference to the model fit of alternative specifications all the logistic models include linear, quadratic and cubic terms for age. Substantively, we believe that a cubic specification is appropriate as it is can produce an age gradient with a size and shape that is consistent with what we know about physical development and reproductive risk. The "weathering" hypothesis posits that the risk of poor child health, for African American mothers, is reduced at young maternal ages, but medical evidence suggests that births at the youngest ages also carry high risk (Amini, Catalano, Dierker, & Mann, 1996). A cubic specification allows the age gradient to fall and rise with age more flexibly than a quadratic. Model fit tests indicate that adding a cubic term for age significantly improves the model fit for Black mothers when estimating the models. For consistency, we estimate the models for White mothers with a cubic specification as well. Our results are robust to different specifications of age (e.g. quadratic, discrete age categories and non-parametric specification). Graphs showing predicted probabilities allow us to assess whether and to what extent we observe a pattern consistent with the predictions of the "weathering" hypothesis. As a robustness check, the analyses have been conducted with a cubic B-spline (presented at the end of the results section) in order to assess whether the shape of the age gradients is not determined by the functional form of age that is imposed by the cubic specification.

Logistic models are estimated separately for Black and White mothers, by residential area characteristics and educational levels. The models include a control for migration

status (reference E&W born) in order to account for the fact that mothers have had different length of exposures to the U.K. context. The models also include controls for basic child characteristics, namely gender and whether the child is a twin. The model analysing overall Black/White age gradients in LBW include five years' time dummies (2005-2009 is the reference category). The models which stratify mothers as living in relatively advantaged/disadvantaged areas (using births around the 1991 and 2001 censuses), include a control for births occurring between 1989-1994 (births occurring between 1999-2004 is the reference category).

3.5 Results

3.5.1 Black/White age gradients in LBW

To assess whether patterns consistent with the tenets of the "weathering" hypothesis are observed in the U.K. we analyse age gradients in LBW for Black and White mothers having their first birth between 1989 and 2009. Table 1 reports the prevalence of LBW and the distribution of first births across maternal age categories for Black (which groups together Black African and Caribbean) and White mothers. Maternal age is divided into 3 categories based on the overall distribution of first births in E&W between 1999 and 2009. The mean age at first birth in E&W has risen from 25.4 in 1989 to 27.6 in 2009 (ONS, 2011). Therefore, age 30 has been chosen as the lower cut-off for the 'older' age category as it is well above the mean age at first birth. Conversely, age 23 is chosen as the upper cut off for births occurring at 'younger' ages, as it is well below the mean age at childbearing in that period and previous research has shown that births to women in their early 20s appear to be linked to disadvantaged outcomes (Hobcraft & Kiernan, 2001). The middle age group refers to births occurring between ages 23 to 29. The distribution of first births for the two ethnic groups is similar, a pattern consistent with evidence from the U.K. Labour Force Survey for year 1992-2000 inclusive (Robson & Berthoud, 2006). The risk of LBW is considerably higher for Black mothers (10%) than for White mothers (7%), a pattern in line with existing U.S. and U.K. evidence (Teitler et al., 2007). Results not shown here reveal that, although the mean prevalence of LBW is higher for Black Caribbean than for Black Africans, for both groups it markedly increases with maternal

age. In addition, the prevalence of LBW for Black mothers shows a marked age gradient; the increase between the young/middle and older age group is almost two-fold. In contrast, the pattern for White mothers is fairly flat (gently decreases and then increases with maternal age) but consistent with what we know about age-related pregnancy complications.

Table 3.2 Distribution of first births and prevalence of LBW by ethnic group and maternal age (first births 1989-2009)

Maternal age	**White**		**Black**	
	% Birth	**% LBW**	**% Birth**	**% LBW**
14-22	28.8	7.4	27.5	7.7
23-29	40.7	6.6	39.1	6.5
30+	30.6	7.5	33.3	15.7
Mean LBW	7.1		9.9	
Migrant	4.2		30.2	
Total N	45148		708	
Pearson chi2	0.001		0.001	

Table 2 reports the results of logistic models, which compare Black/White age gradients in LBW, while controlling for year dummies, basic child characteristics and migration status. Table 2 shows that the age terms are statistically significant (at the 5% level) for the model estimated for Black but not for White mothers. For both ethnic groups, twin births are significantly more likely to be LBW; for White mothers only, girls are significantly more likely to be born LBW. E&W born Black mothers are more likely (significant at the 1% level) to have a LBW child than their counterparts who migrated to E&W prior to age 15 (later arrivals are excluded from our sample). The result might reflect a pattern which is consistent with the "weathering" hypothesis, although, so far, the literature has not explicitly discussed how the framework may interact with migration status. The relatively better outcomes of Black mothers who migrated might reflect the fact that they have been exposed to the social disadvantages (e.g. social inequality and racism) of the U.K. context for a shorter period of time than the U.K. born Black mothers. It is also consistent with a "healthy" migrant paradox (Jackson, McLanahan, & Kiernan, 2012). Migration status is not associated with LBW for White mothers. White migrants in our sample are more likely to come from other OECD countries and are more similar (in health status and behaviours) to E&W born White mothers.

To facilitate interpretation of the age terms, Figure 1 plots the predicted probabilities of LBW (with 95% confidence intervals), based on the regression coefficients, from age 16

to age 40. Figure 1 shows that the Black/White gap in LBW widens with maternal age, in particular from the late-20s onwards. Both relative to Black mothers and in absolute terms, the age gradient for White mothers is fairly flat showing slightly higher predicted probabilities at the oldest ages. The flatness of the age profile for White mothers might suggest that their, average, higher social status (Rendall et al., 2009) compensates for the health complications of later childbearing, an argument consistent with the "diverging destinies" perspective and the evidence presented in Chapter 2. The result of a Wald test estimated on a fully interacted model (where the age terms and control variables are interacted with the "black" dummy) reveals that the age gradients for Black and White mothers are significantly (at the 1% level) different from one another.[48] The age gradient for Black mothers falls and rises with maternal age, following an inverse J-shape (supporting the inclusion of a cubic term of maternal age at birth), while the one of White mothers follows a mild U-shape. The results suggest that despite their postponement and despite their investments in socioeconomic resources, there is still evidence that in the U.K. the age gradient in LBW of Black mothers rises more quickly than the one of White mothers. To the extent that LBW can be seen as reflecting something about the mother's health as well, the results suggest that the health of the former deteriorates more quickly relative to the health of the latter group.

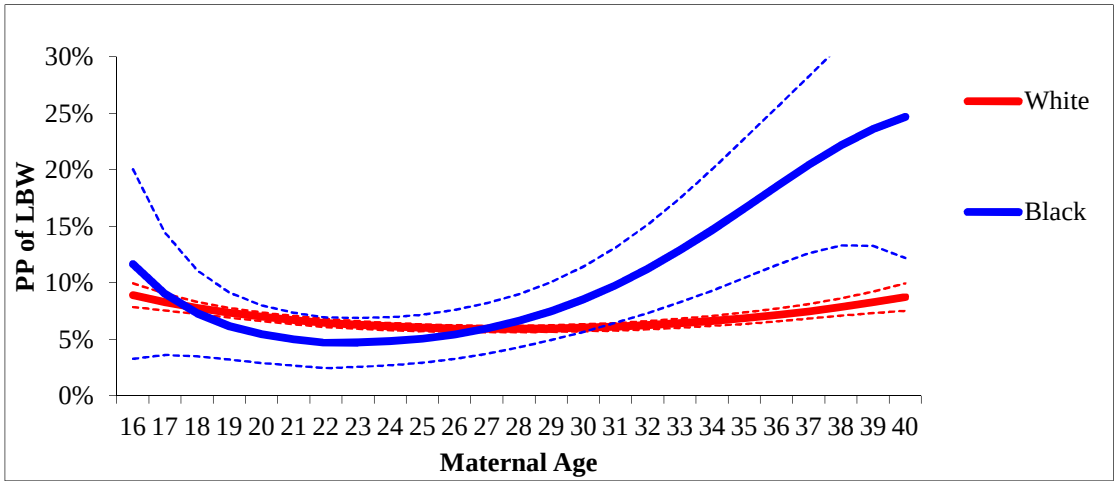
[48] Prob>chi2= 0.002

Table 3.3 Logistic regression results on LBW for Black and White mothers (first births 1989-2009)

	White	Black
	β/se	**β/se**
Mother age	-0.231*	-1.702**
	(0.130)	(0.731)
Mother age^2	0.005	0.058**
	(0.005)	(0.026)
Mother age^3	-0.000	-0.001**
	(0.000)	(0.000)
Girl	0.142***	0.360
	(0.038)	(0.270)
Twin	3.114***	3.073***
	(0.084)	(0.629)
Migrant	-0.115	-0.908***
	(0.099)	(0.348)
1989-1994	0.206***	0.409
	(0.054)	(0.399)
1995-1999	0.165***	-0.211
	(0.057)	(0.444)
2000-2004	0.223***	-0.025
	(0.058)	(0.428)
Constant	-0.150	12.806**
	(1.151)	(6.521)
N	45,148	708
Pseudo R-squared	0.106	0.057

Note: *** p<0.01, ** p<0.05, * p<0.1; standard errors provided in parenthesis

Fig. 3.1 Predicted Probability of LBW for White and Black mothers (first births 1989-2009) with 95% confidence intervals



Note: with the exception of the age coefficients, the control variables are set at their mean values.

3.5.2 Isolating and Intersecting Ethnicity and Disadvantage

In this section we analyse Black/White age gradients in LBW by area and individual level advantage/disadvantage. We do so in order to investigate the role that ethnic minority status and disadvantage separately and interactively play on the overall patterns and, in particular, in order to investigate whether the former, within disadvantaged/advantaged groups, amplifies age gradients in LBW. The U.K. offers a unique perspective to explore the role of disadvantage and ethnic minority status as Black women live in a more protective environment than the U.S. and have at least partially similar socioeconomic profiles, but are still subject to discrimination and racism.

Classification into relatively advantaged (for White mothers) vs. disadvantaged (for White and Black mothers) areas is done on the basis of the Carstairs Index. The analyses focus on first births occurring between 1989-1994 and 1999-2004 (details are provided in the "Methods" section). As mentioned earlier, the sample provides an insufficient number of Black mothers living in advantaged areas and so we are unable estimate models for this subgroup. Table 3 shows the distribution of first births and prevalence of LBW for relatively advantaged White and disadvantaged White and Black mothers. There is a marked difference in fertility schedules amongst White mothers based on their area of residence. The distribution of first births for White mothers living in relatively advantaged areas is highly skewed towards older ages while that of White mothers living in

disadvantaged areas is skewed towards younger ages. In contrast, the distribution of first births for disadvantaged Black mothers looks similar to the distribution of the overall Black sample in Table 2. This is not surprising as there is very little variation in residential area characteristics, since most Black mothers live in disadvantaged areas.

The average proportion of LBW births is higher for White mothers living in relatively disadvantaged areas than in relatively advantaged ones. There is almost no evidence of a widening gap with increasing maternal age, however. Namely, the proportion of LBW births is characterized by a negative and then positive age gradient for White mothers living in both relatively disadvantaged and advantaged areas. In contrast, the prevalence of LBW for relatively disadvantaged Black mothers increases markedly with maternal age. Although the mean prevalence of LBW is lower for this subset of disadvantaged Black mothers than for the overall mean presented in Table 2 (mean LBW 9.9%), this sub-sample of disadvantaged Black mothers is considerably smaller (n=260) and, as a consequence, the estimates need to be interpreted with caution.

Table 3.4 Distribution of first births and prevalence of LBW for mothers living in relatively disadvantaged/advantaged areas by ethnic group and maternal age (first births 1989-1994 & 1999-2004)

Maternal age	**Advantaged-area White**		**Disadvantaged-area White**		**Disadvantaged-area Black**	
	% Birth	**% LBW**	**% Birth**	**% LBW**	**% Birth**	**% LBW**
14-22	14.6	7.9	40.9	8.3	30.8	6.1
23-29	42.1	5.7	38.7	7.3	38.5	
30+	43.3	7.4	20.4	8.2	30.8	16.3
Mean LBW	6.8		7.9		9.2	
Migrant	5.2		4.1		29.6	
Total N	3,037		7334		260	
Pearson chi2	0.194		0.328		0.03	

a Because of disclosure control on cell size, the first two age categories have to be grouped together.

Table 5 presents the results of logistic models and Figure 2 shows predicted probabilities of LBW (with 95% confidence intervals) up to age 35 as there is a small number of Black mothers living in disadvantaged areas who give birth after this age.[49] We begin by comparing the age gradients for the relatively advantaged and disadvantaged White sample and we then continue by comparing those of relatively disadvantaged White and Black mothers.

[49] 9.2% of births to Black mothers occur after age 35 (n=24).

Although the predicted probabilities in Figure 2 show a very minor widening of the gap in LBW for White mothers residing in relatively disadvantaged and advantaged areas towards older ages (around age 30), differences in the predicted age gradients of advantaged and disadvantaged White mothers are not statistically significant.[50] By excluding Black mothers from this comparison, the results provide evidence which rejects the hypothesis that the widening of the Black/White gap in LBW can be entirely attributed to greater exposure to disadvantage of the former group. Although, on average, relatively disadvantaged White mothers are more likely to give birth to a LBW baby, the two White groups have quite similar and flat age gradients of LBW. It is however important to highlight that interpreting (lack of) differences in age gradients between relatively disadvantaged and advantaged White mothers is complicated by the fact that the two groups have very different fertility schedules. This is a similar obstacle faced by U.S. researchers when wanting to compare African American and White women. Indeed, the absence of a widening gap could be, at least in part, due to the fact that a lot of White disadvantaged mothers give birth to their first child at younger ages when their health is more favourable and before it eventually deteriorates. Despite the fact that a quarter of births to disadvantaged mothers occurs after age 30, had more disadvantaged women given birth at older ages, the widening of the gradient could have been more marked.

In contrast, the age terms for the model run on relatively disadvantaged Black mothers are statistically significant (at the 5% level). Notwithstanding the large confidence intervals (which reflect the challenge represented by the small sample of Black mothers) the age gradient of LBW of Black mothers differs (at a 10% level of significance[51]) from that obtained for the relatively disadvantaged White sample. Table 4 also shows that differences in fertility schedules between disadvantaged White and Black mothers are reduced compared to those between relatively advantaged and disadvantaged White mothers. This enables us to more confidently interpret differences in the age gradients of relatively disadvantaged Black and White mothers than (lack of) differences between relatively advantaged and disadvantaged White ones. Figure 2 shows that while the predicted probability (with 95% confidence intervals) of giving birth a LBW child is lower for Black mothers than it is for (both advantaged and disadvantaged) White ones until the

[50] Prob>chi2=0.324

[51] Prob>chi2=0.083. It is important to highlight that the significant result is driven by group differences at both younger and older ages, although the latter is of greater interest for this study.

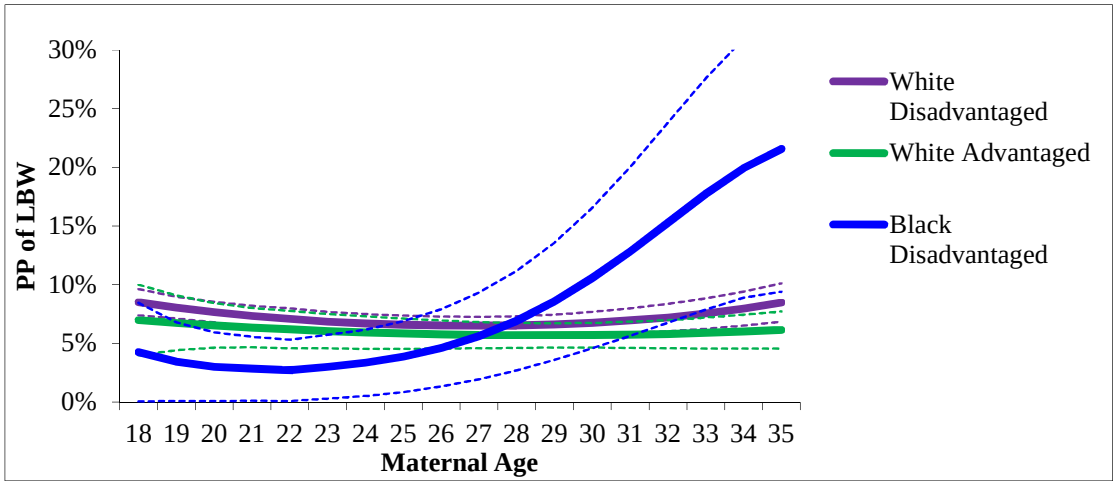
mid-20s, the gap reverses and increases with maternal age. The shape of the age gradient for Black mothers in Figure 2 is similar to the one presented in Figure 1.

Table 3.5 Logistic regression of LBW for mothers living in relatively disadvantaged/advantaged areas by ethnic group and maternal age

	Advantaged-area White	**Disadvantaged-area White**	**Disadvantaged-area Black**
	β/se	**β/se**	**β/se**
Mother age	-0.083	-0.131	-3.252**
	(0.584)	(0.305)	(1.367)
Mother age^2	0.001	0.001	0.121**
	(0.021)	(0.011)	(0.052)
Mother age^3	0.000	0.000	-0.001**
	(0.000)	(0.000)	(0.001)
Girl	0.132	0.133	0.389
	(0.152)	(0.089)	(0.470)
Twin	3.192***	3.074***	3.305***
	(0.271)	(0.230)	(1.068)
Migrant	-0.365	-0.040	-0.611
	(0.381)	(0.229)	(0.582)
1989-1994	0.032	-0.004	0.700
	(0.157)	(0.090)	(0.532)
Constant	-1.566	-0.617	24.033**
	(5.370)	(2.633)	(11.422)
N	3,037	7,334	260
Pseudo-R squared	0.087	0.045	0.132

Note: *** p<0.01, ** p<0.05, * p<0.1; standard errors provided in parenthesis

Fig. 3.2 Predicted probabilities of LBW for mothers residing in relatively disadvantaged and advantaged areas (first births 1989-1994 & 1999-2004) with 95% confidence intervals



Note: with the exception of the age coefficients, the control variables are set at their mean values.

Finally, we estimate a similar set of models using mothers' educational level. Because we only have access to education level at the time of the 2001 census and not at the time of birth, the results need be treated cautiously. Nevertheless, they are informative for two main reasons. First, they allow us to estimate age gradients for a relatively advantaged group of Black mothers, which we are unable to analyse when looking at area level disadvantage/advantage. Moreover, they enable us to assess that the findings obtained when looking at area-level measures do not depend on the division into advantaged/disadvantaged groups based on the Carstairs Index. Table 6 reports the descriptive results, while Table 7 the logistic models followed, in Figure 3, by the predicted probabilities obtained from the models. In terms of distribution of first births across the age categories, we see a pattern consistent with that shown in Table 4. Moreover, the distribution of births for highly educated Black and White mothers is highly similar. We also notice that there is an education gradient in LBW: within both ethnic groups, the more educated have lower mean LBW than the less educated. In addition, the results reveal that highly educated Black mothers have higher mean LBW at older than younger ages and higher mean LBW than both highly and not-educated White mothers.

Table 3.6 Distribution of first births and prevalence of LBW for mothers with high/low education by ethnic group and maternal age (first births 1989-2009)

Maternal age	White high education		White low education		Black high education		Black low education	
	% Birth	% LBW	% Birth	% LBW	% Birth	% LBW	% Birth	% LBW
14-22	8.9	5.3	30.5	7.4	12.6	6.4	30.8	7.1
23-29	41.6		44.4		44.3		38.5	
30+	49.5	6.3	25.1	8.5	43.2	11.1	30.8	19.6
Mean LBW	5.8		7.7		10.9		8.5	
Migrant	24.9		3.2		34.0		24.9	
Total N	13,713		26,511		271		329	
Pearson chi2	0.004		0.002		0.345		0.003	

[a] Because of disclosure control on cell size, the first two age categories have to be grouped together.

Table 7 presents logistic models by ethnicity and education and Figure 3 shows the predicted probabilities of LBW, which are computed for the age range 21-35 as few births to White and, especially, Black highly educated mothers occur before and after these ages.[52] The confidence intervals of the age gradients for both educated and less educated Black mothers are wide. Nonetheless, the results are in line with what we observe in Figure 2. On average, the age gradient of low educated White mothers is (this time significantly[53]) higher than the one of more educated White mothers, but there is no evidence of a widening gap with increasing maternal age at first birth. Moreover, similarly to Figure 2, there is evidence of a significant[54] widening of Black/White gaps in LBW amongst less educated mothers. Ultimately, the analyses allow us to look at patterns for more advantaged Black mothers. The confidence intervals are remarkably wide, suggesting that the predicted probability is not precisely estimated. Broadly speaking, however, what emerges is that the age gradient of more educated Black mothers is below the one of less educated ones. This is consistent with the extant "weathering" hypothesis literature, showing that the increase in rates of LBW with maternal age is more pronounced amongst disadvantaged African American mothers than more advantaged ones (Geronimus, 1996). While the gradient of highly educated Black mothers rises with age and is above the one of educated White mothers, differences are not significant. However, we should highlight that the confidence intervals for highly educated Black mothers are too wide to be meaningfully compared across the two groups.

[52] 10.7% (n=29) and 5.9% (n=16) of birth to Black educated mother occur, respective, after age 35 and before age 21. 10.7% (n=1469) and 4.38% (n=599) of births to White educated mothers occur, respectively, after age 35 and before age 21.
[53] Prob > chi2 = 0.0081
[54] Prob > chi2 = 0.0181

Notwithstanding the fact that we are not able to directly test the role played by ethnic minority status, above and beyond other (socioeconomic, demographic etc.) factors, both the results by area and individual level disadvantage are in line with an argument that it could represent an added and modifying burden in the risk of giving birth to a LBW child. To the extent that LBW reflects something about the mother's health, the results suggest that being (the child of) a Black mother seems to confer health disadvantages above and beyond individual- or area-level measures of disadvantage.

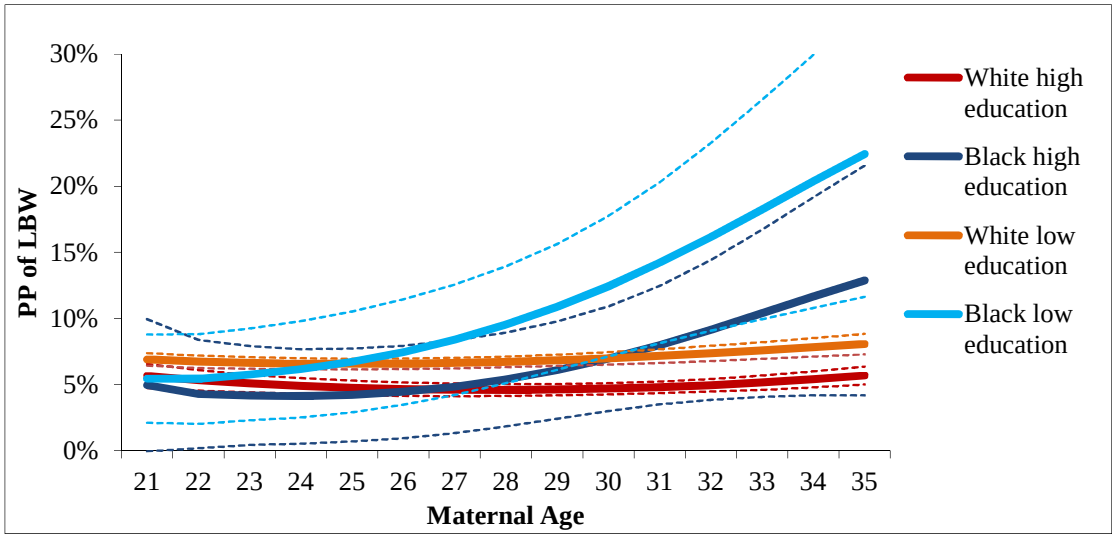
Table 3.7 Logistic regression of LBW for mothers living in relatively disadvantaged/advantaged areas by ethnic group and maternal age

	White High Edu	**White Low Edu**	**Black High Edu**	**Black Low Edu**
	β/se	**β/se**	**β/se**	**β/se**
Mother age	-0.334	-0.348**	-2.695	-1.487
	(0.324)	(0.173)	(2.387)	(1.250)
Mother age^2	0.007	0.011*	0.092	0.054
	(0.011)	(0.006)	(0.082)	(0.044)
Mother age^3	-0.000	-0.000	-0.001	-0.001
	(0.000)	(0.000)	(0.001)	(0.000)
Girl	0.152**	0.170***	-0.106	0.278
	(0.076)	(0.048)	(0.470)	(0.366)
Twin	3.137***	3.136***	2.688***	Dropped[55]
	(0.139)	(0.112)	(0.928)	
Migrant	-0.175	-0.016	-0.794	-0.490
	(0.165)	(0.137)	(0.562)	(0.472)
1989-1994	0.236**	0.138*	1.057	-0.123
	(0.107)	(0.082)	(0.799)	(0.600)
1995-1999	0.030	0.110	-0.122	-0.559
	(0.114)	(0.085)	(0.917)	(0.623)
2000-2004	0.189*	0.150*	0.661	-0.267
	(0.105)	(0.089)	(0.798)	(0.619)
Constant	1.009	0.673	21.997	10.246
	(3.123)	(1.535)	(22.476)	(11.552)
N	13,713	26,511	271	329
Pseudo R squared	0.077	0.054	0.093	0.063

Note: *** p<0.01, ** p<0.05, * p<0.1; standard errors provided in parenthesis

[55] The control for twin is dropped because of multicollinearity with LBW.

Figure 3.3 Predicted probabilities of LBW for Black and White mothers by education, with 95% confidence intervals



Note: with the exception of the age coefficients, the control variables are set at their mean values.

3.5.3 Family structure extension

The aim of this section is that of expanding the main body of the paper by exploring the role of family structure. The "diverging destinies" framework (McLanahan, 2004) places emphasis on forming stable partnerships, together with the postponement of childbearing and investment in education and training, as a way to reduce the disadvantage experienced by some groups of families (p. 622). This is a relevant variable to consider within a "weathering" hypothesis framework as African American mothers are less likely to be partnered than White mothers and given that family structure is found to be associated with LBW (Reichman et al., 2008). Because in the U.S. African American mothers tend to concentrate their births at young(er) ages, it is impossible, by looking at this context, to assess whether African American mothers (and their children) have and (eventually) benefit from more stable family structures if they postpone their first births. By following a logic similar to the one used in the main body of the Chapter, we look at the U.K. to describe and compare family structures profiles of Black and White mothers by age at first birth and assess how they relate to the observed widening Black/White gap in LBW. While Black and White mothers in the U.K. are (at least partially) similar in terms of educational levels and employment status, the former are much more likely to be un-partnered at the time of birth and over the life course (Kiernan & Mensah, 2010).

Therefore, despite the adoption of other "beneficial" behaviours (i.e. postponement of childbearing and investments in education) in the U.K. marriage remains less common for Black mothers, which suggests that family structure is a relevant variable to incorporate in this Chapter and its framework. However, we do not know to what extent ethnic disparities in family structure hold when Black and White mothers postpone childbearing to older ages, which is what this section aims to do.

