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Título Educational Homogamy, Parenting Practices, and Children's Early Development

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Abstract: *La tesis analiza las pautas y tendencias de homogamia educativa entre parejas con hijos nacidos en el Reino Unido a lo largo de la segunda mitad del pasado siglo, así como el impacto que diferentes combinaciones de logro educativo parental tienen en las prácticas de crianza de los hijos y en el desarrollo cognitivo y emocional de los mismos. La investigación está motivada por un interés en los mecanismos de transmisión intergeneracional de capital humano, y toma como punto de partida tres fenómenos bien documentados: en primer lugar, la creciente simetría en los niveles de logro educativo de hombres y mujeres; en segundo lugar, el peso de la educación como criterio en la selección de pareja; y, en tercer lugar, la marcada correlación positiva entre el nivel educativo de padres e hijos. El núcleo de la tesis está compuesto por tres capítulos empíricos que analizan distintas variables dependientes en la cadena de influencias que une la educación de padres e hijos. El primero de estos capítulos examina cambios en las distribuciones de logro educativo de los padres y madres de cuatro cohortes de niños británicos nacidos en 1958, 1970, 1990-01 y 2000-01, así como en la propensión a que los miembros de la pareja posean niveles de logro similares. Los análisis manejan indicadores de homogamia educativa absoluta y relativa. La primera de estas medidas corresponde a la proporción de parejas con niveles educativos similares sobre el total de parejas. La segunda se manifiesta en la tendencia a la semejanza en los niveles de cualificación de los esposos una vez que se han tenido en cuenta las distribuciones de logro de hombres y mujeres; el método de análisis empleado para obtener las tasas relativas son modelos log-lineales. Los resultados indican que la fuerza de la homogamia educativa aumentó entre las cohortes parentales de 1958 y 1970 para descender después a niveles muy inferiores y mantenerse estable en la década de los 1990s, evolución que diferencia al Reino Unido de otros países donde se ha observado un incremento progresivo de la homogamia educativa durante el mismo periodo. Por otro lado, los datos revelan que el número de parejas en que la madre posee un nivel de educación superior al del padre y el número de parejas en la situación opuesta se igualaron en las cohortes parentales más jóvenes. El segundo capítulo empírico investiga el impacto que el grado de similitud en el logro educativo de padres y madres tiene sobre las prácticas de crianza de los hijos. En concreto, las variables examinadas reflejan las opiniones de los padres hacia distintas formas de tratamiento de los hijos y las interacciones de carácter pedagógico que mantienen con ellos. Los datos corresponden a la cohorte parental de 2000-01 y los análisis estadísticos se basan en Diagonal Reference Models diseñados para el estudio de situaciones de inconsistencia de estatus. Los resultados sugieren una pauta de influencia femenina en el terreno de las opiniones y creencias sobre la crianza de los hijos, de modo de los padres tienden a exhibir actitudes más acordes con el nivel educativo de las madres que con los suyos propios. En lo que atañe a las interacciones*

directas con los hijos, en cambio, no se detectan cambios en el comportamiento de los padres en función de sus niveles de homogamia educativa. El tercer capítulo empírico estudia los efectos que diferentes combinaciones de logro educativo parental tienen en el desarrollo cognitivo y emocional de los hijos, prestando especial atención a las diferencias por género. Más en concreto, el capítulo analiza si el impacto de la educación de padres y madres es más pronunciado para las los hijos e hijas, respectivamente, y se pregunta si la variación en estos efectos podría interpretarse como diferencias en las preferencias de padres y madres en torno a las inversiones familiares en niños y niñas. Los datos y la técnica estadística empleados son los mismos que en capítulo precedente. Los resultados obtenidos corroboran el asociación positiva entre la educación de los padres y los niveles de desarrollo cognitivo y emocional de niños y niñas; en cambio, no respaldan la hipótesis de que los efectos de la educación sean más acusados entre padres e hijos del mismo sexo. En otras palabras, el género de los hijos no parece interactuar de forma significativa con el nivel educativo de padres o madres. En su conjunto, la tesis ofrece nueva evidencia empírica sobre la evolución de la homogamia educativa en el Reino Unido y sugiere que la preocupación de muchos analistas por las posibles consecuencias de esta tendencia es quizás excesiva. En lo que respecta al proceso de transmisión intergeneracional de capital humano en el Reino Unido en décadas recientes, los efectos de la semejanza relativa de logro educativo de los padres resultan ocasionales y moderados.

Instituto Juan March de Estudios e Investigaciones

CARLOS GONZÁLEZ SANCHO

EDUCATIONAL HOMOGAMY, PARENTING PRACTICES, AND CHILDREN'S EARLY DEVELOPMENT

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Carlos González Sancho (Madrid, 1979) es licenciado en Humanidades por la Universidad Carlos III de Madrid. Formó parte de la decimoséptima promoción de estudiantes del Centro de Estudios Avanzados en Ciencias Sociales del Instituto Juan March de Estudios e Investigaciones, donde obtuvo el título de *Master* en 2006. En el propio Centro elaboró su tesis doctoral bajo la supervisión del Profesor Gøsta Esping-Andersen.