As in the previous sections, the role of partnership status is investigated by producing descriptive tables and running logistic regressions. The descriptive analyses are meant to reveal whether Black and White mothers' partnership status varies with increasing maternal age at first birth. We then conduct two sets of logistic regression models. The first model consists in replicating the analyses stratified by individual/area level disadvantage using family structure as a marker of advantage/disadvantage. The purpose is that of describing age gradients in LBW by family structure for Black and White mothers and reveal whether partnership status underpins (any of) the observed gaps in LBW and whether ethnic minority status amplifies LBW gaps by family structure. In addition, given the salient differences in family structure that, on average, have been documented between Black and White mothers in the U.K., the second purpose of running a logistic model is that of revealing whether and to what extent the overall Black/White gap in LBW is attenuated when the models include controls for partnership status at the time of birth.

Both descriptive and logistic analyses are run on the overall sample of Black and White mothers (which excludes those who migrated after age 15). We are unable to replicate the analyses on the subsample stratified by area and individual level disadvantage as the sample of Black mothers is small and the models/predicted probabilities would not be very precisely estimated. Information on mothers' marital status is obtained through the birth registration form. The live birth registration entry form provides information of whether the birth occurs within marriage or outside of marriage. Births that occur outside of marriage are divided into those for which the registration is done by both parents living at the same address, by both parents living at different addresses or as a "sole" registration. Namely, when births are registered by parents living at the same address, this is likely to reflect cohabiting couples. For those births that occur outside of marriage we do not always know whether parents are cohabiting or whether they are separated. Previous research has tended to assume that the category of "sole" registered births largely consist of births to lone mothers (Whitehead & Drever, 1999). Whitehead and Drever (1999) motivate this argument by saying "because the option of joint registration is widely available and used, it

is unlikely that the “sole” registration category contains more than a small proportion of couple parents who wished but failed to make a joint registration” (p. 2). The classification is less clear for births that occur outside of marriage but are jointly registered by parents living at different addresses. Some of these births could be of lone mothers, but there is really no way of differentiating (Whitehead & Drever, 1999). Reassuringly, previous research using the ONS LS, has found that this measure of family structure is associated with low birth weight (Pattenden et al., 1999) and that “sole” registered births are the most likely to be low birth weight. This evidence allows us to more confidently use this measure to investigate the role of family structure in our data.

We begin by describing, in Table 8, how Black and White mothers are grouped into the family structure categories based on their age at first birth. Table 8 shows that, on average, with increasing age at first birth, both Black and White mothers tend to be more likely to be married and less likely to “sole” register the birth. However, the pattern seems to be more marked for White than Black mothers. While 72.7% and 2.7% of White mothers giving birth at ages 30 and above are, respectively, recorded to be married and to “sole” register the birth, 46.6% and 16.1%, of older Black mothers are. Moreover, a decreasing portion of White mothers jointly registers (at the same or different addresses) the birth with increasing maternal age at first birth. Conversely, an increasing portion of Black mothers jointly registers the birth while living at the same address and a marginally decreasing portion jointly registers the birth while living at different addresses. The descriptive analyses suggest that, in line with existing evidence, Black mothers are less likely to be married and jointly register the birth, but also that their overall disadvantaged position relative to White mothers is not reduced (even) when they postpone their first birth to older ages. The last column to the right shows that, as revealed in the previous analyses, within family structure categories, Black mothers are, on average, more likely to give birth to a LBW child. The gap is widest within the “sole” registration group.

Table 3.8 Distribution of first births and partnership status by ethnic group and maternal age (first births 1989-2009)

			White		
Type of birth registration	**% 14-22**	**% 23-29**	**% 30+**	**Total**	**Mean LBW**
Married	14.8	64.1	72.7	52.5	6.7
Joint same address	41.1	26.7	22.0	8.7	7.0
Joint different address	23.1	4.7	2.7	29.4	8.4
"Sole" registration	21.0	4.6	2.7	9.4	8.6
N			45,148		
			Black		
Type of birth registration	**% 14-22**	**% 23-29**	**% 30+**	**Total**	**Mean LBW**
Married	12.8	42.2	46.6	35.6	7.9
Joint same address	14.9	18.1	22.9	23.0	9.0
Joint different address	35.9	20.2	14.4	18.8	8.8
"Sole" registration	36.4	19.5	16.1	22.6	14.7
N			708		

We run a regression model by stratifying Black and White mothers into partnership statutes at the time of birth, similarly to what we have done with area and individual-level disadvantage. As computing the predicted probabilities by grouping mothers in the four partnership categories is prevented by sample size issues, we have created two groups, which we label "partnered" and "un-partnered". The partnered group includes married mothers and those that jointly register the birth while living at the same address. The un-partnered group includes mothers who "sole" register the birth or who jointly register it while living at different addresses. This is not an ideal classification in light of the fact that the "diverging destinies" framework places importance on the continuity of stable marriages (although at the end of the paper, McLanahan refers, more generally, to partnerships). Nonetheless, it is a tentative one at best given that it enables the analyses to distinguish between mothers who are likely to receive at least some support from their partner from those who are less likely to receive support. Regression models are presented in Table 9 and Figure 4 reports the predicted probabilities of LBW (with 95% confidence intervals). The regression models reveal that the age coefficients are statistically significant for partnered White and un-partnered Black mothers only. The predicted probabilities are only presented for births that occur between ages 24 and 35 (included) as un-partnered births are relatively rare at older ages and partnered ones at younger ages. For White mothers, the predicted probability of giving birth to a LBW child is higher for un-partnered births than for partnered ones, but there is no indication of a widening gap with increasing

maternal age at first birth. For Black mothers, partnered births are at lower risk of being LBW compared to the un-partnered ones. Hence, for Black mothers being partnered is protective against "weathering" processes but for both un-partnered and partnered mothers there is indication of an increasing predicted probability of LBW with maternal age at first birth. The wide confidence intervals, which reflect the challenge represented by the small sample size for Black mothers when births are stratified by partnership status, prevent to conclusively compare the confidence intervals of the age gradients. Nonetheless, a Wald test on the joint significance of the age coefficients, suggests that amongst partnered mothers, the age gradient of Black mothers differ significantly from that of White mothers[56]; conversely, amongst un-partnered mothers, ethnic gaps are not significant.[57] Overall, the analyses by partnership status at birth present a picture which is similar to the one observed when stratifying mothers by area-individual advantage/disadvantage. Being partnered is protective for both groups but, within family structure groups, Black mothers are, with maternal age at first birth, increasingly more likely to give birth to a LBW child than White mothers. Similarly to what we observe when looking at gaps by individual and area level disadvantage, this final set of results is in line with an argument that ethnic minority status amplifies family structure gaps.

To the best of our knowledge, the role of family structure has only been given limited attention within the "weathering" hypothesis literature. Rich-Edwards et al. (Rich-Edwards et al., 2003) mention (but do not show) that the benefits of marriage on LBW are more marked at older rather than younger ages and that there is evidence of a heterogeneous effect: the benefits of marriage are, at any age, larger for White than African American mothers. The study by El-Sayed et al. (El-Sayed, Tracy, & Galea, 2012) shows that the benefits of marriage on giving birth to a preterm baby increase with maternal age at birth, but the results are shown only after adjusting for parity (as the analyses are on all order births) and SES, which makes a comparison with the results presented in our study difficult. Our findings do not appear to be consistent with those of Rich-Edwards et al. as they fail to reveal that the benefits associated with being partnered increase with maternal age at first birth for White or Black mothers. Whether this is something to do with the fact that we aren't only looking at married couples or with cross-country differences in the meaning of cohabitation/marriage (or with issues that have to do with the small sample of Black mothers) is something that will need to be investigated in future research

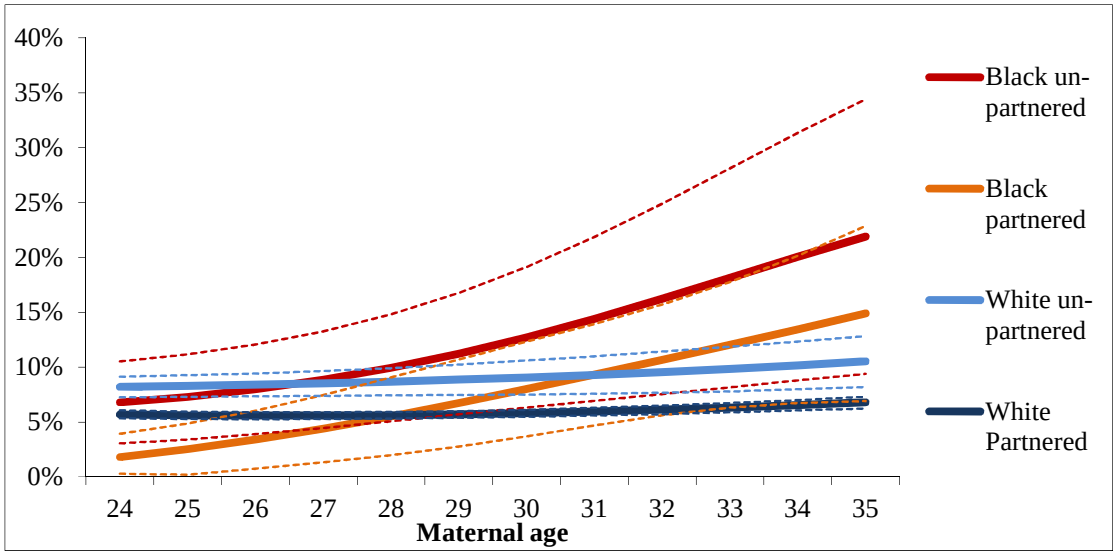
[56] Prob > chi2 =0.0122
[57] Prob > chi2 =0.3417

Table 3.9 Logistic regression model of LBW for Black and White mothers (first births 1989-2009) by partnership status at birth

	White partnered	Black partnered	White un-partnered	Black un-partnered
	β/se	**β/se**	**β/se**	**β/se**
Mother age	-0.444***	2.287	-0.033	-1.653*
	(0.171)	(3.620)	(0.266)	(0.941)
Mother age^2	0.013**	-0.060	0.001	0.059*
	(0.006)	(0.112)	(0.010)	(0.035)
Mother age^3	-0.000	0.001	0.000	-0.001
	(0.000)	(0.001)	(0.000)	(0.000)
Girl	0.172***	0.461	0.036	0.336
	(0.043)	(0.413)	(0.081)	(0.379)
Twin	3.176***	2.796***	2.722***	4.055***
	(0.089)	(0.825)	(0.250)	(1.225)
Migrant	-0.105	-0.457	-0.191	-1.403**
	(0.108)	(0.501)	(0.252)	(0.549)
1989-1994	0.263***	0.487	0.032	0.464
	(0.062)	(0.667)	(0.113)	(0.535)
1995-1999	0.192***	-0.405	0.072	0.017
	(0.066)	(0.693)	(0.117)	(0.609)
2000-2004	0.258***	0.003	0.115	0.093
	(0.066)	(0.637)	(0.122)	(0.618)
Constant	1.677	-32.133	-2.184	11.950
	(1.559)	(38.274)	(2.248)	(8.226)
N	36,984	385	8,164	323
Pseudo R-squared	0.0662	0.1553	0.0243	0.1136

Note: *** p<0.01, ** p<0.05, * p<0.1

Figure 3.4 Predicted Probabilities of LBW for partnered and un-partnered White and Black mothers with 95% confidence intervals (first births 1989-2009)



Note: with the exception of the age coefficients, the control variables are set at their mean values.

As a final step, we run logistic models the purpose of which is to assess to what extent differences in family structure attenuate the widening of the overall Black/White gap in LBW. Table 10 presents logistic regression models that include controls for partnership status at the time of birth. Differently from the regression model presented in Table 9, partnership status is grouped into four categories and births registered by married mothers are the reference category. The results reveal minor changes (both in magnitude and significance level) in the maternal age coefficients compared to those presented in Table 3 (which show the overall and unadjusted gaps in LBW). The linear coefficient for White mothers is reduced in size and it's not significant when controls for partnership status are included, while the one for Black mothers is slightly reduced in size but remains significant (at the 5% level). The quadratic and cubic coefficients remain virtually identical for both Black and White mothers when the coefficients have been included. For White mothers, births that are registered by married parents are significantly less likely to be LBW than births registered in any other partnership status. For Black mothers, births registered by married parents are significantly less likely to be LBW (at the 1% level) only compared to "sole" registered births. As for the previous analyses, we have tested the joint significance of the Black/White age gradients in a fully interacted model and the results reveal that the age gradient of Black mothers significantly differs (at the 1%) from that of

White mothers[58], confirming that the fact that Black mothers tend to have less stable family structures than White ones is unable to largely explain why such a different age gradient in LBW is observed between the two groups.

Table 3.10 Regression model of LBW for Black and White mothers (first births 1989-2009) controlling for partnership status at birth

	White	**Black**
	β/se	**β/se**
Mother age	-0.148	-1.616**
	(0.133)	(0.745)
Mother age^2	0.004	0.057**
	(0.005)	(0.027)
Mother age^3	-0.000	-0.001**
	(0.000)	(0.000)
Girl	0.142***	0.442
	(0.038)	(0.275)
Twin	3.139***	3.245***
	(0.084)	(0.637)
Migrant	-0.111	-1.034***
	(0.099)	(0.360)
Single registration	0.361***	1.155***
	(0.073)	(0.363)
Joint registration: same address	0.187***	0.081
	(0.048)	(0.416)
Joint registration: different address	0.376***	0.395
	(0.071)	(0.409)
1989-1994	0.247***	0.368
	(0.055)	(0.403)
1995-1999	0.183***	-0.287
	(0.058)	(0.449)
2000-2004	0.235***	-0.075
	(0.058)	(0.435)
Constant	-1.458	10.809
	(1.187)	(6.660)
Number of observations	45,148	708
Pseudo- R square	0.0584	0.1303

Note: *** p<0.01, ** p<0.05, * p<0.1

The fact that controlling for partnership status does not eliminate or reduce to a large extent overall gaps in LBW between Black and White mothers and the fact that the

[58] Prob > chi2 = 0.0017

Black/White gap in LBW amongst partnered mothers widen with age at first birth can be discussed within the auspices of another paper we are currently working on (Sigle-Rushton & Goisis, 2013). By examining family structure gaps for another measure of child health, i.e. obesity at age 5, results reveal that the benefits of marriage are uniform and that it does not confer similar levels of wellbeing to the children of first and second generation mothers from less privileged[59] countries, namely more socially and institutionally excluded groups. Although the focus of this other study is on nativity groups (first, second and third generation mothers) while the one of the current study is on Black mothers, both studies are concerned with subpopulation groups that face difficulties and discrimination in integrating in the U.K. context. There is an overlap in the theoretical and empirical arguments of the two studies which can contribute to situate this final set of results. The findings of both studies, which are mutually reinforcing, underscore the need to exercise care when thinking about the benefits of marriage to reduce the disadvantage experienced by certain groups of the population, which opens up rich possibilities for future research. It is however important to highlight that the analyses presented here rely on a measure of family structure at the time of birth and neglect the partnership history of the mother prior to birth. Therefore, the analyses do not control for the fact that Black mothers, regardless of their marital status at the time of birth, may have spent throughout their life courses a lower amount of time in stable relationships. In particular, one could posit that older married White mothers may have had the chance to benefit from the potential (health) corollaries of marriage (such as financial and social support (El-Sayed et al., 2012)) to a larger extent than older Black married mothers. This represents an interesting area of future research.

3.5.4 Robustness checks

As a robustness check, we regress LBW on maternal age using a cubic B-spline to smooth the data in order to ensure that the shape observed in Figures 1, 2 and 3 does not reflect a functional form of age which is imposed by the cubic model. This is done by using the command 'flexcurve' in Stata (Newson, 2012) which produces regression parameters that correspond to values of the spline at (specified) reference points, making

[59] Mothers (or their parents) that were not born in EU 15 countries, Norway, US, Iceland, Australia or New Zealand.

interpretation of the results intuitive. A cubic (rather than quadratic or linear) spline is used to allow more flexibility in smoothing the curve. Compared to a standard cubic spline, a cubic B-spline is able to reduce the collinearity in the basis function of the model matrix (which is likely to occur since each matrix column is basically a transformed version of the control variable, i.e. maternal age, used to generate the reference splines). A cubic B-spline reduces the collinearity through a rescaling of the x functions (Newson, 2012). Reassuringly, the results in Figures 5, 6, and 7 present results largely consistent with those presented in the previous sections.

Figure 3.5 Cubic B-spline of the overall Black/White age gradients in LBW

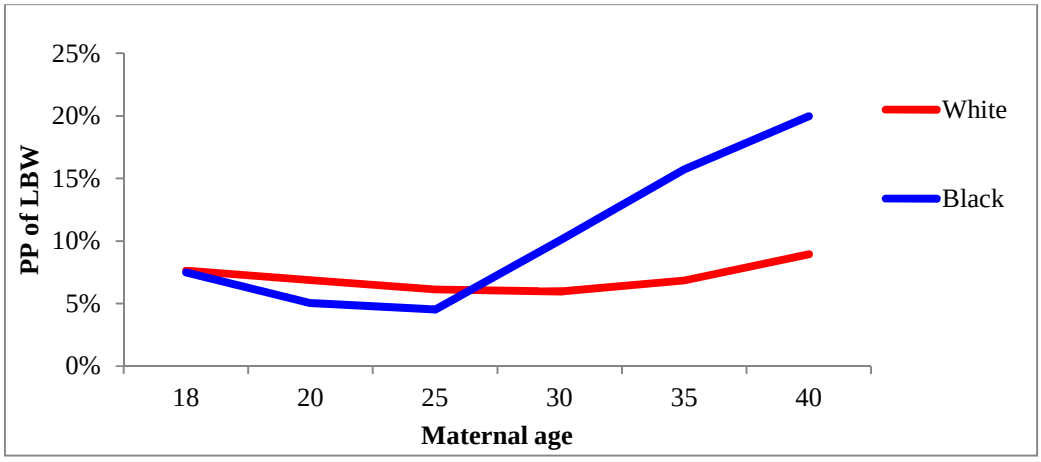


Figure 3.6 Cubic B-spline of the Black/White age gradients by area-level disadvantage

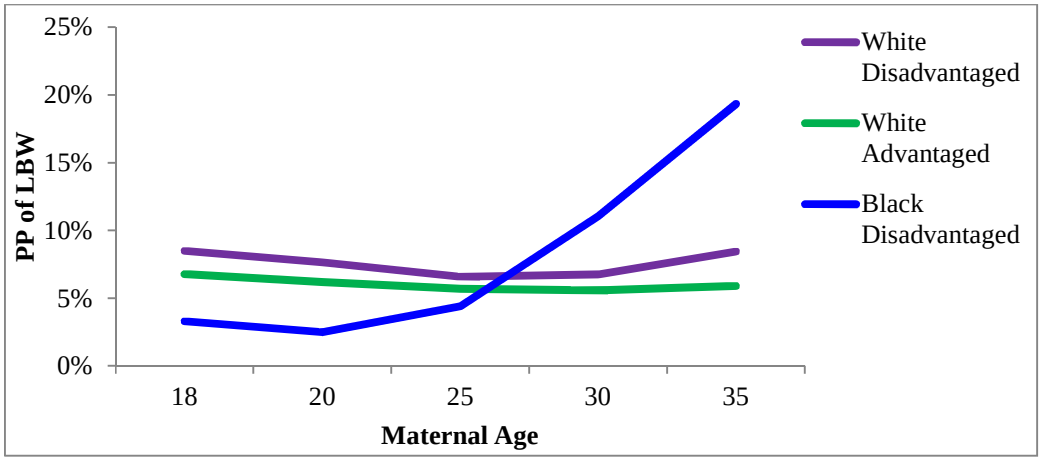
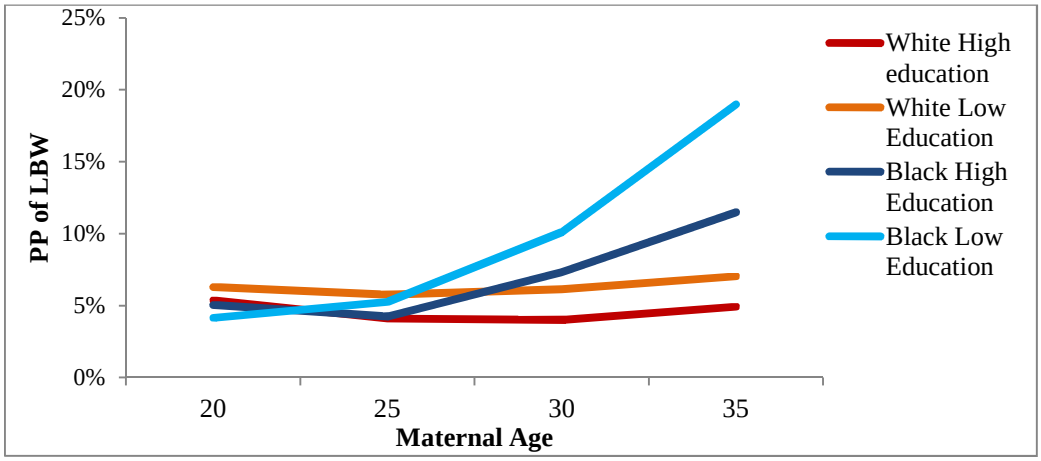


Figure 3.7 Cubic B-spline of the Black/White age gradients by individual-level disadvantage



We have also conducted a series of further robustness checks. The model presented in Table 3 i.e. the overall Black/White gap in LBW is run by excluding migrants and twin births the purpose of which is to reveal what the age gradients look like when excluding these subsamples for which the risk of LBW is, respectively, lower (Jackson et al., 2012) and higher (Douglas, Chay, & Lee, 2005). Table 11 and Figure 8 show the analyses excluding migrant mothers and results are similar to the ones presented in Table 3 and Figure 1 revealing a marked widening of the Black/White gap in LBW (significant at the 1% level). When Black mothers who were not born in the U.K. are excluded (possibly because they tend to have advantageous health profiles and have been exposed to the U.K. context for a lower period of time), the predicted probability of LBW for Black mothers is marginally higher when compared to the one shown in Figure 1. Since around 30% of Black mothers are migrants, we are not able to run subsequent models (i.e. the ones stratifying by individual and area level disadvantage) excluding migrants as the sample size would become too small. Although it would be ideal to focus on a sub-sample of mothers who have been exposed to the context under study since birth, we prefer to rely on the sample including those mothers who migrated before age 15 (including a control in the regression model) rather than on native mothers only as the sample of Black mothers would drop considerably.

Finally, models are run excluding twin births. The results presented in Table 12 and Figure 9 are essentially unchanged compared to the ones that include twin births. As we would expect, the average prevalence of LBW (not shown) decreases but this occurs to a similar extent for both Black and White mothers. Because of sample size issues and

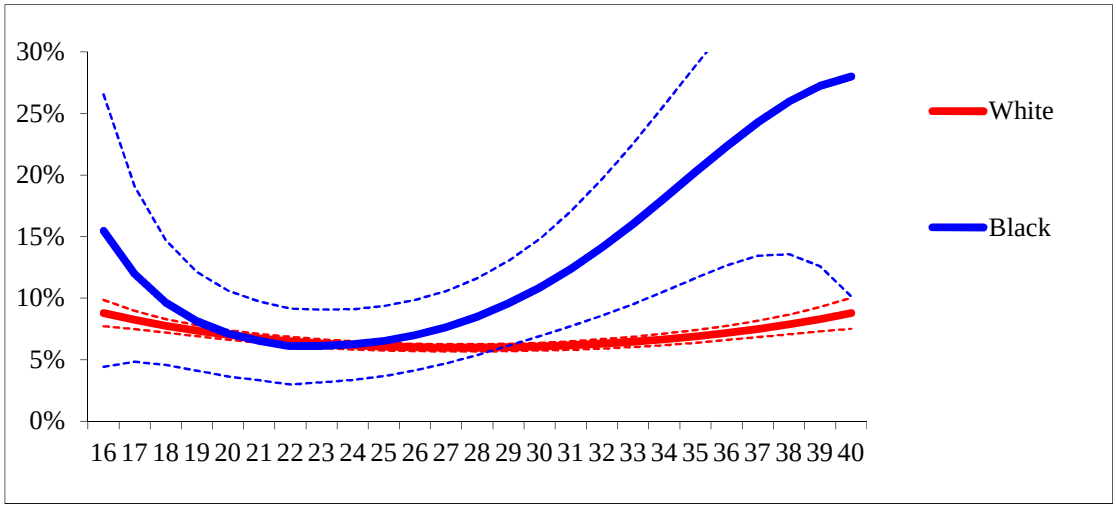
because an older age at first birth is found to increase the risk of multiple births (Tough et al., 2002), we prefer to rely on a sample which includes twins.

Table 3.11 Logistic regression results on LBW for Black and White mothers (first births 1989-2009) excluding migrants

	White	**Black**
	β/se	**β/se**
Mother age	-0.206	-1.794**
	(0.133)	(0.859)
Mother age^2	0.005	0.061*
	(0.005)	(0.031)
Mother age^3	-0.000	-0.001*
	(0.000)	(0.000)
Girl	0.154***	0.376
	(0.039)	(0.301)
Twin	3.106***	2.909***
	(0.086)	(0.705)
1989-1994	0.184***	0.475
	(0.055)	(0.453)
1995-1999	0.155***	-0.244
	(0.058)	(0.495)
2000-2004	0.210***	-0.083
	(0.059)	(0.471)
Constant	-0.387	13.623*
	(1.177)	(7.536)
Number of observations	43,307	503

Note: *** p<0.01, ** p<0.05, * p<0.1; standard errors in parenthesis

Figure 3.8 Predicted Probability of LBW for White and Black mothers (first births 1989-2009) excluding migrants with 95% confidence intervals



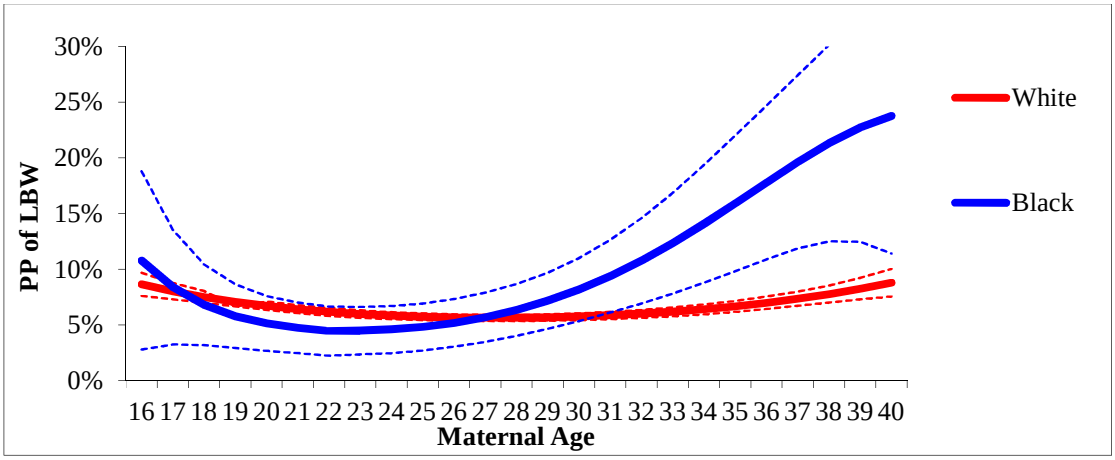
Note: with the exception of the age coefficients, the control variables are set at their mean values.

Table 3.12 Logistic regression results on LBW for Black and White mothers (first births 1989-2009) excluding twin births

	White	**Black**
	β/se	**β/se**
Mother age	-0.233*	-1.676**
	(0.132)	(0.755)
Mother age^2	0.005	0.057**
	(0.005)	(0.027)
Mother age^3	-0.000	-0.001*
	(0.000)	(0.000)
Girl	0.132***	0.255
	(0.039)	(0.274)
Migrant	-0.128	-0.969***
	(0.103)	(0.364)
1989-1994	0.222***	0.544
	(0.056)	(0.426)
1995-1999	0.163***	0.086
	(0.059)	(0.458)
2005-2009	0.222***	0.123
	(0.060)	(0.458)
Constant	-0.080	12.445*
	(1.167)	(6.739)
Number of observations	44,508	695

Note: *** p<0.01, ** p<0.05, * p<0.1; standard errors in parentheses

Figure 3.9 Predicted Probability of LBW for White and Black mothers (first births 1989-2009) excluding twin births with 95% confidence intervals



Note: with the exception of the age coefficients, the control variables are set at their mean values.

3.6 Discussion & Conclusion

The "weathering" hypothesis literature, which emerged in the U.S. during the 1990s, posits that the costs and benefits of postponement may vary systematically across population subgroups. Notwithstanding the fact that this framework focuses on important processes linking postponement to wellbeing, it has had, thus far, limited influence on the way the timing of fertility is conceptualized and discussed in the demographic literature. In part, this has occurred because, in the U.S., substantial differences in first birth fertility schedules between White and African American mothers means efforts to find compelling evidence to support it are problematic as they would involve considering as counterfactual a rare and (potentially) selected group of older African American mothers. In this paper, we look for evidence to support the "weathering" hypothesis in the U.K. a context where, because first birth fertility schedules are similar for Black and White women, we can observe, rather than assume, whether the meaning and consequences of postponement vary across these population subgroups. Although we do not argue that we provide a test of what would happen if African American women postponed their first births, the results, which show evidence consistent with the "weathering" hypothesis in the U.K., could indicate that the association between postponement and wellbeing may well vary across contexts (U.K vs. U.S.) and across groups within the same context (Black vs. White mothers). While it is impossible to make a direct comparison with results in the extant U.S. literature (e.g. because of the different functional form of maternal age used in this and other studies), evidence suggests that in the U.S. the risk of LBW starts rising from the early 20s (Geronimus, 1996) whilst in the paper we know that in the U.K. this seems to occur after the mid-20s. In the U.K., a more protective context than the U.S. as Black women have access to health care, have somewhat invested in education and tend to be employed, the "inflection point" i.e. the age at which the rates of LBW start to markedly rise, seem to be observed later (after mid-20s) than the U.S. (early 20s). This suggests that the interaction between the social and biological component of maternal age could be intertwined with the institutional context and how different groups experience it, an observation which opens up rich possibilities for policy intervention to improve health outcomes. However, despite the fact that the inflection point may occur at later ages in the U.K., the results reveal a marked widening of the Black/White gap in LBW with increasing maternal age at first birth. To the extent that the literature suggests that LBW is likely to

reflect low socioeconomic status in the family (Reichman, 2005), the fact that older Black mothers are at higher risk of giving birth to a LBW child could indicate that increasing maternal age at first birth may not reflect the same level of wellbeing. Namely, the accumulation of socioeconomic resources associated with postponement, discussed in the demographic literature and in the "diverging destinies" framework, may materialize to a different extent for White and Black mothers. This could occur because Black mothers may have fewer opportunities than White mothers to acquire resources and obtain status even if they postpone childbearing and use that time to invest in their education and careers. Patterns of residential disadvantage which show very few Black women in the top quintile of the Carstairs' index lend support to this hypothesis, as do our analyses of age gradients in LBW which indicate that being a Black mother may confer unique risks for health deterioration processes which go beyond socioeconomic status and which amplify any negative association between exposure to social inequality and health deterioration. This ultimately underscores that it is important to study both class and race explicitly and with special attention to their intersection (Sarkisian & Gerstel, 2004), which could create experiences that are unique and different across subgroups of the population (Collins, 2000).

These findings and arguments are important as they suggest that the "diverging destinies" framework and, more generally, the demographic literature (in the U.S.), which have tended to adopt a socioeconomic perspective, would benefit by more explicitly considering the insights provided by the "weathering" perspective and integrating the idea that the benefits of postponement are not necessarily uniform across population subgroups. Ultimately, we think that the results show the potential and lend support to the development and adoption of a framework that integrates the socioeconomic and biosocial perspectives and explicitly conceptualizes them as simultaneous and countervailing processes. Indeed, the results could suggest that the size and importance of these processes could be modified by the characteristics of the context and those of the groups involved, (potentially) predicting diversity in the meaning and consequences of childbearing postponement and, consequently, of "optimal" fertility schedules across populations and their subgroups.

Although the results suggest that the association between maternal age, access to resources and child wellbeing warrants closer attention and investigation, it is important to highlight that we think that they complicate the arguments posited by "diverging destinies" i.e. African American mothers would benefit from postponing their first births, but without

necessarily contra-indicating them. LBW is not an outcome that has been considered in the "diverging destinies" framework, which has (implicitly) referred to children's cognitive and social development (McLanahan, 2004). Although there is evidence that LBW is associated with subsequent disadvantage (Black, Devereux, & Salvanes, 2007; Dalton & Bennett, 2000), its relationship with other outcomes and life chances more generally is potentially complex (Boardman, Powers, & Hummer, 2002; Gorman, 2002), as already discussed in Chapter 2. A detailed examination of these issues is beyond the scope of this Chapter, but observing evidence consistent with the "weathering" hypothesis in the U.K. based on LBW provides good motivation for such an investigation. Moreover, extending the analyses by inspecting other measure of children's cognitive and social wellbeing would contribute to more conclusively establish whether (or the extent to which) "diverging destinies" does not apply to all groups equally and whether children of older Black mothers experience worse chances in later life. Unfortunately, the ONS LS does not contain information on other markers of child development (including the different aetiologies of LBW such as preterm and growth retardation), so alternative data sources will need to be explored.

The results have limitations and underscore the need and potential for future research. The overarching contribution of this Chapter has been that of showing *whether* the association between maternal age and child wellbeing may vary across subpopulation groups, but it has given less attention, partly because of data limitations, to testing *why* we observe these differentials. The analyses have begun to explore the role of family structure, but they have revealed that it is not likely to play a major role in explaining widening maternal age gradients in Black/White gaps in LBW. Therefore, a lot of questions remain unanswered which underscores the need for future research. One way to begin investigating some of the underlying processes that could drive the widening Black/White gaps in LBW could involve describing and investigating differences in the socioeconomic and health behaviours profiles of Black and White mothers who postpone their first births. Moreover, whilst discussing the potential mechanisms, this Chapter, as well as the extant "weathering" literature, has placed a lot of importance on the role that racism and discrimination might play on health and resource accumulation trajectories, but other biological and cultural explanations are also plausible and should be given more attention in future research. For example, research by Conley and Bennett (2000) has suggested that the intergenerational transmission of low birth weight might also entail a biological

component - which one could explore with data providing information on both parents and filial birth weight. More attention should also be given to cultural explanations. For example, Black families tend to be matrifocal, which could explain why the analyses have revealed a limited role of partnership status in explaining the widening gap in LBW. There is a body of qualitative literature on this topic (for example: Bauer, 2010; Chamberlain, 2001; Goulbourne, 2001), which has highlighted the importance of the extended (rather than nuclear) family for Caribbeans living in the U.K. Based on these arguments, it would be interesting to explore whether support from the extended family declines with increasing maternal age at first birth; if it does, it could possibly result in more difficult pregnancies and experiences of child rearing for Black mothers who postpone to older maternal ages (Colen, 2011; Colen, Geronimus, Bound, & James, 2006). Moreover, efforts to reflect and understand the results presented in this Chapter could be strengthened by qualitative work aimed at exploring and comparing Black and White women's experiences of childbearing postponement. In sum, unravelling the underlying explanatory mechanisms behind the widening Black/White gap in LBW is complex and should involve multiple methods of investigation, especially because it is likely that the observed patterns are linked to a set of processes, rather than being the outcome of a single one. In order to take a first step in this direction, by building and expanding on the results revealed in this Chapter, the next two Chapters of this thesis aim at describing the profiles of older Black and White mothers and to reveal whether support from the extended family declines with increasing maternal age at first birth.

In addition to giving limited attention to the mechanisms, this Chapter has other limitations. First of all, the analyses are based on a small sample of Black mothers, especially the ones that include measures of (individual and area level) disadvantage/advantage. Furthermore, sample size issues have prevented close consideration of the role played by migration status. Second of all, in order to be able to work with a sufficiently large sample of Black mothers, we have pulled together many years of data. Although the models include controls for year of birth, we are unable to dismiss the possibility that the results also reflect cohort effects. Along similar lines, Black Caribbean and African mothers have been considered jointly. Although additional descriptive analyses have shown that the prevalence of LBW rises with maternal age at first birth for both groups, they have experienced different migration and settlement histories to the U.K. and their socioeconomic profiles are surely not identical such that they cannot be considered a homogenous group. Should more data become available in the

future, Black Caribbean and African mothers should be analysed separately. Thirdly, the ONS Longitudinal study does not enable other measures of child health and wellbeing more in general to be analysed, including the different aetiologies of LBW (i.e. growth retardation and preterm delivery). Finally, there are also important issues to consider concerning the way "disadvantage" is measured. When looking at area level disadvantage, we have used a unique point in time close to when the mother has her first birth. It could be the widening gap reflects the fact that Black mothers have experienced lifelong exposure to poor environmental conditions to a larger extent than White ones (Do, Frank, & Finch, 2012) and/or live in the more disadvantaged end of the poorer areas. Furthermore, when looking at educational level disadvantage, we have relied on education measured at the time of the 2001 census, rather than at the time of birth. There is not, however, another U.K. data source that would enable the research questions of this study to be addressed with a larger sample, other measures of child health and more precise measures of disadvantage. Despite some of the limitations, our findings provide a novel perspective on childbearing postponement and its consequences across groups of the population. They contribute to advance discourses around the benefits of childbearing postponement suggesting that the way these processes vary across groups of the population warrants closer attention. While suggesting that there could be benefits in employing a more integrated framework, the results also underscore the need for future research in this area.

3.7 Appendix

3.7.1 Categorizing mothers into educational groups

The main challenge posed by the ONS Longitudinal Study when constructing an indicator of mother's level of education is that it is not recorded at the time of birth. In order to categorize mothers as having high (A-levels and above) or low (below A-levels) education, we need to rely on information provided in the census. For both births that occur between 1989-2000 and 2001-2009, we rely on the 2001 census. Although information on mothers' level of education is provided in the 1991 census, there are two reasons why we do not rely on education as provided in the 1991 census for births that occur in the period 1989-2000. The first reason is that, in contrast from what we observe in the 2001 census, the measure of education collected in the 1991 census only provides indication of whether the mother has/has not completed a degree. This means that, because we wouldn't have any information on the preceding educational steps, we wouldn't be able to know how far those mothers who do not have a degree have gone in the educational system and if, given their age, they are on "track" or not. The second reason why we do not rely on education in the 1991 census is because we would observe mothers' level of education before the time of birth, which might raise concerns especially for those births that occur well after 1991 and for those who in 1991 are below degree age. To the extent that people in the U.K. usually do not exit and re-enter the educational system extensively, although we cannot exclude the possibility of errors in our categorization, it is not heavily problematic to rely on a measure of education which is observed after the time of birth.

As far as births that occur after the 2001 census are concerned, we need to rely on a measure of education measured before the time of birth. Those women who are aged 18 and above in 2001 do not constitute a problem as we know whether they have completed A-levels, the threshold we use to categorize mothers as "highly" educated.[60] Mothers younger than 18 are instead more problematic. This is because there is uncertainty regarding their level of education at the time of birth, especially for those that give birth further away from the 2001 census. Dropping all mothers who are younger than 18 years old in 2001 would mean reducing the sample size considerably, which raises issues of

[60] Around 26% of births occur to mothers who are "highly" educated.

statistical power (particularly for Black mothers) when running the analyses stratified by educational levels. We therefore choose to drop births to mothers aged 13/14 in 2001 that occur after 2004/2003 respectively as there is a wide time lag between 2001, i.e. when we observe their level of education, and the year of birth. For births that occur to mothers aged below 18 in 2001, we proceed as summarized in Table 1A. We attempt to construct a measure of education which is as reliable as possible, without reducing the sample size too much. The idea is that for those younger than 18, we categorize women as having high vs. low education based on whether they are on "track" in the educational system and whether they are currently enrolled in full-time education.

For births that occur both before and after 2001, we have done all that we could to mitigate the possibility of categorizing mothers in the educational category they do not belong to (at the time of birth), but we underscore that the results need to be interpreted with caution as we are not using a measure of education at the time of birth.

Table 3.13 Categorizing mothers in educational categories

Age in 2001	Categorized as having low education	Categorized as having high education	Dropped births that occur after
13	If they give birth before 2004	-	2004
14	If they give birth before 2003	-	2003
15	If in the 2001 census they are coded as having less than GCSEs	If in the 2001 census they are coded as having completed GCSEs and are currently enrolled into full-time education	-
16	If in the 2001 census, they are coded as having less than GCSEs	If in the 2001 census they are coded as having completed GCSEs and are currently enrolled in full-time education	-
17	If in the 2001 census, they are coded as having less than GCSEs	If in the 2001 census they are coded as having completed GCSEs and are currently enrolled in full-time education/Or have already completed A-levels	-

Chapter 4 Same but different: the profiles of Black and White women in the U.K.

Abstract

Chapter 3 shows that the association between maternal age and low birth weight differs for Black and White mothers living in the U.K., similarly to what is documented in the U.S. context by the "weathering" hypothesis literature. Even in the U.K., where there is universal health care and minimum guaranteed income, the Black/White gap in LBW widens with increasing maternal age at first birth. Establishing the "causal" mechanisms behind this result is difficult when using observational data. However, describing the profiles of Black and White mothers is informative to begin exploring some of the hypotheses that could explain why the association between maternal age and LBW is, at older ages, different for Black and White mothers. This Chapter uses the Millennium Cohort Study and the Health Survey for England to describe the (demographic, socioeconomic and health) profiles of Black and White mothers and women in general. The results reveal that Black and White mothers are similarly educated in all maternal age groups, but the former are disadvantaged in terms of income, housing tenure and characteristics of the area of residence compared to the latter. This is observed even when Black mothers postpone childbearing to older ages. Differences in terms of health behaviours around the time of pregnancy are not as marked as those by socioeconomic status, but older Black mothers are significantly more likely than White ones to experience complications during pregnancy. The results also reveal that with increasing age Black women experience a more rapid deterioration of their health compared to White ones, which provides support to the existence of patterns consistent with the "weathering" hypothesis in the U.K. context. However, these disparities seem to largely emerge after the end of the childbearing ages.

4.1 Introduction

Chapter 3 shows that the Black/White gap in LBW widens with increasing maternal age at first birth in the U.K., a pattern which is consistent with the predictions of and the evidence provided by the "weathering" hypothesis literature in the U.S. context (Geronimus, 1996). We have discussed some hypotheses of why this could be the case. For example, we note that minority status could represent an added burden in the association between exposure to disadvantage and health deterioration and that discrimination may prevent Black women from accumulating resources to the same extent as White ones (Meyer, Warren, & Reisine, 2010). As mentioned in Chapter 3, however, providing a conclusive answer to why these patterns are documented in the U.K. context is difficult when using observational data especially because the process is likely to be linked to a range of (intertwined) factors rather than a single one. Moreover, given the nature of the research question, it is also problematic to approach the issue experimentally. This means that identifying what causes Black women to experience higher rates of LBW with increasing maternal age at first birth compared to White women is difficult if not impossible.

The fact that we are unable to identify causal associations does not mean that we cannot increase our knowledge of the observed patterns. A closer examination of the (similar and different) characteristics of Black and White mothers may contribute to elucidate some of the underlying processes that could drive the widening Black/White gaps in LBW with increasing maternal age at first birth. The value of descriptive work in social science research is often dismissed in favour of more complicated models (Goldthorpe, 2001). This is unfortunate as quantitative descriptive work potentially plays a crucial role by revealing what is happening, which should (always) precede analyses attempting to explain why something is happening (Goldthorpe, 2001).

The overarching aim of this Chapter is that of contextualizing the findings of Chapter 3, which reveal that the association between maternal age at first birth and LBW differs for White and Black mothers in the U.K., by analysing White and Black mothers' and women's characteristics. First of all, the present Chapter aims to do so by revealing whether and to what extent the socioeconomic and health (behaviours) profiles of Black and White mothers vary with increasing age at first birth. We already know, through the evidence provided in Chapter 2 that, on average, mothers who postpone childbearing to

ages 30 and above are positively selected in terms of socioeconomic status and health behaviours. The contribution of this Chapter is that of stratifying this finding by ethnicity and reveal whether it reflects the experiences of Black and White mothers to the same extent. The first research question this Chapter aims to address is whether Black and White mothers who postpone their first births to older ages have more advantageous (socioeconomic and health behaviours) profiles than their younger counterparts. In addition, the aim is to assess whether the extent to which this occurs is more marked for White than for Black mothers and, therefore, whether postponement may reflect qualitatively different processes for these two groups. Then, as Chapter 3 implicitly, i.e. through the child's LBW, posits that the health of Black mothers deteriorates faster than among White mothers, the purpose of the second part of this Chapter is that of providing more direct evidence of whether this is the case empirically. The second research question the Chapter aims to address is whether the health of Black women in general deteriorates faster than the one of White women.

The analyses of Chapter 3 are based on the ONS LS, which is an appropriate data source to investigate whether the association between increasing maternal age at first birth and LBW varies for Black and White mothers. This is because the ONS LS provides a relatively large sample of Black mothers together with basic information such as their ethnicity, age, area of residence and migration status and whether the child is born low birth weight. Because of its administrative nature and the limited variables it contains especially at the time of birth, the ONS LS is less appropriate for the purpose of this present Chapter. The analyses are therefore based on two other U.K. data sources: the Millennium Cohort Study and the Health Survey for England, which are described in the "Data" section.

4.2 What variables to look at to compare Black and White mothers/women?

The first research question of this Chapter involves assessing whether childbearing postponement is equally associated with advantageous profiles for Black and White mothers. The question is addressed by comparing the socioeconomic characteristics and health (behaviours) around the time of birth and by age groups of Black and White

mothers. The decision on which variables to focus on when describing their socioeconomic profiles is taken by reflecting on differences and similarities in the profiles of Black and White mothers (and women more in general). Namely, as already discussed in Chapter 3, evidence suggests that Black and White mothers have, at least partially, similar educational profiles and propensity to work (Dale et al., 2006; Lindley et al., 2006). A more complex picture emerges when income levels are compared. Evidence presented by Nandi and Platt (2010) shows that Black mothers have individual income levels which are similar to (or even higher than) those of White mothers; however, when equivalent income at the household level is considered, White mothers have higher equivalent than individual income levels while the reverse is true for Black mothers. In fact, the report also shows that rates of poverty are higher for Black than for White mothers. In addition, other research shows that in the U.K. (similarly to the U.S.) within social classes, White people have higher incomes than ethnic minority people and Black people are disadvantaged in terms of housing and location (Bécares, Nazroo, & Stafford, 2009; Hills et al., 2010; Kelly et al., 2009). This suggests that this Chapter should consider socioeconomic measures beyond education when comparing Black and White mothers, as the former group may not be able to reap the benefits of their investments in education to the same extent as the latter (Nazroo, 2003; Pearson, 2008). In the United States, Williams and Collins (1995) argue:

"SES measures are not equivalent across racial groups. That is, there are racial differences in income returns for a given level of education, the quality of education, the level of wealth associated with a given level of income, the purchasing power of income, the stability of employment and the health risks associated with working in particular occupations (Williams and Collins, 1995, p. 337)".

Black mothers may, at equal levels of education, have lower income, wealth and live in relatively more disadvantaged areas than White mothers. This could occur because of discrimination in the labour market (Blackaby et al., 1998), but also because of differential access to higher education institutions (Shiner & Modood, 2002). Indeed, Shiner and Moodod (2002) reveal that ethnic minorities in the U.K. (with the exception of Chinese) experience lower acceptance rates to older universities (e.g. Oxbridge), while no significant difference is observed for acceptance to new(er) universities. This pattern is likely to have consequences for their employment opportunities as there is evidence that the country's top 2000 companies in the U.K. largely recruit from the old universities

(mentioned in footnote 37 by Shiner and Moodod (2002)). Based on these arguments, in the analyses, Black and White mothers' socioeconomic profiles are described and compared on the basis of different characteristics. Looking at their educational characteristics informs whether, in line with what the literature shows while looking at women more in general, Black and White mothers are relatively similar (although the analyses are not able to show from which universities highly educated respondents received their degrees). Then, looking at measures of income and wealth (such as housing tenure and characteristics of the area of residence), informs whether the returns to their human capital investments are lower for Black mothers. Looking at these indicators by maternal age categories enable the analyses to reveal whether older Black and White mothers are more advantaged compared to their counterparts who start childbearing earlier. In addition, it allows the analyses to reveal whether the accumulation of resources that characterizes childbearing postponement is more marked for White than for Black mothers.

As mentioned in Chapter 3, there is evidence that Black and White mothers differ in terms of family structures at the time of birth and over the life course (Kiernan & Mensah, 2010), whereby the former are markedly more likely to be non-partnered. Partnership status is an important aspect to consider when comparing Black and White mothers. To the extent that continuously married parents tend to have more stable employment patterns and higher income levels than parents in other types of family structures, Black mothers' potential difficulties to benefit from their human capital investments might be reinforced by their tendency to have more unstable relationships than White mothers. By using information on how the birth has been registered by the mother (married, joint registration or "sole" registration) in the LS, Chapter 3 reveals that even at older maternal ages Black mothers are more likely to be non-partnered than White mothers. These patterns can be described (and the LS results checked) by resorting to a different data source, the Millennium Cohort Study (described in the next section), which provides a more standard measure of family structure at the time of birth as it is the mother who declares it.

In order to contribute to contextualizing the findings of Chapter 3, the analyses also describe the mother's health during and close to the time of pregnancy and those health behaviours during pregnancy that the literature documents to be associated with LBW and that could change (differently for Black and White mothers) with age at first birth. For example, Geronimus shows that in the U.S. African American (but not White) mothers' rates of smoking during pregnancy increase with maternal age and posits that this could be a behavioural response to exposure to disadvantage and stress (Geronimus et al., 1993).

The implicit argument could be that changes in health behaviours with increasing age at first birth represent one of the potential mechanisms explaining the widening Black/White gap in LBW. Existing evidence suggests that Black mothers in the U.K., on average, adopt healthier pregnancy related behaviours than White ones in terms, for example, of smoking during pregnancy and use of antenatal care (Hawkins, Lamb, Cole, & Law, 2008; Kelly et al., 2009). The analyses in this Chapter expand existing evidence by showing how health behaviours for Black and White mothers vary with increasing age at first birth.

The second aim of this Chapter is that of describing the health profiles of Black and White women over the life course. The objective is to assess whether the health of Black and White women deteriorates faster than that of White women and provide evidence that can support the existence of "weathering" in the U.K. Evidence reveals that in the U.K. Black women have worse health than White ones (Muennig & Murphy, 2011). Moreover, the report on the health of ethnic minority group by Sproston and Mindell (2006) reveals that the prevalence of different health conditions (measured in the 2004 Health Survey for England through biomarkers) increases for Black women with age. As much as these results are informative of overall patterns, they are not always compared to those of the White population and are unable to inform whether Black women's health deteriorates faster than that of White women. Namely, there is limited evidence that can support or fail to support the existence of "weathering" processes in the U.K. For this reason, this Chapter aims to conduct an explicit comparison of Black and White women's health by age groups. It must be highlighted that the data used in this part of the analyses focuses on women and not (only) on first-time mothers, something that is discussed when commenting the results.

4.3 Data

The analyses aim to describe the profiles of Black and White mothers and women by using the Millennium Cohort Study (MCS) and the Health Survey for England (HSE). The research questions are addressed by running cross-tabs analyses which reveal, by looking at a set of socioeconomic and health indicators, whether and to what extent the profiles of Black and White mothers/women differ with increasing (maternal) age. As in Chapter 3, because of sample size issues, in both sets of analyses Black Caribbean and Black Africans are grouped into a single category.

The analyses of this Chapter focus on Sweep 1 of the MCS (which has been described and used in Chapter 1), which is collected when the cohort child is around 9 months, and on mothers for whom the cohort child is the first birth (consistent with Chapter 3). As in Chapter 1, the analyses focus on those mothers who are the main interviewee, which is the great majority of the cases. Sweep 1 provides extensive information on the cohort child parents' socioeconomic, demographic characteristics and health behaviours at the time of birth, which are used to compare the profiles of Black and White mothers. Moreover and importantly for this study, the MCS oversamples ethnic minorities and disadvantaged individuals. For this reason, weights will be used throughout the analyses to account for the complex survey design of the MCS. Notwithstanding the oversampling of ethnic minorities, the sub-sample of first births to Black mothers is quite small (n=164 when weighted, n=205 when not weighted).

As the MCS sample is used to look at mothers' characteristics in order to situate the results of Chapter 3, it is first important to assess whether the (smaller) sub-sample of Black mothers in the MCS well reflects the patterns observed in the LS. In order to do so, the MCS sub-sample of Black mothers is compared with the much larger LS sample. The comparison is meant to reveal whether there are statistically significant differences in the distribution of first births and the prevalence of LBW by maternal age categories. In other words, the comparison between the two data sources is meant to be a "validation" of the MCS vs. the LS for what concerns the distribution of first births and the prevalence of LBW across the maternal age categories.

The Health Survey for England is used to compare the health profiles of Black and White women in England (the remaining one-sixth of the U.K. population is therefore excluded from the analyses). The HSE is cross-sectional, it interviews respondents aged over 15 and it includes a special topic each year. The 2004 survey includes a "boost" sample of ethnic minorities, including Black respondents, for whom several medical examination data was collected. Because in the 2004 survey medical examination data was not collected for the general population, information for White women is retrieved through the 2006 survey. As both the 2004 and 2006 have a complex survey design which requires the use of survey weights, the analyses are run separately for the two years of data. The analyses on the biomarker data use the "blood weights", which should reduce non-response bias. The HSE 2004 and 2006 survey have already been used to compare the health of Black and White respondents (Muennig & Murphy, 2011). All analyses are run in Stata version 12.

4.4 Variables

In order to compare the profiles of Black and White mothers at the time of birth, following the logic discussed in the previous section, two groups of MCS variables are analysed. The first group consists of socioeconomic and demographic characteristics. Education, as in Chapter 2, is measured based on NVQ levels (none, 1/2, 3, 4/5). Partnership status at the time of birth groups mothers as being married, cohabiting or not partnered at the time of the cohort child's birth. Household income when the cohort child is aged 9 months groups mothers, as in Chapter 2, into high (above £31,200), medium (above £10,400 and below £31,200) or low (less than £10,400). Housing tenure categorizes mothers as either owning a house (on her own outright or through a loan/mortgage) or not and the reference group is mothers who either are renting or live in social housing.[61] Characteristics of area of residence, based on the Index of Multiple Deprivation deciles, groups mothers as living into advantaged (decile 7 and above), middle (from decile 4 to 6) or disadvantaged (decile 3 and below) areas. The second group of variables includes two health behaviours variables related to the time of pregnancy, namely whether the mother smoked during pregnancy and received antenatal care for the first time after 12 weeks of pregnancy as they are found to be related to LBW (Herbst, Mercer, Beazley, Meyer, & Carr, 2003; Kleinman & Madans, 1985). Those mothers who did not receive ante-natal care (around 3% of the overall sample) are grouped together with those who receive ante-natal care after 12 weeks of pregnancy. In addition, I look at whether the mother reports to have had illnesses or other problems during pregnancy, as a measure of overall health during pregnancy, and whether she has ever been told by a doctor to suffer from depression (which is asked when the child is aged 9 months) as a measure of overall psychological wellbeing. Finally, I consider whether the mother declares to have planned the pregnancy as previous work suggests that intention to conceive is associated with better health behaviours during pregnancy (Kost et al., 1998).