Para Claudio y Ander

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ABSTRACT

This thesis investigates the pattern of parental educational homogamy and its implications for parenting practices and children's early development in contemporary Britain. At the heart of the thesis lies an interest in the mechanisms behind the intergenerational transmission of educational success and, more specifically, the consequences for children of new patterns of parental resemblance in education.

The thesis is composed of three empirical chapters, each of which is concerned with a different outcome: 1) trends in educational attainment and educational assortative mating amongst parental couples; 2) parents' childrearing values and stimulation-oriented interactions with children; and 3) children's early cognitive and behavioural skills. The first chapter combines data from four birth cohort studies from 1958, 1970, 1990 and 2000-01 while the second and third chapters rely exclusively on the latter study. The empirical analyses use Log-linear and Diagonal Reference models.

With regard to trends in educational assortative mating, the thesis finds that the strength of homogamy increased between 1958 and 1970 to decrease thereafter and remain stable, at its lowest level, throughout the 1990s. Moreover, amongst recent cohorts of parental couples the percentage of unions where mothers are more educated than their male partners equalled that of unions exhibiting the opposite pattern.

The findings concerning the dynamics of parenting in heterogamous couples suggest a pattern of female dominance in the attitudinal domain as fathers align with the views that can be expected on the basis of the mother's level of education rather than their own; however, no significant adjustments between partners are observed in parenting behaviours.

Lastly, the thesis finds a positive gradient in the association between parental education and children's early cognitive and socio-emotional development but little or no support for the hypotheses of differential effects for sons and daughters or gender biases in parental preferences for children. That is, no significant interactions are observed between the gender of children and the impact of parents' absolute and relative levels of education.

Taken together, the findings of the thesis qualify concerns about the increase of educational assortative mating in industrialised societies and its potential consequences for the intergenerational reproduction of inequalities in education.

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CHAPTER 1. INTRODUCTION

1.1. Introduction

This thesis investigates the degree of parental educational homogamy and its implications for children's early development in contemporary Britain[1]. My research is guided by a general interest in social stratification in industrialised societies and, more specifically, the intergenerational reproduction of inequalities in education. The acquisition of the skills that facilitate educational attainment is deeply rooted in the family and linked to parental investments during childhood (Waldfogel 2006; Feinstein et al. 2008). Educational credentials are then critical mediators of individuals' socio-economic attainment in adulthood. As such, the degree of intergenerational continuity in educational success can be considered one of the key indicators of the rigidity of the stratification system.

The primary focus of this thesis relates to changes in the educational composition of parental couples that are linked to increasing parity in attainment between men and women and associated changes in the pattern of spousal resemblance in

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[1] For convenience, in this introduction I refer to Britain and the United Kingdom (henceforth, UK) interchangeably. The first empirical chapter uses data from England, Wales and Scotland only, while subsequent chapters use data from Northern Ireland as well.

education[2]. Assortative mating –i.e. the partnering of individuals with similar traits at a higher rate than predicted by probability alone– is a pervasive phenomenon in modern societies and education is one of main dimensions on which it occurs (for reviews, see Kalmijn 1998; Blossfeld 2009)[3]. Changes in the relative balance of educational attainments between men and women tend to modify the pattern of educational assortative mating, and this in turn is likely to have consequences for the reproduction of social inequalities both between and within families. As put by Ultee and Luijkx (1990: 127), heterogamy, the *mirror image of assortative mating*, "*amount[s] to the existence of* positive social relations between persons varying in some important resource in the competition with other members of society for scarce rewards". Hence the belief of many stratification researchers that increasing homogamy may lead to a more uneven distribution across families of the (dis)advantages associated with different levels of education.

In this thesis I adopt an inter-generational perspective and restrict my focus to the pattern of similarity in education amongst parental couples and its potential impact on children. As developed below, this is due to the consistent relationship between parental education and the resources, behaviours and values that make children progress in education. In addition, the research questions I address in later chapters are motivated by our limited

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[2] Throughout the thesis the terms 'spouses' and 'partners' are used loosely and interchangeably. My focus is not restricted to married parents but includes cohabiting parental unions as well.

[3] Throughout the thesis the terms 'educational assortative mating' and 'educational homogamy' are used interchangeably. 'Homogamy' is defined as the situation where partners have the same level of education. 'Heterogamy' refers to the opposite situation where partners have different levels of education. In turn, the latter can be broken down into 'hypergamy' (i.e. partnering up in terms of education) or 'hypogamy' (i.e. partnering down). By convention, the perspective of the female partner is adopted.

knowledge about whether this relationship operates differently depending on the degree of parental similarity in education. For instance, are individual parenting practices influenced by the similarity of partners' educational attainments? Also, in heterogamous couples, does the gender of the more educated parent have more influence on the development of children and, if so, is it equal for boys and girls? These are questions that can be answered through the lens of parental similarity in education.