In order to compare the health profiles of Black and White women, the following biomarker indicators from the 2004 (for Black women) and 2006 (for White women) are used. The thresholds used are in line with those of existing papers adopting the same health

[61] Information on housing tenure is available in the LS, but only at the time of census i.e. not at the time of birth. This implies that, in order to compare the house ownership profiles of Black and White mothers on the basis of this indicator of wealth, I would need to focus on those births that occur only during the census years. The sample would be smaller than the one provided by the MCS.

measures and using the HSE (Martinson, 2012; Martinson, Teitler, & Reichman, 2011). Diabetes is assessed through glycosylated haemoglobin tests (HbA1c≥6.5%). High blood pressure is defined with mean systolic blood pressure of 140 mm of mercury or higher, mean diastolic blood pressure of 90 mm of mercury or higher or reports of current treatment for hypertension with medication. C-reactive protein, a biomarker of inflammation, categorizes respondents as low (<1 mg/L) or medium (1-3 mg/L) risk vs. high (>3 mg/L) risk. While using objective measures of health through biomarkers has several advantages, response rates were low in some sections of the questionnaire (less than 20% in the fasting blood sample in 2004 (Muennig & Murphy, 2011)), so results need to be interpreted cautiously as the sample size results to be small. In order to use a measure of health which provides a larger sample size, the analyses look at respondents' self-reported health where the variable takes the value 1 when respondents are coded as not having (at least) good health and mean BMI (derived variable). There are, however, other issues involved when using self-reported measures of health, especially for the overall measure of health. Different groups may interpret questions differently (Krause & Jay, 1994) and may bias (upward or downward) their level of health for a variety of reasons (for a review, see (Dowd & Todd, 2011)). Existing research also documents racial differences in the reporting of self-reported health, although evidence is not conclusive for what concerns the direction of the bias. Some studies reveal that Black individuals tend to be pessimistic when they self-report their health (Boardman, 2004), while the study by Dowd and Todd (2011) reveals the opposite. Notwithstanding these limitations, measures of self-reported health are widely used in surveys and are found to be related to other indicators of health and to mortality (Idler & Benyamini, 1997). Moreover, research in the U.S. suggests that self-reported health has qualitatively similar mortality risks for Black and White respondents (Do et al., 2012; McGee, Liao, Cao, & Cooper, 1999).

4.5 Analyses

The analyses are divided into three sections. The first one compares the MCS and the LS ONS and (partially) assesses whether the small Black subsample of the MCS raises issues. The second and third sections present analyses which aim to compare the profiles of Black and White mothers/women (based on the variables discussed above) using the MCS and the HSE.

4.5.1 Validation of Millennium Cohort Study against the ONS Longitudinal Study

As the MCS provides a small sample of first births occurring to Black mothers, it is compared to the LS by looking at the distribution of first births across maternal age categories, the overall prevalence of LBW together with that by age groups across the two data sources. Weights are used to account for the complex structure of the MCS when computing the distribution of first births and prevalence of LBW by maternal age categories (with confidence intervals) in Table 1 and 2. In order to test whether the age gradient obtained in the MCS and LS differs to a significant extent, I run a regression model which groups together the two data sources. This implies that the model does not use complex survey weights for the MCS. Reassuringly, the distribution of first births for Black mothers remains almost unaltered when the MCS is not weighted, while the prevalence of LBW increases in the younger age group and decreases in the other two. Nonetheless, the shape of the age gradient that is obtained when the MCS sample is not weighted is virtually identical.

The results suggest that there are not statistically significant differences between the Black sub-sample of first-time mothers in the LS and MCS samples. Table 1 shows that the distribution of first births looks similar between the two groups and that there are no significant differences between the two data sources. Table 2 shows that there are some differences both in the overall prevalence of LBW and the one observed by age groups. The overall prevalence of LBW is higher in the MCS than in the LS, but the p-value (0.446) suggests that differences are not significant. The prevalence of LBW in the youngest and oldest age groups is similar for the two groups, but that for the middle age groups differs substantially. Not surprisingly and given the smaller sample size, the confidence intervals for the MCS are much larger than what is observed for the LS. There are no significant differences in the prevalence of LBW in the younger and older age groups, while there is a significant difference (at the 10% level) in the middle one. Notwithstanding the significant difference in the middle age groups, the logistic regression in Table 3 does not reveal overall differences in the age gradient of Black mothers in the two data sources. All the coefficients are interacted with a binary variable which takes the value one when the mother belongs to the MCS and zero when she belongs to the LS. None of the interaction terms is statistically significant. In addition, as in Chapter 3, I have

run a test on the joint significance of the MCS coefficients, which reveals a non-significant result.[62] On the basis of the fact that the distribution of first births across the age groups as well as the prevalence of LBW in the younger and older age categories is similar between the two data sources, I can more confidently use the MCS to compare the profiles of Black and White mothers. That said, caution is needed when interpreting the results as the small size of the Black sample will be reflected in wide confidence intervals.

Table 4.1 Distribution of first births for Black mothers in the LS and MCS

	LS	**MCS**
	% of births	
<23	27.5%	29.6%
23-30	39.1%	33.3%
30+	33.3%	37.2%
N(unweighted)	708	205

Table 4.2 Prevalence of LBW across age categories for Black mothers in the LS and MCS

	LS			**MCS**		
	% LBW	Lower CI	Upper CI	% LBW	Lower CI	Upper CI
<23	7.7%	3.9%	11.5%	5.9%	0.8%	10.9%
23-29	6.5%	3.6%	9.4%	16.6%	4.8%	28.4%
30+	15.7%	11.0%	20.4%	16.7%	6.0%	27.5%
Mean LBW	9.9%			13.4%		
P-value			0.446			
N (unweighted)		708			205	

[62] Prob>Chi2=0.7616

Table 4.3 Logistic regression for Black mothers in the LS and MCS combined

	β/se
Mother age	-1.553**
	(0.686)
Mother age*MCS	0.147
	(1.699)
Mother age^2	0.053**
	(0.025)
Mother age^2*MCS	-0.001
	(0.062)
Mother age^3	-0.001*
	(0.000)
Mother age^3*MCS	-0.000
	(0.001)
MCS	-1.883
	(15.018)
Girl	0.385
	(0.267)
Girl*MCS	0.002
	(0.536)
Twin	2.954***
	(0.605)
Twin*MCS	-0.476
	(1.424)
Constant	11.360*
	(6.113)
N	913

Note: *** p<0.01, ** p<0.05, * p<0.1

4.5.2 Evidence from the Millennium Cohort Study

In order to contribute to assess whether childbearing postponement is equally associated with advantageous socioeconomic status and health behaviours for Black and White mothers, the characteristics of the two groups around the time of birth are described and compared using the MCS. As in previous Chapters of this thesis, maternal age at first birth is divided into the following categories: younger (<23), middle (23-29) and older (30 and over). The results are weighted in order to account for the complex survey design of the MCS. The weighted number of observations is 6958 for White and 164 for Black mothers. In Table 4, the Chi2 p-value at the bottom of each "Average" column refers to the Chi-square test (age groups vs. variable) for White and Black mothers separately. The Chi2 p-value at the bottom of each age group column shows whether there are significant differences between Black and White mothers for a particular variable for each age group. For example, the p-value at the bottom of the younger age group for the educational variable is 0.3033, revealing that the distribution of Black and White mothers across the educational categories is not statistically significantly different for this particular age group. The asterisks reveal whether for each cell there are statistically significant differences (at the 1%, 5% and 10% levels) between White and Black mothers (this is done only for the results by age groups, not for the average). For example, the asterisks reveal that the prevalence of Black and White mothers holding educational level "none" in the age group 23-29 is statistically significant at the 1% level. In order to reveal whether childbearing postponement reflects a qualitatively different process for White and Black mothers, particular attention is given to discuss whether and to what extent their profiles differ when they delay their first births past the age of age 30.

For both groups the level of education tends to increase with maternal age at first birth (although the proportion of Black mothers with NVQ 4/5 is higher in the middle rather than in the older age group). In particular, there are not significant differences in the younger and older age groups, while educational levels significantly differ in the middle age group as White mothers tend to be more educated than Black mothers. Amongst the older group, Black mothers are significantly (at the 10% level) more likely to hold no level of education than White mothers, but the proportion of mothers in this group is rather small. In the older group, an identical proportion of Black and White mothers hold educational level NVQ 4/5. In terms of partnership status at the time of birth, there are,

unsurprisingly, significant differences between Black and White mothers in all three age categories. In particular, Black mothers are significantly more likely to be non-partnered and less likely to be married at the time of birth at any age (with the exception of the younger age group where rates of non-partnership are not significantly different between the two groups). In contrast, rates of cohabitation are only significantly different in the younger age group but differences level off in the middle and older age groups. Although both Black and White mothers are less likely to be non-partnered and more likely to be married with increasing maternal age at first birth, the pattern is more marked for White mothers and ethnic differences tend to widen with age. In terms of household income, both Black and White mothers see their income levels increase with maternal age at first birth. Yet, White mothers have a much more "favourable" income distribution than Black mothers. Indeed, the results reveal that there are significant differences in income levels for Black and White mothers giving birth in the middle and older age groups. Interestingly, amongst mothers giving birth at age 30 and above, there is a significantly higher proportion of Black mothers (31%) that has low levels of income compared to White mothers (6%). Although differences in the proportion of mothers having high levels of income are quite marked (47.8% for White and 27.4% for Black mothers), they are not significantly different from each other. This could possibly be a consequence of the small sample. In terms of housing tenure, both Black and White mothers are more likely to own a house with increasing age at first birth. Yet, Black mothers are, at any age, significantly less likely to own a house or have a mortgage and differences do not appear to level off with increasing maternal age at first birth. As Black people are more likely to live in urban areas (Lupton & Power, 2004) where house ownership is lower, I have also looked at house ownership for those White mothers living in metropolitan and large town areas based on the Birbeck Urban Rural indicator (2005). White mothers' home ownership across the age categories is essentially unchanged when I exclude those living in smaller towns and rural areas. Finally, in terms of area of residence, both groups are more likely to live in advantaged areas with increasing maternal age at first birth. But as with the other measures, Black mothers are significantly more likely to live in disadvantaged areas and less likely to live in advantaged areas on average and in each age group. In contrast, there are not significant differences (with the exception of the younger group) for those Black and White mothers living in neither advantaged or disadvantaged areas.

In terms of health behaviours during pregnancy, Black mothers giving birth in the younger group are significantly less likely to smoke during pregnancy than White mothers,

possibly suggesting the latter are more (negatively) selected. In contrast, ethnic differences (which become smaller with increasing age at first birth) are not significant in the middle and older age groups. In contrast with evidence provided by the "weathering" hypothesis literature, however, there is no sign of increasing rates of smoking for Black mothers with maternal age at first birth as in the U.S. Both Black and White mothers tend, with increasing maternal age at first birth, to be less likely to use antenatal care for the first time after 12 weeks of pregnancy. Differences are statistically significant only in the middle age group (where the rates for Black mothers are double those of White ones) and the prevalence of mothers in the older age groups who uses antenatal care for the first time before week 12 is similar between Black and White mothers (actually lower for the former than for the latter). Finally, White mothers are more likely to have planned the birth than Black mothers. Although for both White and Black mothers rates of intended pregnancy increase with age, differences between the two groups widen with increasing age at first birth. In terms of health during pregnancy, it is interesting to observe that with increasing age at first birth White mothers are less likely to report experiencing illness and problems during pregnancy; on the contrary, Black mothers are more likely to do so. This could suggest that the advantageous socioeconomic profiles of White mothers may (more than) compensate for the increased health risks involved when giving birth at older ages (yet, the results of Chapter 2 suggest that the picture may change when the 30+ group is stratified into age groups 30-34, 35-39 and 40 and over). Amongst older mothers, there are significant (at the 10% level) differences between the two ethnic groups. Finally, White mothers giving birth in the younger group are significantly (at the 1% level) more likely to report being depressed (when the child is around 9 months old) than younger Black mothers. Differences in the middle age group narrow and are not significant amongst older mothers, but interestingly, with increasing age at first birth, the prevalence of depression decreases for White and increases for Black mothers.

While it is not possible to establish whether and how these findings may contribute to explain the widening Black/White gap in LBW documented in Chapter 3, the results suggest that childbearing postponement may reflect different socioeconomic and, to some extent, health processes for these two groups. In terms of socioeconomic and demographic characteristics, around the time of birth and based on maternal age at first birth, Black and White mothers appear to be similar in some respects but different in others. In particular, older Black and White mothers hold similar levels of education (with the exception of

Black mothers being marginally more likely to hold no level of education[63]). In contrast, older Black mothers are significantly more likely to have low levels of family income, to live in disadvantaged areas and significantly less likely to own a house (in its outright or to have a mortgage) and to be married than White ones. The mismatch between the educational and wealth levels of Black mothers who postpone childbearing could reflect exposure to discrimination, which is documented to exist in the U.K. society and labour market (Muennig & Murphy, 2011; Nazroo, 2003).

In terms of pregnancy related behaviours, it appears that older Black mothers are significantly less likely to have planned the birth compared to White mothers, but no significant difference is reported for what concerns smoking behaviours during pregnancy and depression. Small differences are revealed for what concerns use of antenatal care in the middle age group, but rates are similar in the older one. Based on this evidence, changes in health behaviours are unlikely to be a strong explanatory factor behind the widening Black/White gap in LBW. However, with increasing age at first birth, Black mothers are (significantly) more likely to report illnesses or problems during pregnancy. This could be a sign of earlier health deterioration for Black compared to White mothers. In order to look for further evidence that can support the existence of "weathering" processes in the U.K., the next section inspects and compares the health profiles of Black and White women across the life course.

[63] Given that the question in the MCS includes an "overseas qualification" category, this result is unlikely to be associated with the fact that Black migrant mothers do not have qualifications that map easily onto the MCS categories.

Table 4.4 The profiles of Black and White mothers based on the MCS

	White				Black			
	<23	23-29	30+	Total	<23	23-29	30+	Total
Education								
None	19.19%	3.61%***	2.65%*	7.57%	16.66%	13.83%***	7.33%*	12.26%
NVQ 1/2	55.21%	35.06%***	27.18%	37.79%	46.21%	3.65%***	27.51%	25.23%
NVQ 3	19.48%*	19.92%	14.45%	17.82%	31.98%*	21.65%	9.75%	20.32%
NVQ 4/5	6.13%	41.4%**	55.72%	36.81%	5.14%	60.88%**	55.41%	42.19%
Chi 2 P-value	0.3033	0.000	0.229	0.000	0.3033	0.000	0.229	0.000
Partnership status								
Married	8.31%	58.19%***	73.39%***	49.88%	7.93%	21.38%***	45.94%***	26.48%
Cohabiting	45.43%***	32.28%	21.38%	31.98%	11.57%***	29.84%	23.86%	22.16%
Non-partnered	46.26%***	9.53%***	5.23%***	18.14%	80.5%***	48.78%***	30.2%***	51.36%
Chi 2 P-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Income								
High	2.21%	24.22%	47.81%	26.58%	0.00%	12.30%	27.45%	14.22%
Medium	38.5%***	63.48%***	45.92%	50.24%	18.75%***	43.39%***	41.65%	35.09%
Low	59.29%***	12.3%***	6.27%***	23.18%	81.25%***	44.31%***	30.9%***	50.69%
Chi 2 P-value	0.0599	0.000	0.000	0.000	0.0599	0.000	0.000	0.0016
Housing tenure								
Owns or mortgage	19.73%*	75.98%***	87.79%***	64.68%	7.64%*	13.93%***	45.27%***	23.73%
Chi 2 P-value	0.099	0.000	0.000	0.000	0.099	0.000	0.000	0.000

Table 4.4 continued

Area of residence								
Advantaged	17.17%***	43.77%***	55.48%***	40.64%	4.13%***	3.99%***	17.86%***	9.18%
Middle	27.7%*	32.72%	29.93%	30.32%	13.72%*	26.62%	24.64%	22.03%
Disadvantaged	55.13%***	23.51%***	14.59%***	29.04%	82.15%***	69.39%***	57.5%***	68.79%
Chi 2 P-value	0.000	0.000	0.020	0.000	0.000	0.000	0.020	0.176
Smoke	40.08%***	18.39%	11.67%	21.96%	18.13%***	11.42%	11.54%	13.47%
Chi 2 P-value	0.006	0.310	0.969	0.000	0.006	0.310	0.969	0.510
Planned pregnancy	19.9%*	66.11%***	78.11%***	57.66%	11.33%*	31.07%***	55.03%***	34.07%
Chi 2 P-value	0.093	0.000	0.001	0.000	0.093	0.000	0.001	0.000
Antenatal care first received after 12 weeks	34.68%	18.07%**	19.74%	23.21%	47.09%	36.08%**	15.93%	31.95%
Chi 2 P-value	0.167	0.010	0.631	0.000	0.167	0.010	0.631	0.010
Illness or complications during pregnancy	42.93%	40.98%	38.45%*	40.61%	32.66%	35.71%	48.94%*	39.73%
Chi 2 P-value	0.136	0.330	0.072	0.028	0.136	0.330	0.072	0.126
Depression	25.81%***	22%*	18.35%	21.74%	8.53%***	11.45%*	13.26%	11.25%
Chi 2 P-value	0.0014	0.066	0.344	0.000	0.0014	0.066	0.344	0.684
N	27.66%	36.26%	36.09%	6958	29.89%	32.97%	37.14%	164

Note: *** p<0.01, ** p<0.05, * p<0.1

4.5.3 Evidence from the Health Survey for England

The next set of analyses provide an overview of the health profiles of Black and White women across the life course, the purpose of which is to reveal evidence of whether the health of Black women deteriorates faster than the one of White women. Before moving onto the results, it is important to stress that these analyses include all women and not only mothers (which is the focus of the earlier part of this Chapter and the rest of the dissertation). Moreover, the analyses are based on women's age and not age at first birth. The HSE would not allow focusing the analyses on mothers only as it does not provide information on respondents' childbearing histories. The household roster provides information on the number of children who are living with the mother at the time of interview, but, amongst the older respondents, mothers would not be identified as their children are likely to have left the parental home. In the younger group, where it is easier to distinguish mothers from childless respondents as children are likely to still be living at home, the sample of Black women would become too small if childless respondents were to be excluded. To the best of my knowledge there is not another U.K. data source that could be used to look at Black mothers' health trajectories over the life course through both biomarkers and self-reported health. The Understanding Society, which also provides an overrepresentation of ethnic minorities, does not do so for the questionnaire collecting the biomarker data. This data source, however, represents a unique source to analyse, when more waves become available in the future, individuals' health trajectories over the life course and overcome the limitations imposed by cross-sectional analysis.

The different focus of this last set of analyses makes the link with the results of Chapter 3 less explicit. Nonetheless, one could argue that if the health of Black mothers deteriorates faster than the one of White ones, this should be observed when looking at the entire population of Black women (i.e. not only mothers). The counterargument is however that the health trajectories of women may differ depending on whether they have had children or not, on parity and age at first birth (Kravdal, Grundy, Lyngstad, & Wiik, 2012), but this is something that the analyses here do not look into.

Table 5 and Figures 1, 2, 3, 4 and 5 show age gradients in health for Black and White women in the U.K. using data from the HSE (2004 survey for Black and 2006

survey for White respondents). Diseases' prevalence are computed for three age groups (20-34, 35-49 and 50 and over) and presented in the Figures with 95% confidence intervals, which enable to assess whether significant differences exist between the two groups. Results reveal that diseases' prevalence tends to increase with age for both groups but that the pattern, for some health indicators, looks more marked for Black than for White women. Indeed, there is evidence that Black women aged 35 and over are significantly more likely than White women to have higher levels of BMI and to self-report "bad" health. Moreover, Black women aged 50 and over are significantly more likely to have diabetes and hypertension. Conversely, there are not significant differences between the two groups in age patterns of c-reactive protein.

The fact that significant differences in the health of Black and White women for what concerns BMI and self-reported health begin emerging at age 35, while those of the biomarkers at age 50, could reflect the fact that Black women's health begins deteriorating earlier in life but it takes time for diseases (measured though biomarkers) to develop. In the U.S., in contrast, Geronimus (1996) shows that disparities in hypertension between White and African American mothers (not women) begin emerging in the age group 25-29. Although confidence intervals are not provided in the paper so it is not possible to assess whether the widening gap is statistically significant, the fact that Black/White differences in hypertension in the U.K. tend to widen at older ages compared to the U.S. could be interpreted as evidence in support to the argument put forward in Chapter 3. Namely, in the U.K., a more protective environment than the U.S. is, the "inflection point" i.e. the age at which the age gradient of Black mothers starts to markedly depart from that of White mothers, occurs at older ages.

There are a series of limitations and issues that need to be discussed when interpreting these results, however. As mentioned earlier in the Chapter, one should be careful when using a measure of self-reported health as the literature reveals that groups may differ in the way they self-report their health (Dowd & Todd, 2011). Moreover, the response rates for the biomarkers are low and this could suggest that the results are based on a selected group of the population. It could also occur that different groups provide differential response rates such that the relationship between health status and response rate for the fasting blood sample is subject to different biases i.e. it goes in opposite directions for groups with different characteristics. This

should, at least partially, be compensated by the use of response weights. Finally, the results are unable to distinguish between age and cohort effects. Older respondents are more likely to include first generation migrants, who, despite better health profiles at arrival, after spending time in the destination country may experience worse health profiles than the native population (Teitler, Hutto, & Reichman, 2012). In contrast, there is a larger pool of second generation migrant women in the younger respondents, who may have more similar health profiles to White respondents. Notwithstanding these limitations, the findings reveal a pattern that is, at least partially, consistent with the tenets of the "weathering" hypothesis framework: Black/White gaps in women's health are found to widen with increasing age.

Table 4.5 Health conditions by age groups for Black and White women

	Age Group					
	20-34	**35-49**	**50-over**	**Average**	**Chi2 P-value**	**N**
Diabetes						
White	0.58%	1.32%	7.87%	4.31%	0.000	3282
Black	5.50%	1.63%	22.26%	7.98%	0.001	239
High blood pressure						
White	2.15%	11.90%	50.54%	28.96%	0.000	2949
Black	12.99%	20.30%	77.19%	32.90%	0.000	204
C-reactive protein						
White	28.37%	26.36%	35.38%	31.20%	0.000	3282
Black	27.01%	27.31%	36.11%	29.36%	0.529	270
BMI						
White	25.44	26.95	27.94	25.53	0.000	6486
Black	26.26	29.74	31.27	26.37	0.000	916
Bad health (Self-Reported)						
White	13.71%	18.02%	36.34%	33.45%	0.000	919
Black	16.97%	28.29%	59.23%	26.02%	0.000	6127

Note: Results are weighted using survey weights

Figure 4.1 Age gradients in prevalence of diabetes for Black and White women

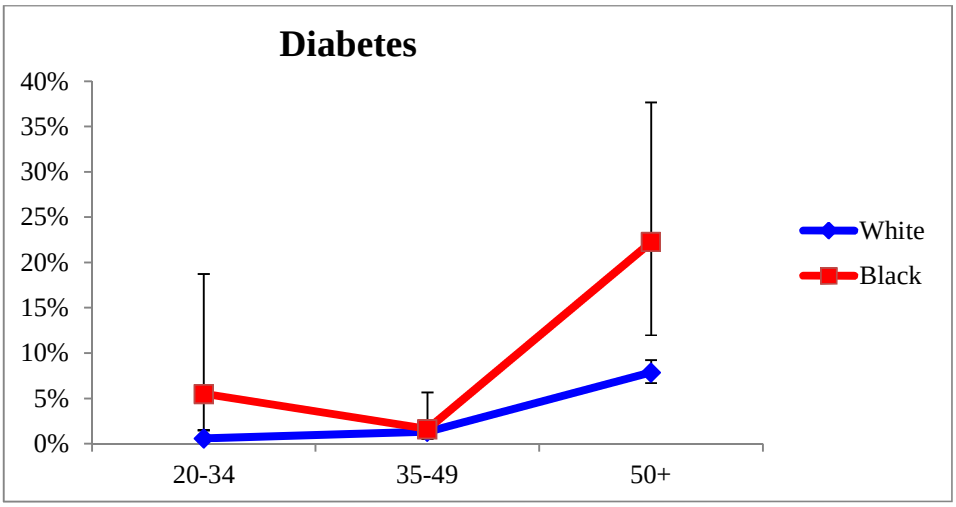


Figure 4.2 Age gradient in prevalence of high blood pressure for Black and White women

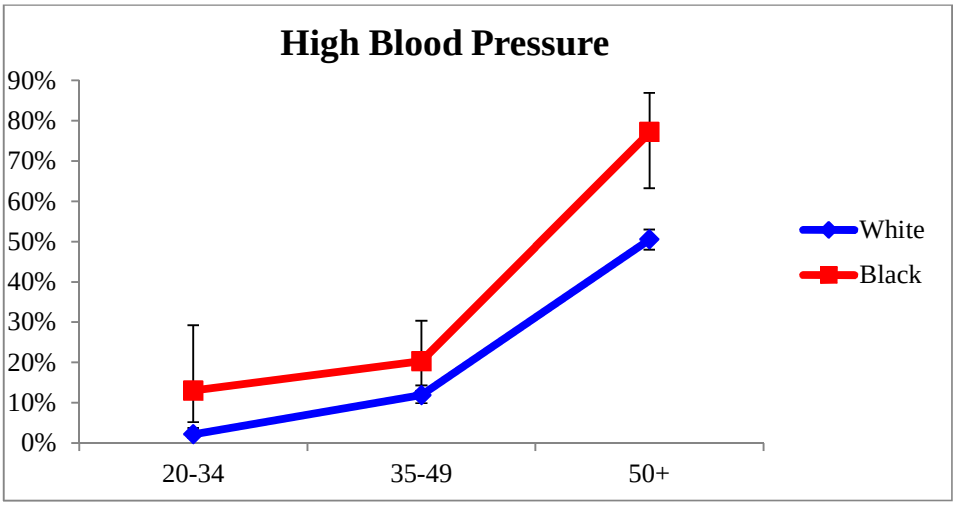


Figure 4.3 Age gradient in prevalence of C-reactive protein for Black and White women