With regard to the outcomes of interest of this thesis, ultimately the focus remains on children. My research is in this respect motivated by a large body of evidence that documents the persistence of barriers to social mobility and opportunity in the UK associated with parental education and other measures of children's social origins.

Social mobility studies covering the post-1970 period depict Britain as a moderately fluid society where mobility trends in recent decades have been characterised by stability (e.g. Goldthorpe and Mills 2008). Analyses of income mobility, on the other hand, find that the inheritance of economic status has strengthened for cohorts born after 1960 (e.g. Blanden et al. 2005). Closer to my interest are studies on the association between social origins and educational attainment. Analyses of the 1972 Oxford Mobility Study (OMS) suggested that little change in the strength of this association had occurred since the 1940s (e.g. Halsey et al. 1980; Kerckhoff and Trott 1993). Merging observations from the OMS and other sources, Jonsson et al. (1996) similarly concluded that no decline across cohorts in class origin effects on educational attainment could be detected in England -contrary to Germany and Sweden- and that England's level of inequality occupied an intermediate position relative to these two countries. More recent analyses by Breen et al. (2009) suggest, on the contrary, that Britain belongs to a group of countries where class inequalities in education are relatively small and that the association between origins and attainment has significantly declined over time. It is important to note that all the studies above examine the experiences in the educational system of cohorts born in the first two-thirds of the 20th century.

The educational outcomes of British children born after 1970 have become the object of a growing body of research. While the evidence is not systematic in either the measures of family background used or the outcomes explored, overall this literature confirms the persistence of substantial social inequalities in education over the last three decades. Descriptive evidence for the period 1988-2006 reveals that academic attainment gaps, as measured by the proportion of pupils attaining five or more good GCSEs, remained over 40% between children in the top and bottom parental occupation categories and widened from 3% to 9% between males and females (DCSF 2008). Further, attainment differentials in 2006 by parental qualifications are similar in size to those by parental occupation, with over four fifths of children with a parent holding a university degree and only two thirds of those whose parents' highest qualification was an A-level attaining five or more good GCSEs.

More detailed analyses with multiple datasets confirm the view that disparities in educational outcomes by family background persist among recent cohorts of British children. For instance, Ermisch and Francesconi (2001) use data from the British Household Panel Study (BHPS) data to analyse the impact of parental education on the highest level of schooling of children born between 1974 and 1981. After controlling for household income and family structure, they find that both the father's and mother's education remain strong predictors of children's attainment. The education gradient becomes clear, for instance, in the predicted probabilities of attaining A-levels or more, which range from 38% for children of mothers without qualifications to 52% for children of university graduate mothers, and revolve around 45% for intermediate categories. Inequalities by class and income are also pervasive. Jackson et al. (2007) combine two datasets to analyse social class differentials in the transition to A-levels in England and Wales in 1974, 1986 and 2001. They find that the class-transition association weakened between the first two time points but strengthened substantially after 1986. Despite the strong increase in post-secondary attainment over the period, class differentials, as measured by odds ratios, reveal no consistent decline in either grades or transition propensities. In turn, Blanden and Machin (2007) combine data from the BHPS and three cohort studies to explore variation over time in how parental income affects cognitive and behavioural development and degree attainment. Comparing families in the top and bottom income quintiles, they find a strengthening of the relationship between family income and all three outcomes between the 1958 and 1970 birth cohorts, and stability amongst more recent cohorts whose outcomes are observed in the 1990-2006 period. The authors conclude that the decrease in social mobility observed for older cohorts is likely to have flattened out, but that no signs of reversal are observed.

All in all, the evidence suggests that family background continues to play a significant role in generating disparities in educational outcomes among recent cohorts of British children. My thesis seeks to examine the contribution of parental education to these processes, especially in connection with the question of how the influence of parental attainments operates, given new patterns of assortative mating.

The choice of the UK as my case study is justified on several grounds. Most importantly, the UK provides a good example of sustained increase in post-compulsory levels of education and the narrowing of the gender gap in attainment across cohorts (Smith 2000). This can be expected to increase the heterogeneity of combinations of parental educational attainments. Secondly, the persistence of social background differentials in children's educational outcomes confirms the relevance of analysing the potential implications of the new pattern of educational assortative mating. Lastly, a more practical but equally important reason is the availability of high-quality datasets covering the selected period that allow me to examine the variables of interest.

The remainder of this introductory chapter is structured as follows. In Section 1.2, I present the theoretical background of the thesis. In Section 1.3, I describe my data sources, discuss sample selection criteria and introduce the methods employed for my empirical analyses as well as a cautionary note about causality claims. Lastly, in Section 1.4, I outline the content of my empirical chapters.

1.2. Theoretical framework

This section provides the theoretical background that motivates my research for this thesis. This includes, firstly, an overview of debates about equality of opportunity and about the role of education in the process of social mobility (1.2.1); secondly, a discussion of the conventional understanding of family influences on educational attainment and its limitations (1.2.2); thirdly, an overview of sociological and developmental perspectives on the pathways that link parental resources to children's success in school (1.2.3); and fourthly, a review of arguments on the relationship between educational assortative mating and the intergenerational reproduction of inequality (1.2.4). I deliberately maintain the discussion here at a general level because subsequent chapters include more focused literature reviews on the specific issues addressed in each of them.

The standard account of developments in the field of social stratification identifies four distinct research generations (Ganzeboom et al. 1991; Treiman and Ganzeboom 2000). My thesis ties in with the fourth and current generation and its "return to the broad questions of early stratification research, in particular, the central question of how the stratification outcomes of individuals are affected by their social environment" (Treiman and Ganzeboom 2000: 124). More specifically, the thesis addresses the themes of country-specific trends in marital homogamy and "the impact of family characteristics beyond the status variables that were at the core of the Blau-Duncan model", both of which have received a great deal of attention by members of the International Sociological Association Research Committee 28 over the last two decades (Hout and DiPrete 2006: 9, 13).

1.2.1. Social mobility, equality of opportunity and education

Social inequalities in the ability of families to equip their children with the skills and credentials required to climb the socioeconomic ladder represent a major barrier to equality of opportunity –i.e. the scenario in which differential social achievements result exclusively from differential amounts of autonomous volition or effort (Roemer 1998, 2000; Heath 2001). Views of equality of opportunity typically differ with respect to the point after which they hold individuals accountable for social achievement. However, provided that the efforts of families to promote their children's prospects are concentrated in the early stages of the life cycle, and that they predominantly crystallise in outcomes which mediate later achievements, inequalities between families can be said to affect opportunity from the very moment that families engage in reproduction.

In modern societies, status placement operates through the conflicting mechanisms of familial ascription and individual achievement. While ascription puts the emphasis on the continuity of status from one generation to another, achievement ties in with social fluidity. The definition of status groups through family relationships is a constant of social life across historical periods and geographies (Weber 1968). Arguably, the family-based reproduction of advantage is distinct from other forms of stratification in that it is embedded in kinship relationships. Status attainment research identifies a fundamental link between the family and the stratification system in the principle of familial ascription of status. This states that, notwithstanding differences by sex and age, all family members tend to occupy the same status with regard to larger groups or communities. Family solidarity is most visibly expressed in the rules of good parenthood, which dictate that parents must try to ensure the best prospects for their children (Lipset and Bendix 1964).

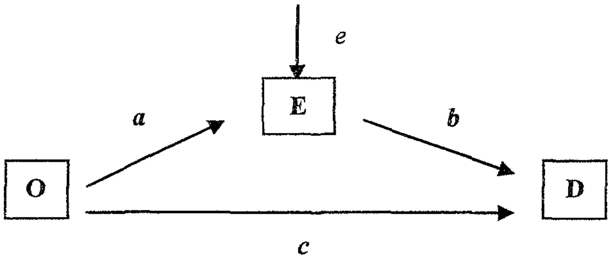
Class theory similarly posits that, inasmuch as family members broadly share their life chances, they belong to the same social class. Before individuals are able to modify their social condition, the circumstances of birth exert a strong influence on them. Schumpeter (1951: 148) argues that individuals are "born into a given class situation" and that "the family, not the physical person, is the true unit of class and class theory". In the same vein, Erikson and Goldthorpe (1992: 233) refer to the family as "the unit of class 'fate'". An indicator of the salience of class can thus be found in the degree to which family origins determine the acquisition of assets that become valuable for socio-economic attainment later in life: "The greater the role played by natural and family-acquired aptitude, the firmer will class position be" (Schumpeter 1951: 213). Therefore, the centrality of kinship in society and the pressure of the principles of family solidarity help explain why socioeconomic advantage is to a large extent maintained within families, and why, relative to other forms of stratification, it is likely to show a high degree of persistence over time (Grusky and DiPrete 1990).

The relative importance of familial ascription and education in status attainment is central to debates about the role of education in industrialised societies. Key contributions to these discussions were made by the second and third generations of stratification researchers, as outlined below. The liberal and pluralist theories from the 1960s and 1970s represent a useful starting point. These theories posited a gradual decline of ascription and an increase of social fluidity as the principle of universalism pervaded multiple spheres of life during the process of modernisation (Kerr et al. 1960; Blau and Duncan 1967; Treiman 1970). The logic of industrialism entails a fundamental change in social selection criteria away from the traditional forms of ascription-based discrimination and toward universalistic standards emphasising efficiency and individual achievement. This follows from technological advancement, economic growth and increasing differentiation in the division of labour, which require an accurate matching of workers to jobs on the basis of merit. Due to the increasing demand for skills and credentials, education had to gain significance as an indicator of achievement (Bell 1973). This logic was to have profound implications for the stratification system because ascribed familial status would lose prominence to individual achievement as the main mechanism for status placement. According to liberal theories, therefore, the modernisation process would bring about more social fluidity, primarily through the merit-based mechanism of educational attainment.