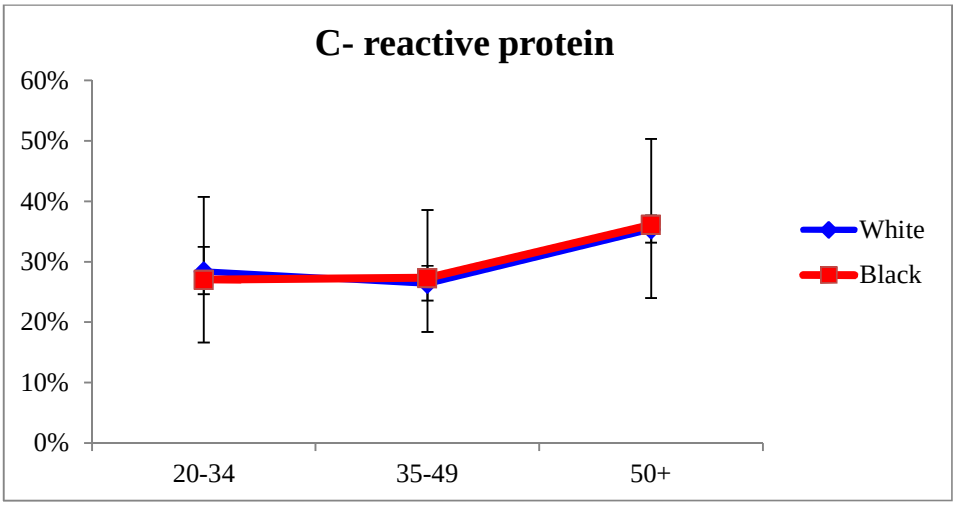


Figure 4.4 Age gradient in mean BMI for Black and White women

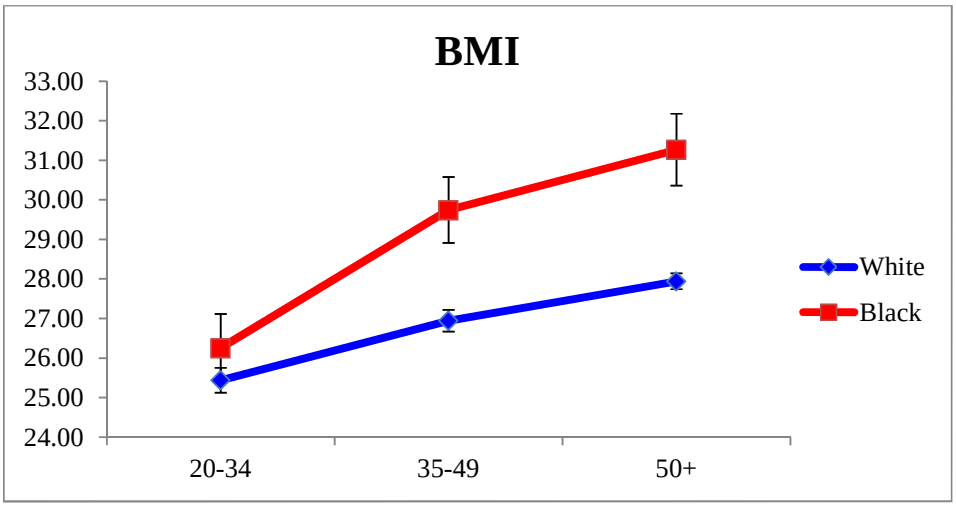
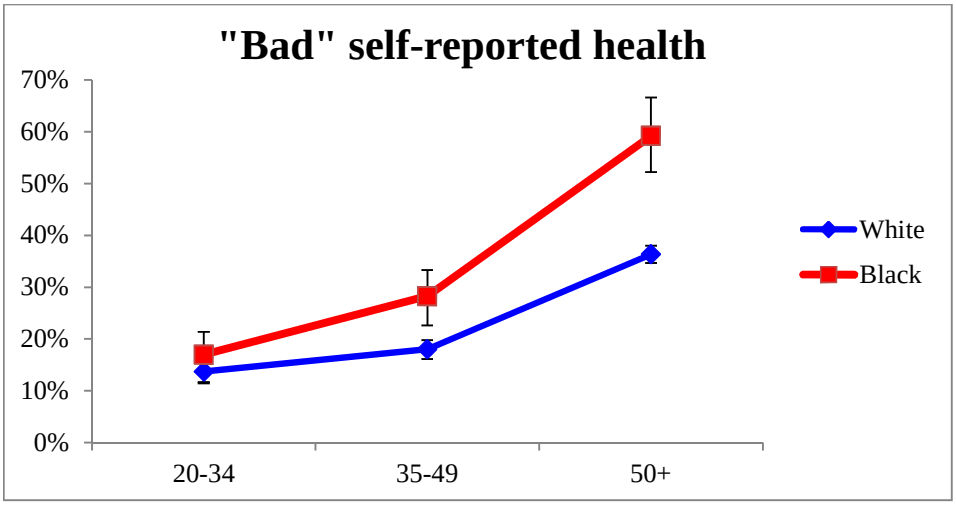


Figure 4.5 Age gradient in prevalence of "Bad" health for Black and White women



4.6 Discussion & Conclusions

In order to situate the results of Chapter 3, this Chapter describes and compares the profiles of Black and White mothers and women in the U.K. context on the basis of socioeconomic, demographic and health characteristics. Although comparing the profiles of these two groups does not enable conclusions to be drawn and hypotheses to be tested, the results allow us to grasp a better understanding of what is happening and highlight some of the potential, underlying, mechanisms behind the widening Black/White gap in LBW. The analyses are based on the Millennium Cohort Study and the Health Survey for England, which provide an oversampling of ethnic minorities. The small MCS sample of Black mothers is compared (on the basis of first births distribution and prevalence of LBW) to the ONS Longitudinal Study (used in Chapter 3) and the results (largely) fail to reveal significant differences between the two data sources. The lack of significant differences between the two data sources provides some traction for using the MCS sample, which, despite the oversampling of ethnic minorities, includes a small sample of first-time Black mothers (n=205).

The results are in line with a hypothesis that childbearing postponement may reflect different processes and experiences for these two groups of the U.K. population. When looking at socioeconomic status, what emerges from the analyses is that Black and White mothers in the U.K. are similar in some respects but differ in others. Both older Black and White mothers are more advantaged compared to their younger counterparts. However, the results are in line with the hypothesis that Black mothers may not be able to accumulate resources to the same extent as White ones even if they postpone childbearing and invest in education. The results suggest that despite the similar educational profiles, older Black mothers report to have lower levels of income, are more likely to live in disadvantaged areas and are less likely to own a house or to have a mortgage than older White mothers. Namely, while a process of resource accumulation with increasing age at first birth is documented for both Black and White mothers, this is significantly more marked for the latter. The finding is consistent with research documenting that, in both the U.K. and the U.S., White adults receive greater income returns for a given level of education than Black adults (Farmer & Ferraro, 2005; Nazroo, 2003; Pearson, 2008; Smith et al., 2000;

Williams, 1999). One potential link between the results of Chapter 3 and the ones of this Chapter can be discussed under the auspices of studies that have attempted to investigate how differential returns to human capital investments relate to (child and adults') health. For example, Farmer and Ferraro (2005) reveal that as education levels increase, Black adults in the U.S. do not experience the same improvements in self-rated health as White ones. Meyer et al. (2010) reveal that low work complexity for those with higher educational attainment is strongly associated with LBW for Black mothers, which the authors attribute to the mismatch between educational and occupational characteristics that is experienced by this group. Colen et al. (2006) reveal that increasing family income is positively associated with a lower probability of LBW for White but not Black mothers. Although these studies are unable to identify the mechanisms explaining the link between increased education and lack of (or lower compared to White) health benefits for Black individuals, they mention some hypotheses. Racial disparities in the benefits of upward mobility could be attributed to structural factors, namely differences in wealth accumulation between the two groups. In other words, lower levels of socioeconomic status for Black individuals are associated with worse health profiles and trajectories compared to White individuals. Alternatively or in addition, they could also relate to increased (perception of) racial discrimination in higher social positions and to the fact that unfairness brings along distress which may result in worse health. These studies and their arguments provide evidence to reflect on while thinking about the findings of Chapter 3 and of this Chapter. That is, the documented diminishing returns to education, and possibly the discrimination and racism that produce them for Black mothers who postpone childbearing to older ages in the U.K. could constitute one of the (direct or indirect) mechanisms explaining the widening Black/White gaps in LBW. Discrimination is likely to play a prominent role. As discussed earlier in this Chapter, in the U.K. ethnic minorities endure discrimination both in the labour market (Blackaby et al., 1998) and in admission to older (i.e. more prestigious) universities (Shiner & Modood, 2002), but there might be other underlying processes which might contribute to explain why Black individuals experience a lower wealth accumulation than White ones. For example, origin class has been found to play a role, although smaller for minority groups than for the dominant population (Platt, 2007). Evidence, however, suggests that Black Caribbean from more advantaged background struggle

to maintain their privileged position later in life, suggesting that this group may face particularly strong barriers to success and discrimination (Platt, 2005, 2007).

In line with evidence presented in Chapter 3, Black mothers are more likely to be non-partnered than White mothers at any age. Black/White differences in family structure seem to widen with increasing age at first birth. This is an important difference between the two groups, especially in light of the fact that relationship stability is, under the "diverging destinies" framework, mentioned as one of the ways to reduce the disadvantage experienced by less advantaged groups. The last set of analyses presented in Chapter 3 question the hypothesis that the marked widening of Black/White gaps in LBW can be entirely attributed to the more fragile family structures of Black mothers in the U.K. Nonetheless, this certainly represents an area of future research that could be further explored. In particular, one (speculative) argument could be that Black mothers may find it difficult to accumulate resources to the same extent as White ones also because of the instability of their relationships. However, as discussed at the end of Chapter 3, an opposing argument is that (ethnic) minority groups may find it difficult to reap the (socioeconomic and health) benefits of marriage as the wider population (Sigle-Rushton & Goisis, 2013).

In terms of health behaviours during pregnancy, differences are not marked as those with socioeconomic status, thus providing limited support to the hypothesis that the widening Black/White gap in LBW is explained by differences in health behaviours between the two groups. Smoking rates are higher for younger White than Black mothers and level off with increasing age at first birth. Rates of intended pregnancy increase with age at first birth for both White and Black mothers, but differences between the two groups do as well. This is an issue that merits further attention as birth planning could be a marker of poorer health behaviours but it could also reflect socioeconomic and demographic differences between the two groups (Carson et al., 2011). Differences in the use of antenatal care are marked and statistically significant only in the middle age group. The results reveal that Black mothers are more likely to report, with increasing age at first birth, depression when the child is aged 9 months. Although differences in prevalence of depression between Black and White mothers are not significant, the result could possibly mask for the former more difficult pregnancies and experiences of child rearing as age increases. One of the reasons why Black mothers may find pregnancies and child rearing activities at older maternal ages more difficult could be linked to the diminishing

support they receive from the extended family (Geronimus, 2003). There is not, however, direct evidence of whether family support decreases with age at first birth (Colen, 2011) and the next and final Chapter of this thesis aims to address this gap in the literature. Furthermore, with increasing maternal age at first birth, Black mothers are significantly more likely to experience illnesses or problems during pregnancy, which provides evidence to support the argument that the widening Black/White gaps in LBW reflect something about Black mothers' health (deterioration). Finally, the last set of results present evidence which is in line with the arguments and tenets of the "weathering" hypothesis as Black women's health seems to deteriorate faster than White women's health when looking at self-reported health and biomarkers (hypertension and diabetes). This provides wider support to the existence of "weathering" processes in the U.K. and suggests that more research should be devoted to understand the underlying proximate determinants of why this is the case. There is, however, need to more closely examine these patterns using different sources of longitudinal data, especially in light of the fact that there is a discrepancy between what the biomarkers and self-reported measures reveal and since the results are unable to distinguish age from cohort effects. The release of new waves from the Understanding Society data will contribute to address this last issue as it will allow following individuals' health trajectories over the life course. In the future, attention will also need to be devoted to understand how differences in health outcomes in later life may link with cultural and institutional factors. For example, evidence by Salway et al. (2007) suggests that some ethnic minority groups in the U.K., which include Black African, are less likely to take up welfare benefits such as Disability Living Allowance, which can contribute to maintain living standards, than White individuals with similar health and socioeconomic conditions. Through qualitative analyses the authors reveal that these groups were discouraged to claim these benefits for reasons linked with different conceptions of a "disabled" identity, lack of knowledge and concerns about the legitimacy of claiming support. This suggests that health conditions may intersect with contextual conditions in multiple and different ways for the groups involved, which opens up rich possibilities for research and, to the extent that these processes are amenable to interventions, to policy.

Despite the fact that the results are unable to provide conclusive answers, they contribute to support the hypothesis that (maternal) age may ultimately reflect heterogeneous social and health processes between White and Black mothers/women

in the U.K. Adopting a more nuanced perspective on age and, in particular for the focus of this research, on childbearing postponement which takes into account a multiplicity of experiences and outcomes across subgroups of the population will be helpful to increase our understanding of what this process means and implies for families and their wellbeing.

Chapter 5 Does parental support decline with childbearing postponement?

Abstract

The past two decades have been characterized by a considerable postponement of childbearing behaviours and the demographic literature has identified socioeconomic variables, such as prolonged education, as its main drivers. To the extent that women who postpone tend to be highly educated and affluent, children of older mothers are expected to benefit from this process. But the evidence presented by the "weathering" hypothesis literature in the U.S. and in Chapter 3 of this thesis suggest that children of African American/Black mothers do not benefit from their mothers' older age at first birth. Childbearing postponement might reflect complex and heterogeneous processes for different groups of the population, which suggests that the understanding of its consequences would benefit by adopting a wider perspective that takes into account family processes that go beyond socioeconomic status. This paper intends to contribute to this aim by investigating whether parental support declines when Black and White mothers postpone their first births to older ages. The paper uses data from the Millennium Cohort Study and shows that in the U.K., on average, parental support decreases with maternal age at first birth. The pattern appears to be slightly more marked for Black than for White mothers.

5.1 Introduction

One of the most prominent demographic changes in Western countries of the past few decades has been an increase of first births at older ages. This has attracted the attention of demographers, who have identified socioeconomic incentives and benefits as the main driver of this increasing trend. Namely, experiencing the transition to parenthood at an older age has been associated with higher educational and income levels (Billari et al., 2006; Mills et al., 2011; Ní Bhrolcháin & Beaujouan, 2012). AS already thoroughly discussed in previous Chapters of this thesis, given the selected characteristics of those individuals (women in particular) who postpone, children are expected to benefit from their parents/mothers' older age at first birth (Martin, 2004; McLanahan, 2004). The "weathering" hypothesis literature, as already discussed in Chapter 3, however, argues that this perspective may not well reflect the experiences of all groups of women and their children. Indeed, for ethnic minority women who are exposed to the cumulative effects of poverty, inequality and discrimination, (maternal) age should be conceptualized as a marker of cumulative disadvantage rather than an indicator of parenting "quality".

While the demographic literature suggests that it is legitimate to think of postponement as linked to, and perhaps even explained by rising educational and employment levels, describing this process and, implicitly, its consequences uniquely on the basis of these variables may be too narrow and limiting. The evidence presented in support of the "weathering" hypothesis casts some doubt on the positive association between increasing maternal age at first birth and child wellbeing and on the way we have been used, until now, to think of the process of childbearing postponement. The evidence presented in Chapter 4 of this thesis also shows that postponement may not be associated with the same level of resource accumulation for Black and White mothers. This indicates that other aspects of the family sphere which may change, in addition or rather than socioeconomic status, with increasing age at first birth need to be considered as well.

5.2 Background

The “weathering” hypothesis literature was originally introduced during the 1990s to motivate the persistence of an early timing of childbearing for African American women. By demonstrating that Black/White gaps in child health widen with increasing maternal age at birth, this literature advances the idea that an early timing of childbearing can be understood as an “adaptive” strategy for African American women. It is adaptive mainly because for low income families it is reasonable that at least some childbearing takes place before the mother’s health deteriorates (Geronimus, 1996). But an early timing of childbearing is considered as an “adaptive” behaviour also because, within disadvantaged communities, it is socially accepted and supported by extended and multigenerational families who help with child rearing and other activities (Colen, 2011; Geronimus, 2003). In Arline Geronimus’s (2003) words ”children [of African American mothers] may fare best if their birth and pre-school years coincide with their mothers’ peak health and access to social and practical support from kin”. The importance of (access to) kin support for ethnic minority families has been well documented in the U.S. literature. Different patterns of extended family organizations between White and African American families have been, at least partially, attributed both to socioeconomic and cultural differences across the two groups (Sarkisian & Gerstel, 2004; Wong, Capoferro, & Soldo, 1999). In particular, marginalized and minority groups are more likely to make use of multigenerational support networks as a coping strategy in order to facilitate sharing of scarce resources (Harknett & Knab, 2007; Jarrett, 1998; Stack, 1983) and to overcome institutional discrimination and poverty (Williams, 1999; Wong et al., 1999). Moreover, African American mothers may rely on their extended families to overcome the instability of their relationships and lack of fathers’ presence/support (Hogan, Hao, & Parish, 1990; Pearson, 2008). Support takes a variety of forms, but previous research has emphasised the importance of help with child care, housing and transport (Burton, 1990; Harknett & Knab, 2007; Sarkisian & Gerstel, 2004) and it is found to reduce hardship for low income families (Gordon, Chase-Lansdale, & Brooks-Gunn, 2004; Henly, Danziger, & Offer, 2005).

While the literature documents that many ethnic minority mothers who give birth at an early age receive the support of their families of origin (Burton, 1990;

Geronimus, 1992; Hogan et al., 1990; Stack, 1983), knowledge of whether access to support declines with maternal age at birth is less well-established (Colen, 2011; Furstenberg, 1991).[64] Theory suggests that with increasing affluence, contact and support from the family of origin might decrease (Albertini, Kohli, & Vogel, 2007; Chan, 2007; Grundy & Shelton, 2001; Tomassini et al., 2004). This could occur because individuals substitute parental support with market alternatives (e.g. paid nannies) and because upwardly mobile women may find it increasingly difficult to maintain contact with their families of origin because of rising responsibilities in their (new) social position (Colen, 2011). Social mobility could also involve geographical mobility and, consequently, distance from the extended family. Although we do not have direct evidence of how patterns of parental support vary with increasing maternal age, as an older age at (first) birth has been associated with higher socioeconomic status (as revealed in Chapter 2 of this thesis), extended family support may be expected to diminish with increasing maternal age at birth. Moreover, older mothers may find themselves needing to care for their (older) less healthy parents which would exacerbate conflicting needs among network members (Hareven, 1994; Schmidt et al., 2012). Indeed, the proportion of women having overlapping responsibilities towards their children and parents, which in the 1990s was below 10%, is expected to rise with the postponement of first births (Schmidt et al., 2012).

Lack of knowledge of whether contact and support from the extended family decreases with maternal age at birth (i.e. if what the literature posits is supported empirically) is a shortcoming as there are grounds to expect that, notwithstanding the higher social class status associated with an older age at birth, losing family support for Black mothers could be detrimental. This argument is supported by the study of Colen et al. (2006) revealing that African American women having a co-residential mother in the household at the time of birth have decreased odds (significant at the 1% level) of giving birth to a low birth weight child; in contrast, an increase in family income is not significantly associated with decreased odds of low birth weight. Although the study by Colen et al. does not explicitly take into account maternal age at birth, the results suggest that giving birth to a child (at an older age) in a context characterised by high levels of economic resources but also reduced support from the

[64] The study by Bornstein et al. (2006) constitutes an exception and it shows that White first-time mothers when older receive less support from the extended family and more in house support. The sample of analysis is quite small (n=335) and it is not representative of the population.

family of origin may result in more difficult and stressful pregnancies for Black mothers. Cole and Omari (2003) discuss qualitative evidence by Tatum (1987) and report "her informants [middle-class Black women] reported that their children were isolated from their extended families and that they had no Black peer group in their communities" (p. 794).

There are different underlying explanatory processes, not yet discussed in the literature, that could help understand why losing the support of the family could be detrimental for older ethnic minority mothers. One of them is that while for White women losing parental involvement with age can be compensated by higher rates of marriage and more stable partnerships, African American mothers may tend, despite increasing maternal age, to have more unstable family structures than White women. This argument is supported by U.K. evidence presented in Chapter 3 and 4 of this thesis. Another one is that as upwardly mobile African American women are exposed to new experiences of racial discrimination in their new social position and role (Cole & Omari, 2003; Colen et al., 2006) such that losing the protective role of kin networks (against racism) could compromise their health and that of their new-borns (Colen et al., 2006). The theoretical arguments and the indirect empirical evidence suggest that combining upward socioeconomic mobility and childbearing postponement may bring along unforeseen consequences and present challenges for minority groups of the population (Colen, 2011), which warrant closer scrutiny especially in light of the fact that the risk of LBW for children of Black/African American mothers tend to get worse with increasing maternal age at first birth.

5.3 Study Contribution

The existing literature discussing the determinants and consequences of childbearing postponement has primarily focused on socioeconomic variables such as education, which, on average, rises with maternal age. What emerges from the review of the existing literature, however, is that the process of postponement and, implicitly, its consequences for family/child wellbeing may have been approached in a too limiting and narrow way. Indeed, the understanding of this process and its consequences, which may be negative for some subpopulation groups, would benefit by adopting a wider perspective that takes into account other family characteristics

which may be subject to change with increasing maternal age at birth. By building on the arguments put forward in the "weathering" hypothesis literature, one way to contribute to this aim is to investigate whether parental support/contact diminishes with increasing maternal age at first birth. This might ultimately be an important variable to consider when attempting to understand the widening Black/White gap in LBW that has been documented in the U.S. and in the U.K. Namely, diminishing family support could "mediate" the negative association between increasing maternal age at birth and child health for Black mothers. However, before this can be done, it is first necessary to examine the relationship between parental support and maternal age; to the best of my knowledge, there is no direct evidence in the existing literature of this association.[65] To this end, the primary aim of this study is to reveal whether, around the time of birth, parental involvement decreases with rising maternal age at first birth and whether different patterns are observed for Black and White mothers. In addition, the study also investigates what is the role of socioeconomic and demographic characteristics in explaining (if any is documented) diminishing parental involvement with age and differences between the two ethnic groups.

The geographical focus of this study is the U.K. Chapter 3 has revealed patterns consistent with the "weathering" hypothesis in this context and has discussed why Black and White mothers are two relevant groups to compare. Similarly to the reasons that motivated a comparison of these groups while looking at child outcomes in Chapter 3, since in the U.K. Black and White mothers have similar first births fertility schedules, patterns of parental support for the two ethnic groups can be analysed to a similar extent across the maternal age range. Despite their relatively similar profiles in terms of education and propensity to work, Black mothers in the U.K. differ from White mothers in family structures as the former are more likely to be non-partnered at the time of birth (Kiernan & Mensah, 2010) and over the life course. This is, as mentioned in the background section, a salient aspect to consider when discussing the possible consequences of diminishing family support with increasing maternal age.

In terms of multigenerational solidarity in the U.K., while research documents that family support is weaker in the U.K. than in other (mainly Southern) European contexts (Tomassini et al., 2004), the family is an important source of help and

[65] This is argued by Colen (2006, 2011) and a wider literature search has not revealed any significant study.

support for British families (Grundy, 2005) including younger generations (Tan, Buchanan, Flouri, Attar-Schwartz, & Griggs, 2010). The majority of people in Great Britain have close relatives in different generations with whom they have regular contact (Grundy, 2005; Grundy & Murphy, 1999). Moreover, Chan and Ermisch (2011) report that in the U.K., although intergenerational support/contact is not extensive, parents and adult children are supportive[66] of each other at critical moments of life transitions such as the birth of a child. In the U.K., compared to the U.S., research on intergenerational support is less developed (Henretta, Grundy, & Harris, 2001; Young et al., 2005). In particular, in the U.K. little attention has been devoted, in part due to lack of appropriate data (with a few exceptions (Goulborne, 1999; Hawkes & Joshi, 2007; Shaw, 2004; Young et al., 2005)), to how patterns of parental involvement vary by ethnic group. Until now, attention has been mostly given to studying patterns of social support for low-income mothers, regardless of their ethnic group (Grundy & Shelton, 2001; Mitchell & Green, 2002; Young & Willmott, 1957). Although not a central aim of the current study, while revealing whether there exist Black/White differences in patterns of parental involvement close to the time of birth in the U.K., this study can contribute to address this gap in knowledge.

5.4 Data

5.4.1 Millennium Cohort Study

The study uses the Millennium Cohort Study (MCS), which has been described and used in Chapter 2 and 4 of this thesis. Throughout the analyses and discussion, the term parental support/contact or involvement refers to the support/contact that the cohort child's mother receives from her parents (i.e. cohort child's maternal grandparents). This study focuses on first births and excludes higher order births. This choice is consistent with the rest of the dissertation, which focuses on first order births and aims at discussing the process and consequences of the postponement of first births (for Black and White mothers). Moreover, this current Chapter builds on the

[66] Support is measured through eight types of assistance: giving lift in car, shopping, providing/cooking meals, helping with personal needs (including looking after children), washing/ironing, dealing with personal affairs, decorating/gardening and financial.

evidence provided in Chapter 4, namely that Black and White mothers who postpone childbearing experience a different accumulation of socioeconomic resources, which is a relevant finding in light of the aim and motivation of this current Chapter. To the extent that the support received from the maternal grandparents matters for the wellbeing of the child (Aassve, Iacovou, & Mencarini, 2006; Coall & Hertwig, 2011; Pope, Whiteside, Brooks-Gunn, & et al., 1993), the results of this final analytical Chapter of the thesis are used to further contextualize the findings of the previous Chapters. Namely, if parental support/contact were found to decrease with maternal age at first birth, its consequences might be different for Black mothers and their children, who are not as well-off as White ones. As mentioned before, parental support might therefore represent an important "mediating" variable to consider when situating the results of Chapter 3, which reveal that Black/White gaps in LBW widen with increasing maternal age at first birth.

5.4.2 Variables

The analyses focus on those cohort members for whom the mother is the main interviewee (99% of first births). This is done not only in order to have information on the mother's age at first birth and her socioeconomic characteristics (which may be related to the reception of parental support), but also because the literature documents that it is the mother who is likely to be the main recipient of parental contact and support (Grundy & Shelton, 2001; Hawkes & Joshi, 2007; Mitchell & Green, 2002). The study focuses on Sweep 1 of the MCS, the closest to the birth of the cohort child (around 9 months). This is a choice consistent with the extant "weathering" literature which has, until now, been preoccupied with analysing age gradients in child health looking at birth outcomes.[67] As mentioned above, the analyses are restricted, as the rest of the dissertation is, to first order births and White and Black respondents. The Black group includes both Black Caribbean and Black Africans since sample size issues prevent analysing them separately.[68] As already discussed in Chapter 3,

[67] In addition, looking at subsequent Sweeps is prevented by sample size issues as the sample of Black mothers becomes smaller because of attrition.

[68] The MCS ethnicity categorization includes a "Black other" group, which is excluded from the analyses. This is because this group, in addition to including Black British (a relevant group for the analyses), could include other categories such as Mixed Black, which would be problematic group to include. This is anyways a very small group (n<30).

because of their different settlement, migration histories and partially socioeconomic profiles, the two groups are not homogenous. In particular, their patterns of parental support might vary because of their different migration histories since Black Caribbean mothers might be more likely to have their families of origin living in the U.K. Grouping Black Caribbean and African mothers together is therefore a pragmatic (rather than a deliberate) choice in response to sample size issues and one entails limitations as it might mask differences across these groups. The weighted subsample of analysis includes 6596 (6924 when the data is weighted) White respondents and 208 (164 when the data is weighted) Black respondents. Although the Black sample is small and raises statistical power issues, there is not, to the best of my knowledge, any other data source that would enable the research questions of this study to be addressed with a larger sample of first-time Black mothers. However, the fact that this sample is "tested" against the LS one in Chapter 4 and does not reveal significant differences (in the distribution of first births and, on average, propensity to give birth to a LBW child) is reassuring. Moreover, as robustness check, the analyses have been replicated on all order births and the findings are discussed at the end of the results section.