However, sociologists soon acknowledged that the influence of family background in social stratification is far from disappearing in contemporary industrialised societies. Blau and Duncan (1967: 415) argued that, while education was assuming greater significance for social status, "superior family origins increase a son's chances of attaining superior occupational status in the United States in large part because they help him to obtain a better education". Similarly, Halsey's (1977: 184) assessment that "education is increasingly the mediator of the transmission of status between generations" was paired with a concern about its role in social reproduction in Britain: "Institutionally, education is the principal agent of achievement. But at the same time the intergenerational process over which it exercises increasing sway is just as importantly one in which ascriptive forces find ways of expressing themselves as 'achievement'". Critics of liberal theories argued that these forces operate through the superior ability of high-status parents to provide their children with high-quality schooling and help them develop the cognitive and behavioural skills that foster later success in education (Bourdieu 1973; Bowles and Gintis 1976; Halsey et al. 1980). Therefore, research on the persisting links between social origins and educational achievement poses a challenge to the merit-based selection claims of liberal theorists (Goldthorpe 1996).

A recurrent heuristic in the debates about the role of education in social mobility and opportunity is the so-called Origins-Education-Destinations (OED) model depicted in Figure 1.1 (cf. Blau and Duncan 1967: 170). The OED triangle illustrates the main paths from social origins to destinations. Three fundamental relationships are posited: the effect of origins on education (arrow *a*), the effect of education on destinations (arrow *b*), and the residual direct effect of origins on destinations (arrow *c*), representing the social background effects not mediated through education. The model may be extended to provide a more detailed account of the attainment process. For instance, paths from outside the model to each of the variables determined within it can be added to represent factors uncorrelated with socioeconomic background that have an impact on given outcomes –i.e. unmeasured causes such as luck or pluck. For simplicity, only one external path to education is depicted here (arrow *e*).

Figure 1.1. The OED model



Hence, according to the OED model, education acts as the critical intervening variable in the process of social mobility. This mediating function is common ground for research in sociology and economics. Sociologists have provided empirical support for the mediating role of education in both class mobility (e.g. Ishida et al. 1995; Breen 2004) and status attainment (e.g. Treiman and Yip 1989) traditions. From the most up-to-date comparative study of social mobility, Breen and Luijkx (2004b) conclude that the overall extent to which education mediates the impact of origins on destinations increased over recent decades in several European countries (for a review, see also Breen and Jonsson 2005). In turn, the economic literature documents a growth in the returns to education in the labour market over the last thirty years in most industrialised nations (e.g. Peracchi 2006).

However, merely attesting to the mediating role of education in social mobility does not address the key question of whether education serves to reproduce socioeconomic advantage across generations, or whether it provides a channel for mobility. The OED and other path-analytic models become useful inasmuch as they help quantify the magnitude of the direct (c) and indirect ($a*b$) effects of social origins on destinations. In this framework, social reproduction (R) can be thought of as the composite of these two effects: $R = c + a*b$. The term $a*b$ can be taken to represent the contribution of education to social reproduction, whereas $e*b$ would capture its contribution to the channel of opportunity. The extent to which the growing importance of education implies a replacement of ascription by achievement then becomes an empirical question, mostly determined by the relative importance of paths a and e.

1.2.2. Limitations of the conventional view on family influences on educational attainment

This thesis is mostly concerned with path a in the OED model –i.e. the influence of social background on educational attainment. This area of stratification research was reignited in the early 1990s by the comparative study of trends in educational inequality edited by Blossfeld and Shavit (1993). This influential work maintained that, despite dramatic expansion and reforms in education, the relative advantage in attainment associated with higher social origins showed no decline across cohorts in eleven of the thirteen societies included in the study[4]. However, more recent research, benefiting from longer data series and methodological improvements, has challenged this view by revealing a decline in the association between social origins and educational attainment in several European countries (Breen et al. 2009; 2010). This reduction largely occurred with the cohorts schooled during the period 1950-1975 and was mainly driven by the reduction in class origin effects at the transition to secondary schooling. Further, changes in class inequalities in education were found to be broadly similar for men and women.

Notwithstanding crucial contributions to our knowledge about the mobility and stratification processes throughout much of the 20th century, the insights from the literature reviewed in the preceding section are limited on at least two fronts when applied to the study of these same processes in more recent decades. The first limitation is a heavy reliance on the male-breadwinner and female-carer model of the family (henceforth, MBFC). The second shortcoming relates to the limited attention paid to specific interactions and patterns of influence between family members, both between adult partners and between parents and children.