In order to measure parental involvement, I use five binary variables of Sweep 1 of the MCS: whether the respondent has daily/weekly face-to-face contact[69] with the mother, daily/weekly face-to-face contact with her father, whether the (working or non-working) mother receives grandparental childcare, financial help with buying essentials (for the babies and/or for covering household costs) and monetary transfers from parents. Grandparental childcare includes help received from both maternal and paternal grandparents, although the support received from the former is by far greater than that from the latter. Notwithstanding the fact that the MCS provides information concerning different sources of parental contact/support, it is still limited. First of all, the survey does not provide any information concerning the geographical distance between the mother and her parents, which the literature identifies as an important determinant of level of parental involvement (Grundy & Murphy, 1999). In addition, geographical distance from parents could be a source of differences in level of parental contact/support between Black and White mothers as the former are more likely to be migrants. To the best of my knowledge, there is no study that investigates

[69] The survey question refers to how often respondents see their mother and father. Namely, telephone, e-mail or other forms of contact are not measured in the questionnaire.

the tendency to move away from the parental home as an adult and how this varies between Black and White families in the U.K. Secondly, the questionnaire does not provide information concerning frequency and amount of grandparental childcare help and financial transfers. Another issue concerns the fact that when a respondent does not receive parental support, we do not know the reason of why this is the case. Namely, we do not know if parental support/contact is not received because it is not available (i.e. a supply issue) or because it is simply not needed. To the extent that an older age at childbearing is associated with a better socioeconomic position, the need for help (financial help, in particular) could be fairly low. In fact, women who postpone may be financially better off than their parents (or other siblings). However, evidence provided in Chapter 4 reveals that Black mothers are not as advantaged as White ones even when they postpone childbearing, suggesting that the need for parental support, even at older maternal ages, might vary across the two groups. This issue is further discussed at the end of the results section.

Those respondents who co-reside with their mother and/or father have been coded as having at least weekly contact with their mother and/or father (on average, 8% of White mothers and 13% of Black mothers). Co-residence represents a strong support channel between grandparents and parents of cohort children and therefore it is sensible to include this group of mothers in the analyses. However, one should also keep into consideration that for those mothers co-residing with their parents, financial support may occur through housing and sharing of expenses rather than direct monetary transfers. As often happens in surveys (Shaw, 2004), these types of transfers are not measured in the MCS, which suggests that the analyses might underestimate financial support for this group. However, this issue might be partially compensated by the fact that I am aiming to construct a composite measure of parental support and I am not analysing different sources of support separately.

Respondents, who declare their mother and/or father to be dead, are coded as not receiving contact/support from them on all variables. Excluding them from the analyses wouldn't be consistent with the "weathering" hypothesis argument of maternal age being a marker of disadvantage for certain (disadvantaged) groups of the population. Indeed, a loss in parental contact/support for Black mothers with increasing maternal age could also depend on their parents experiencing a more rapid health deterioration process, chronic conditions and earlier death (Geronimus, Bound, Waidmann, Colen, & Steffick, 2001; Geronimus et al., 2006) compared to the parents

of White and more advantaged respondents. There is a small share of respondents who declare their mother/father to be dead as it is a relatively young sample of mothers. In the subsample of analysis, around 5% and 13% of respondents respectively declare that their mothers and their fathers have died. A larger percentage of Black respondents declare their mother and/or father to be dead, which is consistent with the arguments posited by the "weathering" hypothesis and with the more general literature on differential ageing associated with greater disadvantage (Geronimus, 2001; Kaczmarekm & Skrzypczak, 2008). In the subsample of analysis, around 14% and 25% of Black respondents declares their mothers and fathers respectively to be dead; 5.4% and 12% of White respondents declares their mothers and fathers respectively to be dead.

In terms of mothers' characteristics, the main variable of interest is the mother's age at first birth and ethnicity (i.e. Black or White). In addition, the models looking at whether parental support/contact varies with maternal age at first birth (described in the following section) control for a set of socio-demographic characteristics: partnership status at the time of birth, whether the mother is non-UK born and educational levels based on NVQ qualification levels. As mentioned before, Black mothers are more likely to be non-partnered (at the time of birth and over the life course (Dale et al., 2006)) and this needs to be accounted for when looking at their patterns of parental support/contact in relation to those of White mothers. As in previous Chapters of this thesis, mothers are categorized as being married, cohabiting and non-partnered at the time of the cohort child birth. In addition, Black women are more likely than White women to be migrants, a condition that could affect the kin networks and resources one is able to draw upon.[70] This information is not directly available in Sweep 1 of the MCS. Therefore, in order to construct this indicator I have used the hospital record file (which is available for 89% of the sample (Hockley et al., 2007)) and the direct question on country of birth that is asked in the second Sweep of the MCS. By combining the two sources of information, the indicator results to be missing in around 10% of the sample. Finally, although evidence, discussed in Chapter 3 and 4 of this thesis, suggests that Black and White women do not (extensively) differ in terms of educational qualifications, models include controls for mothers' education as an overall measure of socioeconomic status and look for

[70] Research documents that Black Caribbean draw upon support of overseas family and kinship, which is only partially captured in the analyses through the financial transfers (Goulborne, 1999).

evidence which is/is not consistent with the argument that increasing affluence is associated with reduced contact/support from parents. Respondents are categorized as having no educational qualification, NVQ level 1 or 2, NVQ level 3 and NVQ level 4 or 5. This variable is described in detail in the data section of Chapter 2 of this thesis. Models do not include controls for household income as it is (also) related to whether the mother is working at the time of interview. While this is less likely to be the case for the control variables just discussed, the mother's decision to work could be responsive (i.e. endogenous) to the availability of parental support/contact. In other words, we see the outcome of a decision process that takes into account the supply and availability of parental support, but we do not observe it directly. For this reason, I have therefore decided to exclude this variable from the analyses.

5.5 Method

The first set of analyses reveals, through simple cross-tabs, how parental involvement, measured through the five indicators described in the data section, varies with increasing maternal age at first birth. While the descriptive analysis is informative overall, looking at five variables separately does not identify patterns of parental involvement of any particular woman since these are single indicators' averages and different forms of social support may be interchangeable. For example, monetary transfers from the grandparents may compensate for lack of childcare help or contact. To address this issue, using a Latent Class Analysis (LCA), I generate a summary variable which treats the five indicators as reflecting an underlying, or latent, structure of parental support. LCA is a data reduction technique where the latent variable η as well as the observed items j are categorical (which, as described above, are binary variables).[71] LCA is used when "the researcher assumes that respondents belong to different groups, but membership in these groups is known a priori and must be determined inductively from the data" (Amato et al., 2008 p. 1277). This data reduction technique has been already used in at least two other

[71] LCA differs from Factor Analysis as in the latter both the observed items and the latent variable are continuous rather than categorical while it differs from Latent Trait analyses as in the latter the latent variable is continuous (but the observed items are categorical). As a robustness check, I have performed a Latent Trait Analysis where the latent variable is treated as continuous (rather than categorical as in LCA), but the model fit is considerably worse than for the LCA.

studies to measure intergenerational solidarity (Chan, 2007; Silverstein & Bengtson, 1997).

I begin by computing the item response probabilities for each indicator of parental support/contact, namely the probability that randomly selected individuals, given membership to a certain class c, show a certain value (e.g. l=1) for a given indicator of kin support j. By looking at indicators' response probabilities within each of the classes, an interpretation of the contents of the (latent) classes is given.

$$\pi_{jl(c)} = P(y_j = l|\eta = c) \quad (1)$$

For kin support indicators j=1,..5, indicators' values l=0,1 and latent classes c=1,…C

One challenge of LCA is to determine the optimal number of classes that summarizes the data well. This is because formal theory of model selection for LCA (and other similar techniques) is not fully developed. In practice, different statistics are usually used to guide (rather than entirely determine) model selection. In addition to BIC, AIC and Log Likelihood, I also inspect individual residuals. By comparing observed and expected frequencies for pairs of parental involvement indicators, I can establish, through a bivariate table, which combinations of variables are not fitting the data well. As a rule of thumb, residuals greater than 4 are considered a poor fit and less than 10% of the residuals being above 4 suggest a reasonable fit (Bartholomew, Steele, Moustaki, & Galbraith, 2008).

After deciding on the number of classes, I obtain, for each respondent, the probability of belonging to each of the classes, conditional on their pattern of responses on the five indicators of parental support/contact $\boldsymbol{y}$.

$$P(\eta = c|\boldsymbol{y}) = \frac{P(y|\eta=c)\,P(\eta=c)}{\sum_{c'=1}^{C} P(y|\eta=c')P(\eta=c')} \quad (2)$$

Respondents are assigned to the latent class to which they have the highest conditional probability of belonging. As an overall measure of quality of the classification of respondents' into classes, I inspect the Entropy statistic. Because it is not a measure of model fit and it is not easily interpretable, it is not discussed together with the measures used to guide model selection. The values of entropy range from 0 to 1, with scores close to 1 indicating clear classification (Wagmiller, Lennon, Kuang, Alberti, & Aber, 2006).

After I obtain respondents' assignment into classes, I investigate the association (through a logistic or multinomial logistic model depending on the number of classes) between class membership and the main covariate of interest i.e. ethnicity and

maternal age at first birth. The aim (which is the main one given the aim and motivation of the paper) is to assess whether membership to classes varies with maternal age at first birth and differently for Black and White mothers. The latent variable model is essentially used as a "convenience tool" to measure the relationship amongst a set of observed indicators, which is used to derive the classes; the classes are treated as if they were observed variables in the (multinomial) logistic regression.[72] Then, the models are run by progressively including controls for socio-demographic (partnership status, migration and education) variables. The overall aim of including these control variables is to show to what extent the age gradient (if any is observed) reflects socioeconomic and demographic processes. In particular, the purpose of including these control variables is twofold. The first aim is to reveal how, on average, the age gradient of parental support varies as these variables are included into the models. Given that older mothers, on average, are more likely to be educated and partnered and these characteristics are in turn expected to be associated with lower levels of parental support, controlling for these variables should partially explain *if* parental support is found to diminish with parental age. Conversely, Black mothers are more likely to be migrant and to be non-partnered which are expected to be, respectively, negatively and positively associated with parental support. Controlling for these variables should reduce, if any is documented, differences between the two groups. The LCA analysis is performed using Version 6 of Mplus and R 2.13 software,[73] while the (multinomial) logistic model is performed using version 12 X64 SE of Stata.

5.6 Results

The results section is divided into descriptive, latent class analyses and regression models. The indicators used to measure parental support/contact do not present issues in terms of missing values when the mother is the main interviewee and for first births

[72] An alternative to this procedure and conceptualization of the LCA, is to run a model where the latent class and (multinomial) logistic model are run simultaneously. In this case, however, the latent model is not (entirely) used as a data reduction technique. Rather, the researcher really "believes" the latent model and therefore assigning individuals to classes would be by definition wrong as the *true* class is not known.

[73] Using the LCAT package provided by Dr. J. Kuha and Dr. S. Stares at the LCAT training course held at LSE in May 2012.

(i.e. the focus of this analysis). For all five indicators, information on parental support/contact is missing in less than 1% of the sub-sample of analysis.

5.6.1 Descriptive

Table 1 shows the distribution of the indicators of parental involvement across the age categories for White and Black mothers. In line with existing evidence (Robson & Berthoud, 2006), Black and White mothers' first births fertility schedules are very similar across the three age categories. White mothers, on average, receive higher levels of parental support/contact than Black mothers do. Differences are more marked for the first three indicators namely contact with mother/father and grandparental childcare and less marked for the two indicators of financial support. While White mothers are more likely to receive monetary transfers (especially at younger ages) than Black mothers, there is virtually no difference between the two groups for help with buying essentials.

Looking at patterns of parental support/contact from an age perspective reveals that Black mothers are less likely to have contact and receive childcare help from parents on average. This is somewhat in contrast with existing U.S. evidence documenting that African American mothers are, at least on average, more likely to receive contact and childcare support and less likely to receive financial support (Sarkisian & Gerstel, 2004) from their extended families. While making conclusive arguments of why this is the case is difficult, a few hypotheses can be discussed. The fact that Black mothers, on average, receive less support than White ones could be associated with the fact that Black people (Africans more than Caribbean) in the U.K. have a more recent migration history than African Americans in the U.S. and they may be more likely to have their extended families living (or moving back after spending some time in the U.K.) overseas (Bell, Bryson, Barnes, & O'Shea, 2005). However, this argument is complicated by the fact that the analyses have grouped Black African and Caribbean mothers together, whereby the latter group has a more recent migration history to the U.K. than the former. Finally, another possible explanation concerns the fact that in the data there is no information on support/contact received from other kin members, such as siblings. As Black mothers could be part of denser networks than White mothers (which is the case in the U.S.

context (Ajrouch, Antonucci, & Janevic, 2001)), the picture could change or even be reversed i.e. higher levels of contact/support for Black than White mothers, when kin, rather than only parental support is considered.

All sources of parental contact/support decrease with increasing maternal age at first birth for both Black and White mothers, with some differences between the two groups. Black mothers are more likely to lose face-to-face contact with their mother/father with increasing maternal age at birth. In contrast, Black mothers are less likely to lose childcare help and money transfers. Black and White mothers are similarly likely to lose help with buying essentials. Although, as stated before, the nature of these variables prevents to reveal why contact/support decreases with age at first birth and differently between the two groups, a few (speculative) hypotheses can be discussed. The fact that face-to-face contact decreases more rapidly for Black mothers with age at first birth could be linked to the higher propensity of Black mothers to have their parents moving back overseas to their countries of origin. But the results could indicate that when the grandparents are around, Black mothers are less likely to see childcare support diminishing with maternal age as much as for White mothers. In contrast, White mothers are more likely to lose childcare help but less likely to lose contact with increasing maternal age at first birth; this pattern could explained by the fact that despite living relatively close to their parents, they may tend to substitute grandparental childcare with market alternatives given their (possibly) improved financial circumstances. It is more difficult to comment on the patterns observed for the financial transfers, but the results seem to suggest that they decrease more rapidly for White than for Black mothers. This finding could be discussed in relation to the evidence provided in Chapter 4, showing that older White mothers are more affluent than older Black mothers suggesting that with increasing maternal age at first birth the former are less likely to need the support of their parents.

Table 5.1 Parental support/contact for White and Black mothers, by age categories (first births)

	White				
	<23	**23-29**	**30+**	**Total**	**P-value Chi2**
Daily/weekly face-to-face contact with mother	83.9%	72.4%	52.9%	68.54%	0.000
Daily/weekly face-to-face contact with father	57.4%	56.3%	39.2%	50.45%	0.000
Grandparental childcare	45.5%	49.5%	35.4%	43.28%	0.000
Financial help from grandparents: buying essentials	50.4%	37.0%	24.2%	36.10%	0.000
Financial help from grandparents: money transfer	37.3%	16.6%	8.1%	19.29%	0.000
% and N of births	27.70%	36.23%	36.07%		6924
	Black				
	<23	**23-29**	**30+**	**Total**	**P-value Chi2**
Daily/weekly face-to-face contact with mother	67.2%	36.8%	16.4%	38.22%	0.000
Daily/weekly face-to-face contact with father	23.7%	30.4%	6.3%	19.47%	0.004
Grandparental childcare	27.8%	22.1%	19.5%	22.80%	0.559
Financial help from grandparents: buying essentials	48.5%	29.1%	21.7%	32.10%	0.044
Financial help from grandparents: money transfer	27.4%	18.2%	9.9%	17.81%	0.066
% and N of births	29.60%	33.34%	37.05%		164

Note: survey weights have been used in order to account for the complex structure of the MCS

5.6.2 Latent class analysis

As mentioned above, the descriptive analyses, although informative overall, do not reveal individual mothers' patterns of parental involvement, which is why a LCA analysis is implemented. The first step is that of establishing a number of classes that well summarizes the data. Table 2 presents goodness of fit statistics for a 2, 3 and 4 class model discussed in the Methods section. Table 2 reveals that a three class model performs considerably better than a two class model. BIC, AIC and Log Likelihood decrease and the percentage of residuals above 4 drops from 15% to 0%. Entropy, a measure of the certainty of individuals' assignment to classes, decreases from 0.787 to 0.674 when going from a 2 to a 3 class model and to 0.672 when running a 4 class model. But as mentioned in footnote 13, it is hard to provide a judgment of the goodness of class allocation based on this single statistic. Therefore, I have also inspected the individual posterior probabilities and they suggest that assignment to

classes is quite clear. A 4 class model fits slightly better than a three class model on the overall model statistics. In practice, however, differences in model fit between a three and four class models are very small. A three class model is chosen as a four class model would be substantially more difficult to use in subsequent analyses.[74] As in the next set of analyses, respondents' membership to classes is stratified by ethnicity and since the Black sample is small (n=208 when not weighted and n=164 when the data is weighted), a 3 class model stands out as the most sensible choice.

Table 5.2 Goodness of fitness test of Latent Class Analysis

Classes	BIC	AIC	Log Likelihood	% residuals >4	Entropy	N
2	44185.83	44109.45	-22043.72	15	0.79	6,800
3	43788.39	43670.35	-21818.17	0	0.67	6,800
4	43756.35	43596.64	-21775.32	0	0.67	6,800

Note: the overall number of observations differs from the previous tables as it is not weighted by survey weights

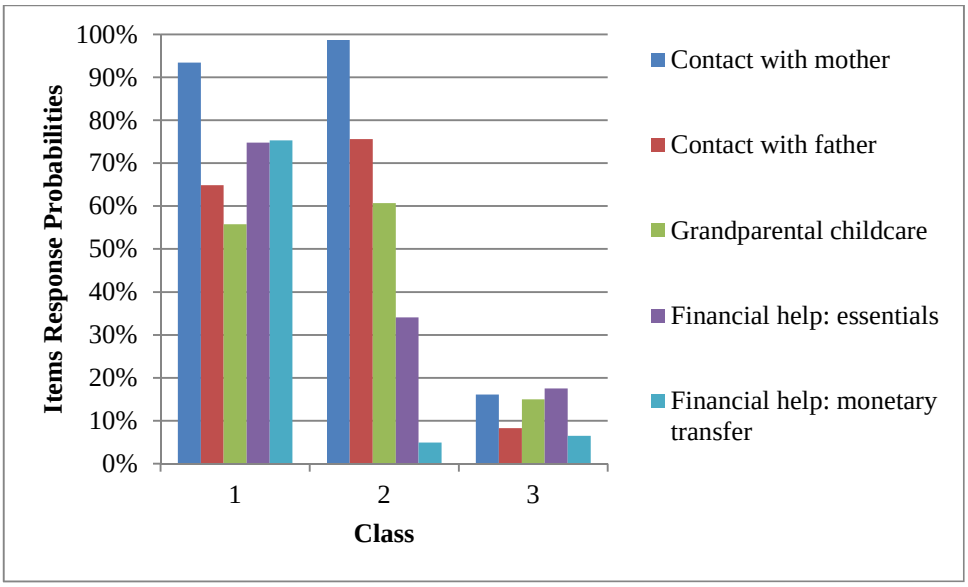
Table 3 reports the item response probabilities across the 3 classes (equation (1) in the methods section), namely the probability that each indicator of parental involvement takes the value 1 given respondents' membership to a certain class. Figure 1 is a graphical representation of Table 3 and shows that interpretation of the 3 classes is quite straightforward. Class 1 shows a medium-high level of support on all indicators, class 2 shows medium-high level of contact with parents and childcare but low(er) levels of financial support and class 3 shows low levels on all indicators. The last row of Table 3 shows that almost half of the respondents are clustered in class 2, followed by class 3 and then class 1, which has the lowest percentage of respondents.

[74] In a 4 class model, differences between class 1 and 2 become more blurred. The additional class shows medium level of contact with mother, financial transfer with buying essentials and monetary transfers and low values of childcare and contact with father. The last class is almost identical in the three and four class models.

Table 5.3 Item response probabilities into classes

	High	Mixed	Low
Daily/weekly contact with mother	93.4%	98.7%	16.1%
daily/weekly contact with father	64.9%	75.6%	8.3%
Grandparental childcare	55.8%	60.7%	15.0%
Financial Help from grandparents: Buying Essentials	74.8%	34.1%	17.5%
Financial Help from grandparents: money transfer	75.3%	4.9%	6.5%
Distribution of respondents into classes	22.0%	45.8%	32.2%

Figure 5.1 Item response probabilities of parental support/contact indicators by classes



Respondents are assigned to the class to which they have the highest conditional probability of belonging (equation (2) in the methods section) and Table 4 reports White and Black respondents' membership to classes by maternal age categories. The overall distribution reported at the bottom of the Table shows that almost half of White mothers belong to class 2, while the great majority of Black mothers belongs to class 3 (the percentage of Black mothers belonging to class 3 is almost double than that of White ones). For both ethnic groups, there is an age gradient in the distribution of respondents across the three classes. With increasing maternal age at first birth, the distribution shifts away from class 1 and 2 towards class 3, namely from higher to lower parental support/contact. While this pattern is observed for both Black and White mothers and it is similar across the two groups for membership to classes 1 and

3, membership to class 2 decreases with age more rapidly for the former than for the latter.

The data are a pooled sample of Black and White mothers, where the latter is a much larger sample than the former. To get a sense of whether the fitted model could be "dominated" by the model for White mothers and thus be a poor representation of patterns for Black mothers, I have estimated a LCA model for Black mothers only. Although the estimates need to be treated cautiously because of the small sample size, the results suggest that the latent classes have a similar interpretation relative to the model estimated on the pooled sample.

Table 5.4 Distribution of White and Black respondents into classes by maternal age at first birth

	Class		
	1	**2**	**3**
		White	
<23	35.10%	43.47%	21.42%
23-29	14.28%	53.54%	32.18%
30+	6.75%	40.94%	52.31%
Total	17.33%	46.21%	36.46%
N		6924	
		Black	
<23	25.64%	34.10%	40.26%
23-29	16.15%	21.91%	61.93%
30+	6.33%	8.81%	84.86%
Total	15.32%	20.67%	64.01%
N		164	

*Note: the results are weighed using survey weights

5.6.3 Regression models

The LCA analysis reveals that a three class model well summarizes the patterns of parental contact/support in the data. Given that there are more than two classes, I resort to a multinomial logistic model to inspect age gradients in parental support/contact for White and Black mothers progressively controlling for mothers' partnership status at birth, educational qualifications and migration status. Table 5 shows how the control variables and their categories are distributed across the three classes (rows sum up to 100%) to reveal how membership to classes is patterned in terms of respondents' socioeconomic and demographic characteristics. Table 5 reveals that married respondents are less likely to belong to class 1 and more likely to belong to class 2 or 3 than cohabiting or non-partnered individuals. Respondents with lower levels of education (no education, NVQ 1/2/3), on average, receive more parental support/contact (i.e. they are more likely to belong to classes 1 or 2) than respondents with higher levels of education (NVQ 4/5). As expected, non U.K. born respondents are less likely to receive parental involvement as almost half of this group belongs to class 3.

Table 5.5 Distribution of control variables into classes

	Class		
Educational level	**1**	**2**	**3**
No education	32.07%	38.23%	29.70%
NVQ 1/2	23.55%	50.88%	25.57%
NVQ 3	18.01%	49.98%	32.01%
NVQ 4/5	7.48%	39.70%	52.82%
Partnership time of birth			
Married	8.06%	46.33%	45.62%
Cohabiting	21.08%	45.66%	33.26%
Non-partnered	34.84%	43.70%	21.46%
Migration status			
UK born	16.91%	47.17%	35.92%
Non-UK born	18.52%	37.11%	44.37%

Note: the results are weighted using survey weights

Table 6 presents the results of the multinomial logistic models where class 1 is the reference category the aim of which is to explore whether parental support significantly varies with increasing maternal age at first birth and whether this occurs to a different extent for Black and White mothers. Maternal age is measured continuously and several model specifications have been tested by including quadratic and cubic terms of maternal age at first birth. Model fit suggests that a quadratic model is superior to a linear and cubic specification. To assess whether the age gradient varies between White and Black mothers, the linear and quadratic terms for maternal age are interacted with the "Black" coefficient. However, the "Black" coefficient is interacted with the linear but not the quadratic term of maternal age. This is done because the interaction between the Black coefficient and the quadratic term is not significant, although this could be the case because of the small Black sample. Yet, by allowing only the linear term to vary between Black and White respondents, the model looks more parsimonious. Possibly due to the small sample size of the Black group, the "Black" coefficient becomes really large when its interaction with the quadratic term is included in the model. Reassuringly, the shape of the age gradients is essentially unchanged regardless of whether the Black coefficient is/is not interacted with the quadratic term.

Model (1) is the baseline model and includes controls for maternal age at first birth and its quadratic term, a binary indicator for being a Black mother and their interaction. Models (2), (3) and (4) add controls for partnership status at birth (being

married is the reference category), educational level (NVQ 1/2 is the reference category) and migration status (UK born is the reference category) respectively. Model (5) includes all control variables at once, the point of which is to reveal how overall age gradients and Black/White differences are associated with socioeconomic factors. Given the small sample size of the Black sample, I have not estimated separate models for White and Black mothers or interacted the socio-demographic variables with the binary indicator for Black. The number of observations drops in Models (4) and (5) as information concerning whether the mother is born in the U.K. is missing for 10% of the sample. Ways to account for/consider the consequences of this reduction in sample size are further discussed while commenting the results.

In order to facilitate interpretation of the age gradients, Figures 2, 3 and 4 present the predicted probabilities, computed from Model (1), of membership to classes for Black and White mothers (together with 95% confidence intervals). In line with the descriptive analyses, the probability of belonging to class 1 (which shows medium/high level on all indicators of parental involvement) decreases with maternal age at birth for both Black and White mothers to a similar extent. In contrast, while the age gradient reflecting the probability of belonging to Class 2 (which shows medium/high level of contact and childcare and low levels of financial support from parents) increases and then decreases for White mothers, for Black mothers it decreases monotonically with maternal age. The rate of decrease, however, from around age 30 onwards is similar between the two groups. Finally, for both ethnic groups the probability of belonging to class 3 (which shows low levels of parental involvement on all indicators) increases with maternal age. Although there is some minor indication that, in the middle of the age interval, the ethnic gap widens, differences between the two groups are more in the baseline membership to this class rather than in the rate of change with increasing maternal age at first birth. A Wald test on the joint significance of the Black coefficient and its interaction with maternal age reveals that Black mothers are significantly more likely (at the 1% level[75]) than White mothers to belong to classes 2 and 3 rather than 1. Both the predicted probabilities and the small or lack of a significant interaction between the maternal age and Black coefficient in Model (1) do not show a large difference in the rate of decrease in support/contact between the two groups. Therefore, this first set of results

[75] Class 2 P-value=0.0173 and Class 3 P-value=0.0256

reveals that parental support/contact tends to decrease with maternal age at first birth and that the pattern is only marginally more marked for Black than for White mothers.

Table 5.6 Multinomial logistic model (class 1 is the reference category)

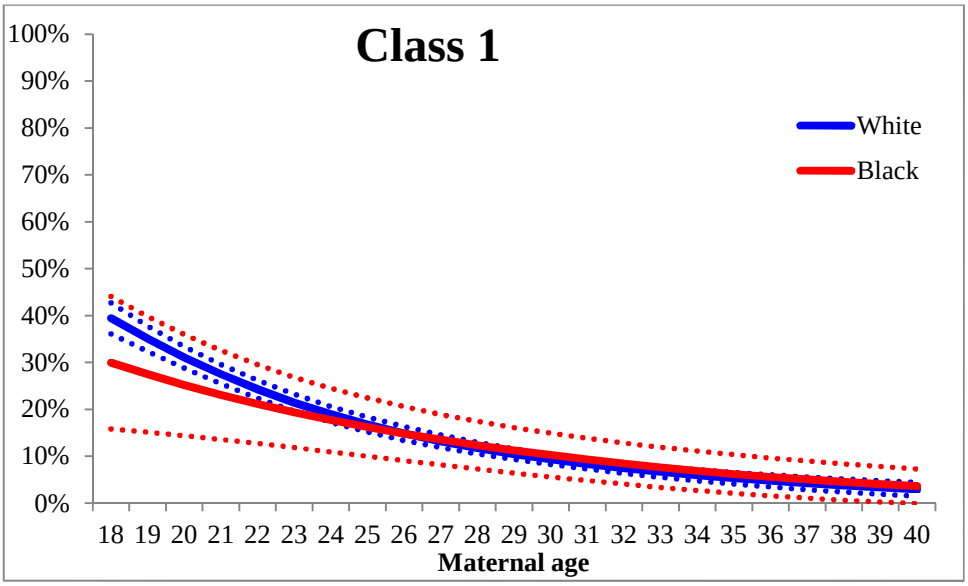
	(1)		(2)		(3)		(4)		(5)	
	2	**3**	**2**	**3**	**2**	**3**	**2**	**3**	**2**	**3**
Class (*class 1 ref*)	**β/se**	**β/se**	**β/se**	**β/se**	**β/se**	**β/se**	**β/se**	**β/se**	**β/se**	**β/se**
Maternal age at birth	0.357***	0.207***	0.250***	0.022	0.311***	0.085	0.369***	0.236***	0.250***	-0.018
	(0.069)	(0.063)	(0.072)	(0.067)	(0.071)	(0.064)	(0.071)	(0.067)	(0.077)	(0.073)
Maternal age at birth squared	-0.005***	-0.000	-0.003**	0.002*	-0.004***	0.001	-0.005***	-0.001	-0.003**	0.003**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Maternal age at birth * Black	-0.093*	-0.045	-0.077	-0.029	-0.092*	-0.043	-0.099*	-0.044	-0.084	-0.031
	(0.057)	(0.036)	(0.057)	(0.038)	(0.054)	(0.035)	(0.057)	(0.039)	(0.053)	(0.041)
Black	1.651	1.802*	1.456	1.811*	1.614	1.705*	1.890	1.618	1.713	1.546
	(1.402)	(1.011)	(1.415)	(1.054)	(1.335)	(1.005)	(1.389)	(1.110)	(1.314)	(1.136)
Cohabiting at birth			-0.545***	-0.656***					-0.474***	-0.526***
			(0.117)	(0.124)					(0.120)	(0.130)
Non-partnered at birth			-0.791***	-1.289***					-0.671***	-1.078***
			(0.139)	(0.138)					(0.140)	(0.144)
Education: None					-0.198	0.302**			-0.137	0.358**
					(0.136)	(0.149)			(0.142)	(0.154)
Education: NVQ 3					0.092	0.325***			0.059	0.293**
					(0.109)	(0.117)			(0.115)	(0.123)
Education: NVQ 4/5					0.351***	1.149***			0.249**	1.021***
					(0.118)	(0.121)			(0.125)	(0.127)

Table 5.6 continued

Migrant							-0.096	0.407***	-0.070	0.463***
							(0.113)	(0.114)	(0.112)	(0.115)
Constant	-4.870***	-4.300***	-2.742***	-0.862	-4.239***	-2.799***	-5.043***	-4.793***	-2.839***	-0.766
Number of observations	7087		7087		7087		6289		6289	

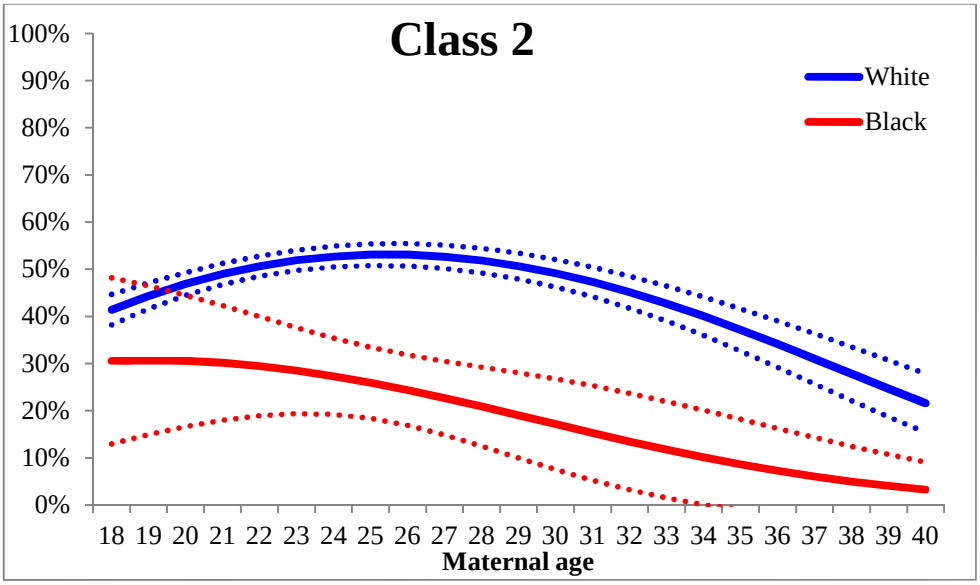
Note: *** p<0.01, ** p<0.05, * p<0.1

Figure 5.2 Predicted probability from Model (1) of belonging to class 1 for White and Black mothers with 95% confidence intervals



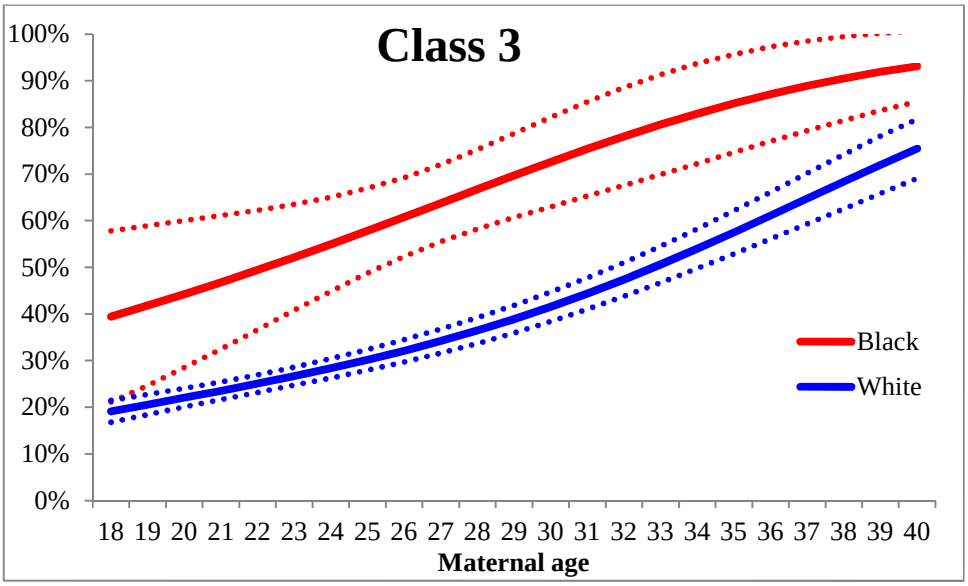
Note: with the exception of the age/Black coefficients, the control variables are set at their mean values.

Figure 5.3 Predicted probability from Model (1) of belonging to class 2 for White and Black mothers with 95% confidence intervals



Note: with the exception of the age/Black coefficients, the control variables are set at their mean values.

Figure 5.4 Predicted probability from Model (1) of belonging to class 3 for White and Black mothers with 95% confidence intervals



Note: with the exception of the age/Black coefficients, the control variables are set at their mean values.

Model (1) is then run by including controls for partnership status at the time of birth, educational level and migration status the aim of which is to assess how the overall gradient and difference between the two ethnic groups vary as these variables are included into the model. Model (2) reveals that, in line with the descriptive analyses, married mothers (the reference category) are significantly (at the 1% level) more likely to belong to classes 2 and 3 compared to non-partnered and cohabiting mothers. This confirms that partnership status is an important factor to consider when analysing (and perhaps even a determinant of) the level of parental involvement. Model (3) shows that compared to those mothers holding an NVQ qualification level 1/2 (the reference category), those holding no qualification levels are, respectively, less likely to belong to class 2 and more likely to belong to class 3 (as opposed to class 1). This somewhat mixed picture might be explained by the fact that both groups have very low levels of qualifications and those having NVQ qualification levels 1/2 cannot be considered as being more "affluent" than those having no qualifications at all. Mothers holding NVQ qualification level 3 are not significantly more or less likely to belong to class 2 than the reference group, but they are significantly (at the 1% level) more likely to belong to class 3. Respondents holding NVQ qualification levels 4/5 (degree level qualification) are significantly (at the 1% level) more likely to

belong to class 2 and 3, with larger coefficients compared to the other educational groups. On average, higher education is negatively associated with parental involvement but this is particularly the case when those holding the lowest levels of education are compared to those holding the highest levels of education. Finally, Model (4) shows non UK born mothers are significantly (at the 1% level) more likely to belong to class 3 compared to class 1 than UK born mother (the reference category). Model (4) and, consequently, Model (5) which includes all sets of controls, are estimated on a smaller sample than the rest of the Models. As mentioned above, information on the migration status of the respondent is retrieved through the hospital birth record and Sweep 2 of the MCS. Because of attrition, 8.8% (n=18) and 11% (n=696) of the Black and White samples respectively are lost once migration status is included. In order to reveal whether this loss in sample raises concerns, I have created a binary variable taking the value 1 when the respondent's migration status is missing. I have included this variable in Models (1), (2) and (3) in order to assess whether there are systematic differences in the level of parental support between those respondent for whom I have/do not have information regarding migration status. The results reject the hypothesis that they are different. The indicator fails to reach statistical significance in all models. As an additional robustness check, I have run Model (1) on the (smaller) sample used for Model (4). Reassuringly, the age gradients for Black and White mothers are very similar to the ones presented in Figures 2, 3 and 4. However, notwithstanding the fact that these robustness checks do not highlight problems with the reduced sample, the results still need to be interpreted cautiously as the small sample might imply wide confidence intervals for the Black coefficients.

In order to assess how mothers' membership to classes varies with the inclusion of demographic and socioeconomic characteristics, Figures 5, 6 and 7 show the predicted probabilities (with 95% confidence intervals) of belonging to the classes using regression coefficients from Model (5) where all the control variables have been included. Compared to Figure 2, the age gradient reflecting the predicted probability of belonging to class 1 for Black mothers is flatter, while for White mothers it is almost not altered. Compared to Figure 3, the probability of belonging to class 2 for Black mothers is marginally higher at younger ages, but still shows a marked and decreasing age gradient. The age gradient for White mothers is almost unchanged. Finally, the predicted probability of belonging to class 3 for Black mothers is reduced, when Figure 7 is compared to Figure 4, in the middle of the age range, but less at

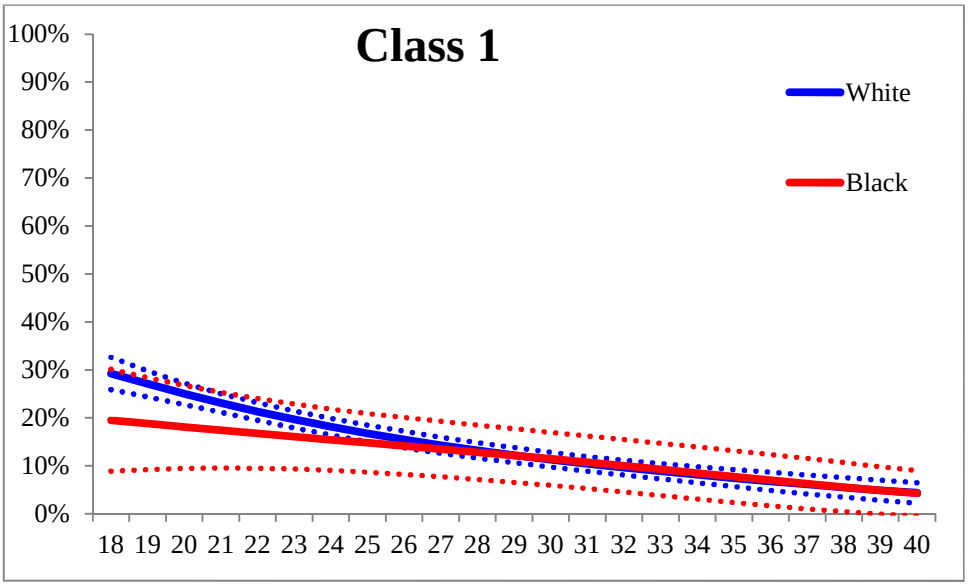
younger and older ages and still shows a quite marked increasing age gradient. For White mothers, the predicted probability of belonging to class 3 is almost unchanged. A Wald test on the joint significance of the Black coefficient and its interaction with maternal age reveals that when the controls are included in the model, Black mothers are significantly more likely (at the 1% level) to belong to class 3 than to class 1 compared to White mothers. However, Black mothers are no longer significantly more likely to belong to class 2 than to class 1 compared to White mothers, suggesting that the control variables partially explain overall differences between the two ethnic groups. In Model (5), the coefficients for partnership status at birth and migration status remain almost unchanged, when compared to Model (2) and so do the coefficients for educational qualifications and migration status when compared, respectively, to the results in Model (3) and (4).

Taken together, the results suggest that controlling for partnership status at birth, migration status and educational levels, differences in age gradients between Black and White mothers are reduced but to a minor extent. More in general, including these controls does not alter to a great extent the fact that Black and White mothers (the former more than the latter) tend to receive less parental support/contact as their age at first birth increases, suggesting that age gradients in patterns of social support/contact do not largely reflect these social processes. Clearly, this set of controls is not exhaustive and there certainly is a range of other (socioeconomic and demographic) factors that could be associated and possibly explain (or at least give an indication of) why this pattern is observed. With a larger sample and different data, future research might reveal that different sets of factors determine why older White and Black mothers tend to receive less parental support/contact than younger ones. For instance, for White mothers diminishing parental involvement with increasing maternal age at first birth could be a natural consequence of changing intergenerational relationships and independence from the family of origin, while for Black mothers it could reflect a loss in power related to parents' declining health and social norms that regulate intergenerational relationships. Unfortunately, this data does not able to identify the underlying reasons (possibly different across the two groups) of why parental support/involvement decreases with increasing maternal age. In addition, the results obtained when including the control variables could yield a different picture if the socioeconomic and demographic variables were interacted with age at first birth and ethnicity, in a way to allow the effect of these variables to vary

with age and across the two groups. This certainly represents something to explore in future research.

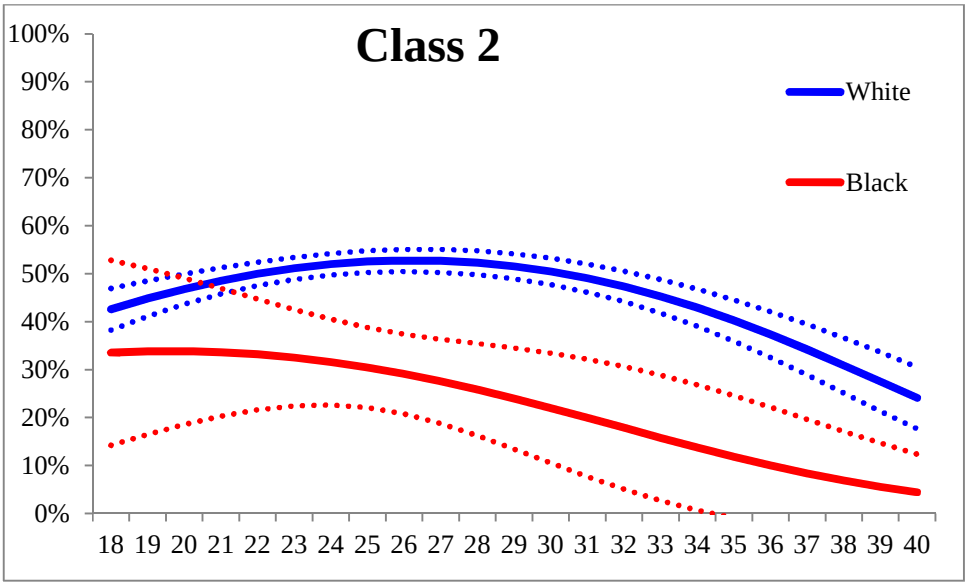
I have conducted a few robustness checks. Model (5) has been run by controlling for a measure of household annual income (described in Chapter 2 and 4 of this thesis). As mentioned in the variable section, income is not used as a control variable in the analyses as it could reflect whether the mother has returned to work after the birth of the cohort child, a decision which might be endogenous to the availability of grandparental support. But given the small role played by the control variables in explaining the diminishing level of parental support/contact received, I checked whether income would play a larger role. The results reveal that even when income is controlled, the shape of the gradient for both Black and White mothers is essentially unchanged. Models have also been run by excluding those mothers whose parents are not alive at the time of interview. When running the analyses on this sub-sample, the results reveal a rather similar picture as parental support tends to decrease with increasing maternal age at first birth. Given that Black mothers are more likely to have dead parents, their average propensity to belong to class 3 is slightly reduced in this new set of analyses. Finally, the models have been run by excluding mothers co-residing with at least one of their parents at the time of interview. Again, a similar picture emerges but the average propensity, with increasing maternal age, to belong to class 3 compared to class 1 is reduced. The result is not unexpected as most of the mothers co-residing with their parents belonged to class 1. As mentioned earlier in the Chapter, Black mothers are more likely to be residing with their parents; once they are excluded from the analyses, the average propensity of this group to belong to class 3 is higher.

Figure 5.5 Predicted probability from Model (5) of belonging to class 1 for White and Black mothers with 95% confidence intervals



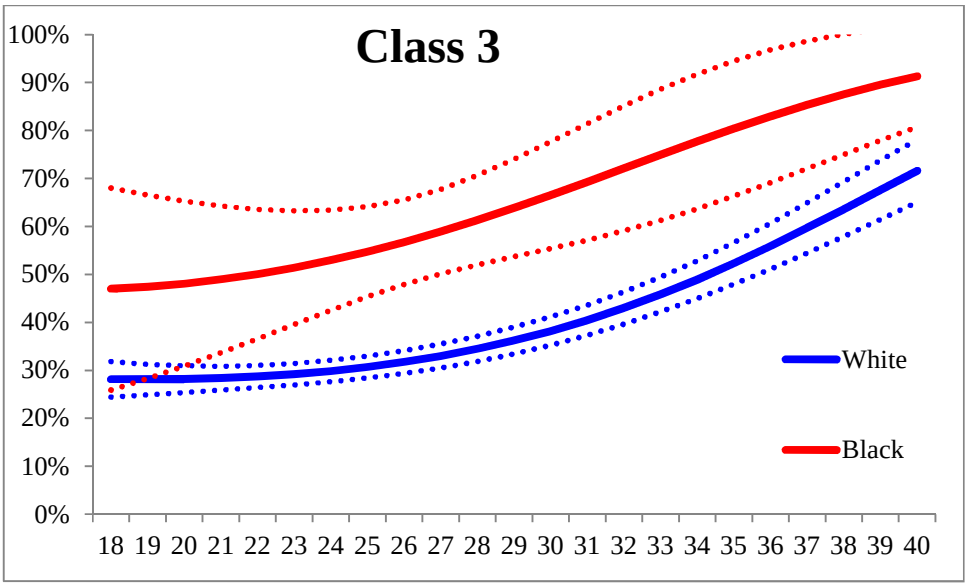
Note: with the exception of the age/Black coefficients, the control variables are set at their mean values.

Figure 5.6 Predicted probability from Model (5) of belonging to class 2 for White and Black mothers with 95% confidence intervals



Note: with the exception of the age/Black coefficients, the control variables are set at their mean values.

Figure 5.7 Predicted probability from Model (5) of belonging to class 3 for White and Black mothers with 95% confidence intervals



Note: with the exception of the age/Black coefficients, the control variables are set at their mean values.

5.7 Analyses on all order births

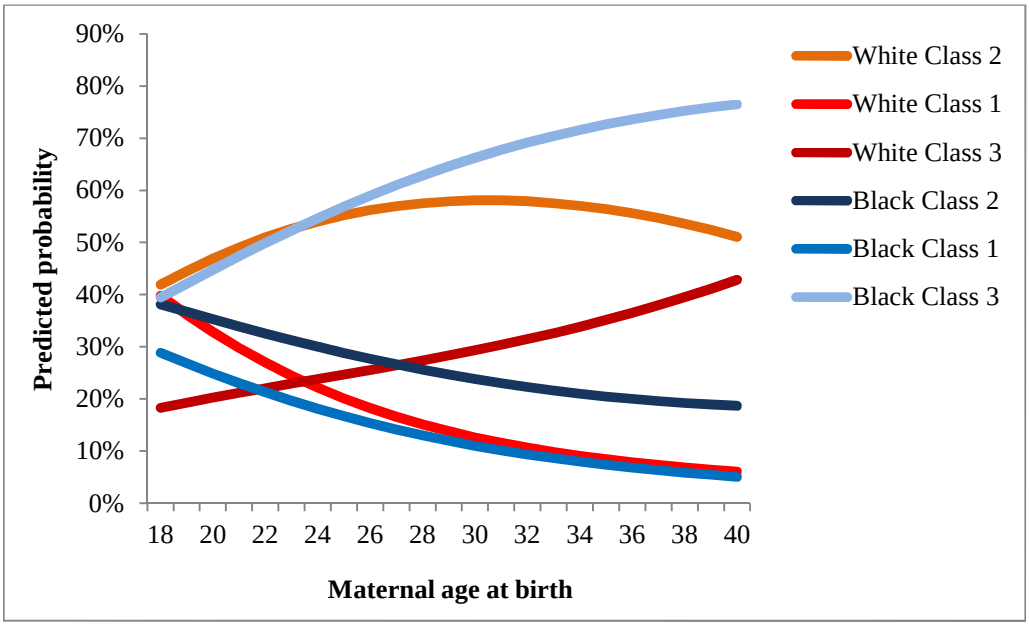
As mentioned before, the analyses of this Chapter have focused on first order births as the rest of the dissertation does. This has enabled the analyses to (further) contextualize the results of Chapter 3 (i.e. widening Black/White gaps in LBW with increasing maternal age at first birth) with reference to patterns of parental support, in light of the results in Chapter 4 of this thesis (i.e. postponement does not seem to be associated with the same accumulation of resources for Black and White mothers). This has meant that the analyses are based on a small subsample of Black mothers, which, despite what the comparison of the MCS vs. LS in Chapter 4 reveals, may raise issues of statistical power. In this section I show the results replicated on all order births. However, looking at all order births introduces different sources of heterogeneity in the sample as parity and birth spacing may confound the association between parental support/contact and maternal age at birth in ways that complicate the overall interpretation and possibly differences between the two ethnic groups. For example, while we know that Black and White mothers have relatively similar first births fertility schedules in the U.K., the extent to which this is the case for higher order births is an empirical question. Moreover, we know that on average kin support and contact increase the probability of progressing to a second child (Mathews & Sear, 2013), but I am not aware of studies that have explicitly investigated whether the extent to which this occurs varies for Black and White mothers and for births higher than second order. Getting into these and other issues that might be relevant for the research question under consideration goes outside the scope of this paper but certainly constitutes an area of future research that could be usefully developed in order to complement this present paper. This is because support from parents is likely to be important for all order births (i.e. not just for the first order ones) and given that an early first birth might imply that subsequent births are more likely to take place before grandparents are too old to help. For the time being, however, replicating the analyses on all order births is done in order to partially assess whether, on average, the age gradients observed when looking at first order births only are similar when the analyses are replicated using a larger sample of births.

The analyses are based on a (weighted) sample of 15696 White mothers and 453 Black mothers. The latent class analysis reveals similar findings to those obtained

when looking at first births only. As in the analyses reported in the main body of the Chapter, I have run a multinomial logistic model in order to assess how membership to classes varies for Black and White mothers and with increasing age at birth. As before, the model includes age coefficients and their interaction with being Black. In addition, in order to partially control for potential confounding associated with birth order, I have included controls for parity (first, second, third and higher) and age at first birth, as the analyses reveal that it is an important intervening factor for whether mothers receive contact/support from their parents. For births higher than first order, age at first birth is obtained by looking at the age of the oldest child living in the household. In doing so, I have not been able to consider non-resident children, as their age is not asked at the time of interview.

For brevity, I only report here a Figure which shows the predicted probability obtained from the multinomial logistic model revealing the age gradient in membership to classes for Black and White mothers. The patterns are relatively similar to those obtained when looking at first births only. This is especially the case for membership to class 1, which decreases with age at birth for both Black and White mothers. The age gradients of membership to classes 2 and 3 look fairly similar to those obtained when looking at first births only, but differences between Black and White mothers are more marked both in baseline membership to classes and rate of change with increasing maternal age. Black mothers' membership to class 2 decreases with maternal age a lot more markedly than for White mothers. Similarly, both Black and White mothers are, with increasing maternal age at birth, more likely to belong to Class 3 and the disparity seems to increase slightly in the middle of the age range. Despite these differences, a similar picture is obtained when looking at first and all order births as the results reveal that parental support decreases with maternal age at birth. To the extent that diminishing family support might result in more difficult experiences of child rearing for disadvantaged mothers, it would be worth exploring these results in more detail for different groups (i.e. not just Black and White mothers) of the population and in relation to birth spacing and child outcomes. But, as mentioned above, the ways in which parity and spacing may influence the results and differences between the two groups warrants a lot more closer attention and consideration.

Figure 5.8 Predicted probability of belonging for the three classes for Black and White mothers using all order births



Note: with the exception of the age/Black coefficients, the control variables are set at their mean values.

5.8 Discussion & Conclusion

In order to contribute to widen the way childbearing postponement and, implicitly, its consequences have been studied and conceptualized in the existing literature, this study examines whether patterns of parental support/contact vary with increasing maternal age at first birth in the UK for Black and White mothers. The decision to focus on this aspect of the family sphere is supported by the "weathering" hypothesis which advances the idea that early childbearing may, amongst other reasons, result to be an "adaptive" strategy for African American mothers as they may be more likely to access the support of the extended family. At present, there is no evidence of whether older mothers are less or equally likely to receive support than younger mothers and whether this varies for Black and White mothers.

The study focuses on the U.K. mostly for substantive (i.e. similar first births fertility schedule of Black and White mothers) and also because of the availability of the MCS data. But despite the advantages derived from comparing these ethnic groups, sample size issues meant that Black African and Caribbean mothers had to be grouped into a single category, despite their distinct migration and settlement histories in the U.K. By conducting a Latent Class Analysis, respondents are assigned to three classes which provide a summary measure of parental support/contact. The first class shows medium/high levels of parental support/contact, the second class is characterised by high/medium levels of contact and childcare support and low levels of financial support and the last class is characterized by overall low levels of support/contact. The results reveal that, on average, increasing maternal age at first birth is negatively associated with parental involvement and that the pattern seems marginally more marked for Black than for White mothers. Controlling for mothers' socio-demographic characteristics such as partnership status at birth, educational level and migration status, reduces but does not entirely eliminate differences between the two ethnic groups and the overall pattern.