With regards to the first issue, it must be said that the backbone of our knowledge about mobility and stratification rests to a large extent on the experience of the mid-20th century decades, a period characterised by the stability of family structure and a sharp division of labour between the sexes, neither of which

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[4] This finding was contrary to the expected attenuation of class differences in the probability of children attaining high levels of education. This prediction was based on the fact that educational reforms in most of these countries had reduced both the direct and indirect costs of education and postponed or eliminated much track differentiation within schools. However, the only countries where inequalities were found to have declined were those that had experienced an exceptional equalisation of living conditions alongside educational expansion (Erikson and Jonsson 1996).

is longer prevalent (for extended critiques, see Blossfeld and Drobnic 2001; Beller and Hout 2006). These features greatly simplified the characterisation of family background, which was typically equated to the labour market position of a male breadwinner. Inversely, women were assumed to take responsibilities within the domestic sphere, including foremost the nurturance of children. Milestones in this research tradition typically analysed the occupational outcomes of men born in the first half of the past century, adopting a father-to-son perspective (e.g. Blau and Duncan 1967; Goldthorpe 1980). This reliance on men's position in the labour market as the main indicator of the social standing of other members of the household was nonetheless well justified. Labour market activity is the key anchor in the characterisation of socioeconomic status, and during that historical period women's participation in paid employment was far less continuous and intense than men's. Further, data sources covering the pre-1970 period seldom provided such information for family members other than the male head. Criticism of the conventional approach led some scholars to adopt the so-called dominance approach (Erikson 1984), which derives the status of the household from the highest occupational position held by any of its adult members, regardless of gender. Moreover, since the late-1980s many studies in this research tradition have incorporated the trajectories of women, but they have mostly compared their attainments to those of their fathers by only, or primarily, relying on paternal characteristics to measure family background (e.g. Erikson and Goldthorpe 1992; Blossfeld and Shavit 1993; Breen 2004).

Nonetheless, it has long been standard practice in studies of the family influence upon individuals' skills, completed schooling or socio-economic status to include information about the mother's education alongside other variables (early examples are, e.g. Sewell et al. 1976; Halsey et al. 1980; Mare 1981). Most often, maternal education is brought in on the grounds that women remain the main agents of children's socialisation. The mother's role in the development of children's abilities and the family transmission of cultural capital is deemed critical in sociology and psychology alike due to the fact that women tend to spend more time and interact more actively with children, in particular during the early years of their lives. In this respect, the hypothesised channels of family influence in traditional stratification research largely adhere to the MBFC model of the family prevalent in the mid-century period. This model expects mothers to have a greater influence on a child's early cognitive development or school grades, but fathers to play a stronger role on completed educational attainment or occupational status (e.g. Leibowitz 1977). These underlying premises about gendered roles and differential influences of mothers and fathers are most clearly visible in the literature concerned with the detrimental effects of maternal employment for children.

A second limitation of the work of the second and third generations of stratification research is to pay little or no attention to the actual mechanisms of transmission of advantage at the micro level –i.e. to treat family interactions as a black box–. This was largely due to a deliberate focus on long-term cross-national trends, and in some cases again to the lack of appropriate data to analyse such interactions.

Consequently, many studies operated under simplistic assumptions about how family inputs translate into individual outcomes. A common premise was that, because of a high correlation between paternal and maternal characteristics, the influence of each parent would be largely similar and therefore, for all practical purposes, redundant. In other words, there would be no separate and cumulative effects of parents' attributes and, instead, family background would be adequately captured by a single measure of the generic household climate. Such a model largely corresponds with the social dominance approach.

An alternative approach, however, was to model the effects of maternal and paternal characteristics as cumulative (Kalmijn 1994). In fact, additive functional forms have now become the standard specification in models predicting children's outcomes on the basis of parental attributes. And more importantly, as noted by Jerrim and Micklewright (2011: 263), the interest in distinguishing the separate contributions of each parent has largely been motivated by a desire to give due recognition to the role of women (see, for example, Korupp et al. 2002; Beller 2009; Marks 2010).

This thesis aligns itself with efforts to update the characterisation of children's family environments in recent decades. This follows from the general argument that family life became a less consistent model in the middle decades of the past century and that the MBFC model of the family can no longer be viewed as an accurate representation of the circumstances of many children in contemporary families. Overall, men and women's socioeconomic roles converged, mostly due to women's advancement into traditionally male spheres, and the equalisation of educational attainments between the sexes was pivotal in this revolution (Goldin 2006; Esping-Andersen 2009). As such, analyses of the impact of family background on children's outcomes now take into account a wider variety of family (production) arrangements. In this respect, the main focus of sociological research has been placed on two critical deviations from the traditional model of the family and their consequences for the wellbeing of children. The first strand of research is concerned with marital breakup and the subsequent experience of living with a lone-parent (e.g. McLanahan and Sandefur 1994; Biblarz et al. 1997; for the UK, see Rodgers and Pryor 1998; Ely et al. 1999; Sigle-Rushton et al. 2005). The second examines the impact of maternal employment, most often during early childhood (e.g. Bianchi 2000; Waldfogel et al. 2002; Goldberg et al. 2008; for the UK, see Gregg et al. 2005; Verropoulou and Joshi 2009).