In line with a "weathering" hypothesis perspective, the results support an argument according to which maternal age, its link with child wellbeing and, consequently, the analysis of postponement would benefit by taking into account a wider set of family processes. The results suggest that it is important to embrace the idea that an older age at first birth may be associated with changing family/personal

dynamics which go beyond conventional socioeconomic measures such as income and education. Alternatively, one could also think of an older age at first birth being associated with increased socioeconomic status which, in turn, brings along other changes such as diminishing levels of parental support/contact. Therefore, focussing exclusively and uncritically on conventional SES measures may limit our understanding of what childbearing postponement means for Black and White mothers. To the extent that subgroups of the population have different family forms and dynamics, understanding what these changes are and what their (not necessarily positive) consequences might be will enable us to develop a more nuanced picture of the costs and benefits that are associated with the timing of first births.

While revealing that increasing maternal age at first birth is associated with diminishing parental support/contact, the study has not established whether this pattern has different implications for Black and White mothers and their children. The fact that overall levels of parental involvement decrease with maternal age at first birth suggests that there are grounds to carry out such an investigation in a subsequent study. While there is no empirical investigation on this matter, the literature presents two contrasting arguments of what the consequences of losing parental support/contact might be for minority groups and their children. Furstenberg (1991) argues that a loss in kin support (for African American mothers) may be compensated by the family's higher socioeconomic status. Conversely, Colen et al. (2006) argue that losing family support for African American mothers is negatively associated with infant's health regardless of the family (increased) financial wellbeing. In support to Colen's argument, I believe that one of the reasons why loosing family support could be more detrimental for Black mothers compared to White ones is because the former are more likely to be in unstable partnerships than the latter (Kiernan & Mensah, 2010). Preliminary evidence seems to support this statement. In the U.K., as shown in both Chapter 3 and 4 of this dissertation, differences in family structure between White and Black mothers are reduced but not eliminated amongst older mothers as older Black mothers are more likely to be unmarried at the time of birth than White ones. This suggests that a loss in kin support may not be compensated by a more stable family structure (i.e. the presence of the child's biological father) for Black mothers to the same extent as for White mothers. Moreover upwardly mobile Black women may find it more difficult than White women to experience an accumulation of socioeconomic resources with childbearing postponement discussed by the existing

demographic literature. And even if they might be relatively better off relative to their parents and other siblings (who might need parental support more), they may experience difficulties such as racial discrimination in their new social position. Evidence presented in Chapter 4 suggests that although older Black mothers have similar educational profiles than older White mothers, they have lower income levels, are less likely to own a house and are more likely to live in disadvantaged areas. Thus, if older Black mothers are not as affluent as older White mothers, they may find it more difficult to cover the costs of (high quality) formal childcare arrangements when parental support/contact declines. In this respect, there is evidence that in the U.K. Black mothers face more difficulties than other ethnic groups in the affordability for (formal) childcare (Bell et al., 2005). A contrasting argument could be that they could, however, benefit from other kin networks than White mothers (i.e. siblings and other relatives), something that the MCS is not able to show evidence of. To the best of my knowledge, this issue has not yet been explored in the U.K. given the lack of suitable data. The Understanding Society, a relatively new longitudinal U.K. survey which provides an oversampling of ethnic minorities, might offer the opportunity to contribute to this gap in knowledge.

While investigating the role that diminishing family support plays in explaining the widening Black/White gaps in child health with increasing maternal age at birth certainly represent a promising area of future research, a problem involved with addressing this research question with the MCS is that parental support/contact is observed when the child is around 9 months, making it somewhat difficult to reveal, if any, the link between birth outcomes and parental involvement (by mothers' age at first birth). One could look at outcomes measured in subsequent Sweeps but, because of attrition, the Black sample would become too small. To the best of my knowledge, there is not any other U.K. data source that would enable this issue to be addressed. The conclusion Chapter discusses ways in which the ONS Longitudinal Study can be used to try and overcome the limitations of the MCS.

This research has a number of limitations. First of all, notwithstanding the design of the MCS which over-represents ethnic minorities, the sample of Black respondents is very small (n=208 and n=164 when weighted) and this could affect the significance of the results and possibly the shape of the age gradient. There is not, however, any other existing data source that would enable the research question of this study to be addressed in the UK to the same extent as the MCS does. In addition, merging

together Black Africans and Caribbeans raises concerns. Black Africans have a more recent migration history such that they may be more likely to be far away from their families of origin and to have low(er) levels of support than Black Caribbeans. Second of all, the indicators measuring parental involvement are rather crude as the MCS does not provide any information on frequency of childcare help and on the level of financial transfers (nor geographical distance). Finally, as mentioned throughout the text, the analyses are unable to reveal why patterns of family support diminish with increasing maternal age at first birth, namely whether support diminishes because it is not available or it is simply not needed. This represents an interesting area of future research in light of the fact that different reasons explaining diminishing support/contact might emerge for Black and White mothers: for the former it might be more likely to be a supply issue than for the latter. In order to explore these issues, quantitative methods could be complemented with qualitative ones.

Notwithstanding these limitations, this study contributes to raise questions concerning the way childbearing postponement and its consequences have been conceptualized until now. Attempting to contextualize childbearing postponement to the heterogeneous family formation dynamics and functions of different subgroups of the population is the way forward in order to increase our understanding of this process and its consequences.

Chapter 6 Conclusion

6.1 Summary of findings

This research project has been inspired by the increase in childbearing at older ages witnessed over the past three decades and by the fact that it represents a marked departure from patterns of family formation observed in earlier periods, such as the 19th century. While a considerable amount of research has been conducted on the determinants and macro-level issues involved with childbearing postponement, limited attention has been devoted to document its consequences for the wellbeing of children. The aim of this thesis is that of contributing to fill in this gap in knowledge by critically assessing the link between maternal age at first birth and early child wellbeing. In addition to investigating the overall association between maternal age and early child wellbeing, this research project has contributed to reveal whether the process and consequences of childbearing postponement may vary across subgroups of the population and if its benefits may have been overstated for some groups of women. This has been done by first analysing the association between maternal age and child wellbeing following the perspective suggested by the existing demographic literature, namely that postponement is expected to bring benefits to children, while revealing whether the association may depend on how late the birth occurs. Then, by reflecting on the "weathering" hypothesis framework, the research investigates whether looking at the issue from this angle is limited and does not reflect the experiences of all groups of women who have children at older ages. The original contribution to knowledge of this research project is that of contributing to the understanding of whether and how childbearing postponement may be associated with child/family wellbeing by integrating and reconciling different perspectives on maternal age, which so far have been developed and applied relatively independently.

The research has focused on the U.K. context both for substantive and for data availability reasons. One of the contributions of this research project has been that of having used different data sources available in the U.K., in particular the Millennium Cohort Study and the ONS Longitudinal Study. The study has built upon the strengths of each data source in order to contribute to understanding the consequences of childbearing postponement for family and child wellbeing. In particular, the MCS has been used to look at whether and why, on average, childbearing postponement is associated with child wellbeing. The ONS LS has been used to reveal whether the

association between maternal age and child wellbeing varies for Black and White mothers in the U.K. and, finally, the MCS has been used to begin reflecting on why this may be the case.

On one side the results reveal findings that are consistent with the "expectations" of the mainstream literature and with the "diverging destinies" framework (McLanahan, 2004). Namely, the results of Chapter 2 reveal that, on average, children of older mothers have better cognitive and behavioural outcomes than children of younger mothers. In contrast, while looking at LBW, there is no marked or significant age gradient. The results reveal that these findings are largely explained by older mothers' selected characteristics which compensate or even more than compensate for the health risks involved when giving birth at older ages identified by the medical literature. However, the results also reveal that the benefits of postponement may cease to accumulate at very old maternal ages as children of mothers in the late 30s do not appear to have significantly better outcomes than children of mothers who are in the mid-20s at the time of birth. Nonetheless, the overall message remains, however, positive: childbearing postponement seems to be associated with, depending on the outcome analysed, improved or not worse child wellbeing when first-time children of older mothers are compared to those of younger ones.

The most important finding of this dissertation has been that of revealing that, while, on average, this picture is true, it might not well represent the experiences of all groups of the population. By reflecting on the "weathering" hypothesis (a U.S. literature which predicts and shows that Black/White gaps in child and adult health widen with increasing maternal age at birth) and analysing age gradients in LBW for Black and White mothers, the findings of Chapter 3 reveal that the association between maternal age at first birth and child wellbeing varies across groups of the population. Namely, the Black/White gap in LBW significantly widens with increasing maternal age at first birth, which provides evidence consistent with the tenets of the "weathering" hypothesis. By stratifying the analyses by area level characteristics, education and partnership status at the time of birth (with some limitations concerning the way these indicators are measured), the picture that emerges is that for Black mothers being less disadvantaged is associated with a less marked increase in LBW with maternal age at birth. However, the results also reveal that disadvantage amongst White mothers is not associated with widening gaps in

LBW and that being Black may confer unique risks above and beyond socioeconomic ones.

While, given the observational nature of the data it is impossible to identify the multiple mechanisms that may explain the observed patterns, Chapter 4 provides a description of the socioeconomic/health profiles of Black and White mothers/women in the U.K. that contribute to situate the results of Chapter 3. Consistent with an idea that Black mothers may not be able to accumulate resources to the same extent as White ones even if they postpone childbearing, the picture that emerges is that the profiles of Black and White mothers are similar in some respects but also different in others. Namely, the two groups have similar educational profiles across the maternal age categories. In particular older Black and White mothers are similarly and more educated than their younger counterparts. However, older Black mothers are more disadvantaged in terms of income, housing and location suggesting that they are not able to reap the benefits of their human capital accumulation to the same extent as White women. Thus, childbearing postponement appears as a qualitatively different process for these two groups of the population. While the results do not reveal marked differences for what concerns health behaviours during pregnancy, they do reveal that, on average, the health of Black women deteriorates faster than the health of White women when looking at self-reported health (from age 35 and onwards) and biomarkers for hypertension and diabetes (from age 50 and onwards), thus providing support to the existence of "weathering" in the U.K. more broadly.

To conclude, the final attempt of this research project has been that of presenting a new perspective on family formation processes that may accompany childbearing postponement beyond increased income and education and that may possibly modify the association between maternal age and child wellbeing for Black and White mothers. The results of Chapter 5 reveal that both Black and White mothers tend to lose the support of their parents with increasing maternal age at first birth, albeit for the former it is slightly more marked than for the latter. Although the research is not able to investigate what is the role of the extended family in mediating the widening Black/White gap in LBW, the fact that older Black mothers are, as revealed in Chapter 4, not as affluent as White ones could suggest that they might find it more difficult (emotionally and financially) to cope with diminished access to family support.

Taken together the results suggest that maternal age reflects both social and health processes and that their interaction reflects the costs and benefits that characterize childbearing postponement. The results highlight that the way the social and health components of maternal age interact with each other may vary across groups of the population resulting in different trade-offs of postponement for the groups involved. Namely, the component of maternal age that is likely to predominate and the age at which this occurs ultimately depends on the characteristics of the groups involved and on the institutional context.

6.2 Implications for policy

This research has a series of implications for policy initiatives and debates. First of all, its findings are relevant from a public health perspective. Generally speaking, identifying that Black women/mothers are at higher risk of developing adverse child health outcomes with increasing maternal age, even though the research has not identified the ultimate mechanisms of why this may be the case, is useful in guiding the allocation of resources and for planning health care needs and services (Kravdal et al., 2012). To the extent that inequalities in child health also reflect something about the mother's health, the results call for prevention strategies aimed at tackling health inequalities for Black women when they are young and before they become pregnant as well as over the life course. More specifically for what concerns birth outcomes, the results point to the importance of questioning prenatal screenings that estimate risk status in pregnancies by applying demographic characteristics uniformly and uncritically across groups (Geronimus, 1996). Currently, age 35 is identified as a threshold age for pregnancy outcomes by the medical literature and in screening protocols (Bewley et al., 2005). The results of this research suggest that these intervention programs should be tailored to the needs and characteristics of different groups of the population rather than assuming that the baseline risk of adverse outcomes is homogenous across groups. In broader terms, there might be a discrepancy between the chronological age (i.e. the age of the mother since her birth in years) and biological age (i.e. her health), something that policy should more explicitly account for. Finally, by showing (indirectly through LBW which might reflect something about the mother's health and more explicitly through the findings

of Chapter 4) that the health of Black mothers/women deteriorates faster than that of White ones, the results also question whether the access and knowledge about health services in the U.K. is equitable across ethnic groups. In the U.K. there is a universal and free health care service through the NHS. By assuming that this is a universal service at the point of delivery, research investigating whether there is actual equity in access, knowledge about services and equal treatment by health professional across ethnic groups has been scant (Nazroo et al., 2009). Therefore, while designing prevention strategies, research should be carried out and efforts should be made at ensuring that this is actually the case for all groups of the U.K. population.

The results are also relevant from, and can be discussed with a public policy lens. As mentioned in the introduction, in the U.K., an early timing of childbearing, teenage pregnancies in particular, are considered a primary concern that needs to be tackled and addressed. Similarly to the U.S., teenage mothers have been considered and conceptualized in policy practices as a serious social problem and a calamity for those that experience it. This led to policy initiatives such as the "Teenage Pregnancy Strategy", created in 1999 with the aim of halving the under 18 teenage conception rate by 2010 and of fostering the involvement of teenage parents in education, training and employment (SEU, 1999; Duncan, 2007). Since the end of the 10 years period, the Government has been following a similar strategy. The dominant portrayal of teenage mothers in current policy debates and initiatives has recently been questioned and criticized by Duncan and colleagues (2010). What Duncan and colleagues claim is that, when the policy has been implemented, a considerable amount of resources have been devoted at addressing the ignorance of adolescents in terms of sexual health knowledge, while less to tackling structural problems such as the social disadvantage of teenage parents. On one side, this has possibly occurred because scant attention has been devoted to the literature showing that teenage mothers are a selected group of the population and they are disadvantaged long before they become parents. But this has also happened because little attention has been given to qualitative studies (Graham and McDermott, 2006; Duncan, 2007) revealing that teenage parenthood is not always perceived as a calamity for the parents involved and may actually represent a positive turning point (Phoenix, 1991). As Graham and McDermott (2006) claim "teenage motherhood opened doors into valued roles and supportive relationships" (p. 34). In this respect, what Duncan and colleagues argue is that heterogeneity according to "class, ethnicity and location can remain unspoken when research - and policy -

remains based on a taxonomic category based on mother's age" (Duncan, 2007 p.327). As a matter of fact, in these policy discourses and initiatives little attention seems to have been devoted to context and diversity, including ethnicity (Owen, Higginbottom, Kirkham, Mathers, & Marsh, 2010). The findings of this research contribute to these on-going debates by providing a new perspective showing quantitative evidence that supports the idea that it is somewhat limited to classify mothers based on age per se. Age reflects biological, socioeconomic and family processes and the way they interact with each other may vary across groups of the population, resulting in very different meanings of "age" and timing of life transitions. Developing policy initiatives based on a concept of age that ignores what it actually reflects for different groups will be limited in aims and outcomes. Similarly, taking the experiences of one group as implicitly normative (Graham & McDermott, 2006) and use that as the benchmark to criticize and build policies to change the possibly "diverging" transition of other groups may warrant closer attention. Ultimately the policy implications of this study are not that Black mothers should be encouraged to have children at younger ages. Rather, the implications are that the reasons explaining why their health and (eventually that of their children) is found to deteriorate faster (with increasing maternal age at first birth) and the mechanisms which prevent them to accumulate resources to a similar extent to White mothers need to be identified and addressed further.

6.3 Implications for research

This research has also a number of implications for subsequent research. From an empirical perspective, while revealing that the association between maternal age, postponement in particular, and child wellbeing does not necessarily go in the direction that is expected by the demographic literature for all groups of the population, brings to the surface the ultimate need to appreciate and investigate diversity across and within groups of society. In other words, looking at nationwide averages may mask important 'local' variations, which need to be brought to surface (Geronimus, Bound, & Colen, 2011). Based on these arguments and evidence, the implication for research of this thesis is that research analysing the determinants and consequences of childbearing postponement would benefit (both theoretically and

empirically) by appreciating diversity and attempting to investigate heterogeneity within and across populations.

The implications for research and the findings of this dissertation can be discussed and understood while reflecting on concepts developed and used in gender theory. The results highlight the importance of considering the effect of the researcher social position in the process under investigation, something that has been referred to in the literature as "reflexivity" (Williams, 2010). A researcher should always be aware of his/her position in the process under study and this should not be underestimated when carrying out quantitative as much as qualitative research. This argument offers an interesting perspective to reflect on the findings of this research, which is that perhaps the position of researchers in the process under investigation has not been considered enough. Indeed, the way childbearing postponement and its consequences have been approached by the mainstream demographic literature until now may reflect the relative social position of the majority of researchers in the process of childbearing postponement. Indeed, for the dominant (White) group, resources are typically transferred from parents to children via investments into offspring's education and by guaranteeing financial security until a certain age. The social norm here is that of the nuclear family, whereby one is expected to become parent after he/she has completed education, which leads to expected pay-offs and ensures to reach financial independence. Adult identity and autonomy is achieved through investments in education, training and career development (Duncan, 2007). Under these circumstances and progressing along this life course trajectory, it is adaptive to postpone childbearing (Geronimus, 2003). To the extent a researcher (and policy maker) may be raised in such a normative context, it might appear intuitive and logical to think of, and consequently scientifically approach, childbearing postponement as a process of resource accumulation. Similarly, it is relatively safe to assume that a woman would continue to give birth to healthy children until a reasonable age. The findings of this dissertation reveal that although this perspective may represent the experiences of some groups, it may not well reflect the experiences of one minority group who follows different life trajectories. For obvious reasons, qualitative researchers have tended to engage more into discussions concerning the researcher position in the process under study. But this might be something that quantitative research would benefit by giving more attention to both theoretically and empirically.

The way in which the view adopted may be limited and therefore problematic to reflect the experiences of different population groups is well summarized by the term "White solipsism", which reflects a vision that "thinks, imagines and speaks as if whiteness described the world" (Spelman, 1988). It does not necessarily involve a perspective that sees one race as superior to another, but rather with a vision that fails to acknowledge diversity in experiences and processes. One way to conceptualize this less theoretically is by referring to the work of Nancy Riley (1999), who talks about the fact that the connection between education and power are context dependent. As Riley puts it (p.382): "Although education can – and often does – result in increased power or in a wider range of options, it does not have to and does not always. To interpret changes in education or differences in education, we must understand the social context and the meaning of that education". A quite obvious parallel can be made to the findings of this dissertation. Despite the fact that, on average, childbearing postponement in the U.K. is associated with a process of resource accumulation, it does not have to and does not always. Indeed, the results show that for a Black mother in the U.K. holding a degree level education is not associated with the same levels of income, housing tenure, residence in advantaged areas etc. of a White one.

All these arguments link well with another concept developed and used in gender theory, which is that of "intersectionality" which has been already discussed in Chapter 3. Intersectionality posits that different dimensions of life are intersecting, mutually modifying and inseparable. As these interlocking dimensions merge, they create experiences that are unique and different for groups of the population (Sigle-Rushton & Lindstrom, 2013). The results of this research can be looked at through an "intersectional" lens. Namely, the association between maternal age and child wellbeing for Black mothers may not differ from that of White ones just because the former are "Black" – as if their race is just another (additive) burden in the relationship. Their experiences of childbearing at younger as well as older ages may be qualitatively different from those of White mothers. Being Black, or a minority group more in general, may confer risks that are unique and inseparable. In other words, the experiences of Black mothers are not like those of White mothers except for their ethnicity. For example, the results of Chapter 3 reveal that living in a disadvantaged area and being Black may confer risks that are unique and different from those of being White and living in a disadvantaged area. Disadvantage and

ethnic minority status may combine in a variety of ways such that the experiences of Black women cannot be understood by considering these dimensions of disadvantage as separate. In more general terms, some of the important findings of this research would not have been identified by running a model including controls for maternal age, minority status and disadvantage of the area of residence. The final and ultimate implication for research, which hopefully the outcome of this research is able to support, is that in order to grasp the intrinsic meaning of childbearing postponement, as well as other demographic processes, for different groups of the population there is need for experiences to be placed into context. Intersectionality provides a theoretical justification for doing so and values approaches that intersect different dimensions of disadvantage which may include race, geography, gender etc.

6.4 Study limitations

Notwithstanding the contribution to knowledge, this research has several limitations that are important to highlight. Some of these limitations have been discussed in more details in each of the Chapters, but there are others, more general, ones that need to be mentioned in order to situate the results more broadly. Highlighting the limitations of this research is also important in order to identify potential areas for future research (discussed in the next section).

First of all, one of the limitations of this research is the fact that when investigating the association between maternal age at first birth and child wellbeing, it uniquely considers mothers who successfully conceived and delivered a live birth both when using the MCS (Chapter 2) and the ONS Longitudinal Study (Chapter 3). The results delivered by this research have to be interpreted keeping in mind that it has only focused on a selected sample of live births, neglecting other health risks that might concern childbearing postponement. For example, we know that an older maternal age at birth increases a woman's chance of stillbirth, miscarriage and ectopic pregnancy (Huang, Sauve, Birkett, Fergusson, & van Walraven, 2008; Stein & Susser, 2000). But to the extent that miscarrying and having a stillbirth are markers of a woman's health status, future research should investigate whether the association between maternal age and these risks is uniform across sub-population groups. Different data sources will need to be used since, although the ONS LS provides data

on stillbirths, the numbers would be too small for this outcome to be analysed separately for Black and White mothers.

Second of all, as already discussed in Chapter 3, it has not been possible to replicate the analyses on LBW using other indicators of child wellbeing at the time of birth and later in life. The baseline Black subsample of first time mothers in the MCS used in Chapter 4 (n=205) becomes even smaller at ages 3, 5 or 7 due to attrition, which prevents using this data source to expand on the analyses based on the ONS LS. Similarly, the ONS LS provides data on infant mortality but its occurrence is too rare to be able to analyse this outcome separately for Black and White mothers. In particular, as discussed in Chapter 2 and 3, this is a limitation to the extent that it is still an empirical question whether and to what extent LBW is associated with wellbeing later in life on average and for different groups of the population.

Thirdly, whilst the analyses consider mothers' age at first birth, they neglect the association between fathers' age and child wellbeing. While historically research on parental age and child wellbeing has tended to focus exclusively on maternal age, more recently the medical literature has highlighted the importance and need of also considering fathers' age (Reichman & Teitler, 2006).

Fourthly, this research constitutes the first attempt to investigate the existence of "weathering" processes in the U.K. Given that the "weathering" hypothesis is a hard to test theory and therefore relies on evidence which is or is not consistent with it, it is not enough to say that there is evidence of "weathering" for Black mothers/women in the U.K. based on a single study that shows evidence consistent with its predictions. Indeed, there is need to assess whether these patterns are observed more broadly by looking at other child and adult outcomes. Moreover, this research is not able to provide an answer that establishes the mechanisms behind the widening gap in LBW (and to some extent in women's health as revealed in Chapter 4). In this sense, this research has contributed to raise questions rather than providing conclusive answers. And the remaining answers are important ones to answer to the extent that the more rapid health deterioration process experienced by some groups of the population is amenable to policy interventions.

Finally, as mentioned throughout the Chapters, some of the analyses rely on a small sample, which means that there might be issues of statistical power involved. There are not, however, other data sources that would have allowed answering the

research questions of this study while relying on a larger sample of Black mother and first births at older ages.

6.5 Directions for future research

There are different areas that, by building on and expanding this research project, could be explored in future research. Some of them, mentioned in what follows, might be able address some of the limitations of this research project.

The first, natural, extension of this research project is that of investigating the existence of "weathering" while analysing mothers' health trajectories to assess whether the health of ethnic minority and disadvantaged mothers deteriorates faster than the one of White and more advantaged mothers. This will be done by looking at mothers' health at different Sweeps of the MCS, thereby exploiting its longitudinal nature. The study would expand this research project by documenting the existence of "weathering" in the U.K. more broadly for two reasons. Firstly, it would reveal whether similar patterns to what this Ph.D. project documents by looking at child health is observed when analysing mothers health outcomes (that would include self-assessed health and chronic illnesses). Secondly, the analyses could also include other ethnic minority groups that are not considered in the current research project. As mentioned before, Pakistani, Bangladeshi and Indian are not included in the analyses as they have different first births fertility schedules to White women. In particular, Pakistani and Bangladeshi women have not yet engaged into a process of childbearing postponement and it would not have been informative to include them in the analyses given the aim and motivation of the paper. However, by shifting the attention to mothers' health trajectories, it would be less problematic to compare White women to a wider set of ethnic minorities, thereby contributing to investigate the existence of "weathering" by going beyond a Black/White comparison.

As mentioned in Chapter 5, the current research has not been able to establish what is the role of the extended family in mediating the widening Black/White gap in LBW with increasing maternal age at first birth. Namely, the remaining question to address is the following: would an older Black mother be at lower risk of giving birth a LBW child if she were able to access the support of her extended family around the time of birth? As mentioned at the end of Chapter 5, this is a difficult question to

answer using the MCS as parental support is observed when the child is aged 9 months, thus relatively far away from the time of birth. One possibility to explore these patterns, with some limitations, is through the ONS Longitudinal Study.[76] Indeed, through the LS, I would be able to know whether the LS member (i.e. mother to be) is living with any member of her family at the time of the census. By focussing on births that occur just before and after the 1991 and 2001, one could investigate the mediating role of co-residence with the extended family in age gradients of LBW, thereby expanding on the work of Colen (2011), discussed in the background section of Chapter 5. However, by restricting the focus on births that occur closely to the census, the sample of Black mothers might be too small to be meaningfully analysed. But as in autumn 2013, the 2011 census should be integrated in the LS, there is additional scope for exploring the feasibility of addressing this research question using this data source.

Furthermore, as already mentioned in Chapter 3, another promising venue for future research to build and expand on the work of this thesis would be that of combining the quantitative analyses with qualitative interviewing. Qualitative work, by providing more attention to context and diversity, could go further in explaining the underlying processes involved in postponing childbearing for Black and White mothers (Duncan, 2007). Black and White mothers, who have postponed childbearing to older ages, would be interviewed to investigate whether different experiences emerge through their narratives. Namely, one could explore the hypothesis that the postponement of first births is perceived differently amongst these groups. Different issues that this research has identified as potentially relevant for Black mothers, such as the role of discrimination and diminishing family support, could be discussed through semi-structured interviews and focus groups. Ultimately, qualitative interviews could bring to surface the importance of considering other relevant variables that would be important to use while describing the process of postponement and the different Black/White outcomes documented through the quantitative analyses.

[76] To the best of my knowledge there aren't other data sources that could be used to address this research question. The British Household Panel Survey does not provide an oversampling of ethnic minorities. Understanding Society, instead, provides an oversampling of ethnic minorities but does not provide information of grandparental support around the time of birth except for those families who have really young children at the time of interview i.e. the analyses would still be based on a small number of ethnic minority families.

This research has contributed to understand the process and consequences of childbearing postponement in a contemporary developed society. As childbearing is increasingly delayed towards older ages, it is important to know more about its consequences for the wellbeing of families and their children. This research project, by integrating different perspectives on maternal age and postponement, has revealed that while on one side childbearing postponement is generally associated with improved outcomes for children, on the other it has contributed to highlight that the benefits of postponement are uniform at older maternal ages and for children of Black and White mothers. In some instances, however, the findings of this research have contributed more to raise questions rather than to provide answers, which leaves room for future extensions to this research project which will contribute to address some of its limitations.

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