This thesis, on the other hand, focuses on the implications of the relative similarity of parental educational attainments. In doing so, it seeks to expand the range of model specifications that are used to represent the impact of parental attributes on children's outcomes. For instance, a parent's level of schooling may exert a non-linear effect on a child's outcome depending on the simultaneous influence of the second parent's level of schooling, as in the scenario where the positive effects of having a highly educated father are enhanced by the presence of a highly educated mother. Also, parental influences may operate primarily along gender lines, as in the case where maternal attributes exert a stronger effect on daughters than on sons. These scenarios are largely ignored by models that subsume all parental influences into generic family inputs.

1.2.3. The inputs that promote children's success in education, and their connection to parental education

The range of explanations for the role of parental inputs on fostering children's development is vast, and any detailed assessment must acknowledge multiple intervening channels. However, most theoretical approaches coincide in emphasising the relationship between parental education and the resources, behaviours and values that make children progress in education. This overview is restricted to such pathways and to the period of early childhood[5, 6]. My approach is eclectic in that it combines insights and concepts from different analytical traditions.

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[5] Genetic inheritance is another critical determinant of children's outcomes linked to their parents, but a detailed consideration of this issue is beyond the scope of my thesis. However, it is important to note that gene expression interacts in fundamental ways with the home environment (Rutter 2006).

[6] Beyond the family context, other settings such as schools and neighbourhoods can also have an impact on children's development. Schools have been considered a less important influence than families since the publication of the Coleman report in the mid-1960s, but variation in school quality has received a great deal of attention. Hanushek (2006: 868) notes that, despite declining class sizes and rising expenditures and teacher qualifications in many countries, "little evidence exists to suggest that any significant changes in student

Economic theories of the family (for a review, see Bergstrom 1997) provide a useful analytical framework that has permeated research on the family transmission of advantage in other disciplines including sociology. A key notion in this framework is that of parental investments. This establishes an analogy with a production function in the family context and presumes the possibility that different technologies be applied. Parents are further assumed to care for and try to promote 'child quality', a generic outcome that represents a set of desirable characteristics consequential for children's wellbeing, most importantly in education and health. This approach is best exemplified by Becker and Tomes's (1986) model of home investments in children, in which unequal child outcomes arise primarily because of the unequal investment capacity of families. The model posits that, in order to promote their children's prospects, parents make "expenditures on their skills, health, learning, motivation, 'credentials', and many other characteristics" (Becker 1991: 242). Researchers working in this framework typically assume that such investments are best embodied in the material and time inputs that parents provide for children (e.g. Leibowitz 1974; Haveman and Wolfe 1994; Bianchi et al. 2004), and that the quality and quantity of such inputs are in turn determined by parents' own abilities and preferences. The central role that this thesis gives to parental education in fostering children's development rests precisely on its positive association with both parent's ability to generate valuable inputs for children and their will to do so.

Another relevant analytical framework comes from ecological perspectives of human development (Bronfenbrenner 1979, 1986).

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outcomes have accompanied this growth in resources devoted to schools". In their review of comparative research on inequality of opportunity, Breen and Jonsson (2005) highlight that endogeneity problems plague most studies of contextual effects and that the bulk of the variation in school achievement appears to be between families within schools or neighbourhoods, thus supporting the view that the effects of these contexts are modest in magnitude compared to those of the family.

This tradition informs the model of intergenerational transmission of education proposed by Feinstein et al. (2008: 23-36), on which I also draw in subsequent chapters. The model distinguishes between 'proximal', 'internal' and 'distal' factors as these reflect different levels of influence in the relationship between parental education and children's development. Proximal factors are closest to the live experience of the child and include the most immediate parenting practices such as nutrition, language use or stimulation-oriented play. Internal features of the family context occupy an intermediate position and are seen to mediate the impact of wider contextual factors. These features include, most importantly, parents' values and beliefs about their role in promoting children's outcomes. Lastly, distal family factors refer to the broader demographic and socio-economic environment of the family. As such, they include family size, employment arrangements and household income, amongst others. According to Feinstein et al. (2008), parental education exerts "a double impact" at every level of the model. On the one hand, it can have an impact on the level or amount of the factors that in turn influence children's development. For instance, more educated parents tend to command higher salaries, which is likely to benefit children by raising family income. On the other, parental education can affect the effectiveness of these factors at any level. For instance, parents with a higher level of education tend to spend a greater proportion of family income on educational resources for children. In the first pathway, therefore, the effect of education on children's outcomes operates via another factor, while in the second pathway, education mediates the effect of other factors.

The positive association between the economic resources of the family and children's educational outcomes is extensively supported by empirical research (for a review, see Blau 1999). The underlying rationale relates to family budget constraint. Given imperfect markets to finance children's education, parents have to weigh current household consumption against such investments.

Hence, poorer families must endure greater sacrifices to maintain a given level of expenditure on children's quality. The costs are both direct and indirect; they range from basic nutrition and shelter to tuition fees and foregone earnings during non-compulsory stages of schooling, including a variety of other learning materials and services (e.g. books, computers, private lessons). Although most studies focus on either current or permanent income, the argument extends to family wealth as asset ownership facilitates inter-temporal investments (e.g. Spilerman 2000). Overall, the largest effects of the economic position of the family are consistently found for individuals experiencing poverty. For most children, however, effects tend to be smaller in comparison to other family characteristics (e.g. Brooks-Gunn and Duncan 1997; Blau 1999; Bratti 2007). Parental education facilitates the application of economic resources to the development of children because credentials crucially shape occupational trajectories and earning opportunities in the labour market, therefore establishing unequal economically-defined standards of living between families (Card 1999; Peracchi 2006; Machin 2009).

A second line of inquiry instead emphasises the role of parental cultural resources. Two well-differentiated approaches exist in this respect. The first sees cultural 'capital' expressed in individuals' familiarity with the major artistic and normative codes of a given culture (e.g. Bourdieu 1977; Swidler 1986). It further argues that high-status families pursue social reproduction by transposing social hierarchies into academic ones as the habits they transmit to their children find reward in the educational system. A second understanding of the role of families' cultural resources focuses instead on the learning environments provided for children (e.g. Teachman 1987; De Graaf et al. 2000; Lareau 2003). This mainly pertains to verbal and intellectual stimulation through a variety of parental practices, for instance reading to and playing with children, helping them with homework or discussing study options. Lareau (2003) argues that two logics of upbringing, relating mainly to the degree of parental involvement in children's leisure and the emphasis they put on reasoning, differentiate children along parental occupation and education levels. Hence, this second notion posits that more educated parents are better at developing children's abilities. Whereas the first perspective is often operationalised through parent's participation in highbrow cultural activities, the second typically measures parental investments through their time with children and the rearing activities they engage in. Yet both propose that cultural capital represents a relevant resource distinct from socio-economic status, and that it increases children's chances of success in school independent of the latter (for extended discussions, see Lareau and Weininger 2003; Goldthorpe 2007). A related set of arguments concerns the relationship between parental education and time with children. That parents allocate enough time to interactions with children is in fact crucial for their cultural resources to be transmitted or have positive developmental effects. An extensive literature with time-use data shows that highly educated parents tend to spend more time with their children, especially at younger ages (e.g. Sayer et al. 2004; Monna and Gauthier 2008; Sullivan 2010). Further, the fact that this occurs despite greater opportunity costs and at the expense of parents' own leisure time suggests that parents with more education place a higher value on investments in children than their less educated counterparts (Guryan et al. 2008).

To summarise, my interest in discussing these approaches rests on the strong positive relationship that parental education has with the resources, behaviours and choices that are posited to affect children's educational outcomes. Chapter 3 examines this relationship in detail and it remains a key argument throughout the whole thesis.

1.2.4. Educational assortative mating

Homogamy and social stratification

The fundamental interweaving between marriage patterns and the reproduction of inequality has occupied social thought since its very origins. Plato discusses the tension between the 'natural' tendency of spouses to resemble each other and social equality noting that "somehow every one is by nature prone to that which is likest to himself, and in this way the whole city becomes unequal in property and in disposition" (Plato 2000 [Book VI]). Anthropologists have also recognised the role of marital selection in maintaining social order. Spouse selection works to prevent the trespassing of social boundaries that would occur under random matches. Davis refers to social stratification as "the master-basis of matrimonial choice" and notes that "a cardinal principle of every stratified social order is that the majority of those marrying shall marry equals" (1941: 376).

The idea that the strength of assortative mating speaks to the relative openness of a social structure is also akin to modern sociological theory (for reviews, see Kalmijn 1998; Blossfeld 2009). In line with Weber's (1968) notion of status group closure, homogamy rates can be interpreted as an indication of the salience and permeability of boundaries between social groups. A high (low) incidence of within-group marriage would reflect a relatively close (open) social structure. As such, "the answer to the question of who marries whom is therefore central for an understanding of the reproduction of social inequality in modern societies" (Blossfeld 2009: 514). It is thus logical that intermarriage has been studied in conjunction with social mobility and discussed in the light of modernisation theories (e.g. Ultee and Luijkx 1990; Smits et al. 1998; Raymo and Xie 2000). Most recently Katrnak et al. (2012), using data from the 2000s for 29 European countries, find that there exists a positive relationship between educational mobility and educational heterogamy or, put differently, between the permeability of educational systems and marriage markets.

My focus on educational marital matching is justified on various grounds. Firstly, education is a highly salient dimension of spouse choice, and there is evidence to suggest that its importance has grown over time in many industrialised countries as average attainment levels has risen and the gender gap in education has narrowed across cohorts (Blossfeld and Timm 2003). Secondly, as discussed in the previous sub-section, it is well established that parental education is one of the key determinants of a family's capacity to invest and shape the aspirations of children (Feinstein et al. 2008). Altogether, the pattern of marital sorting on education in a given society is likely to affect inequality across families by polarising the (dis)advantages associated with varying levels of education. As such, partnership patterns bear the potential of affecting mobility through the family-based transmission of resources from one generation to another (e.g. Ultee and Luijkx 1990; Mare 1991; Kalmijn 1994, 1998; Fernandez and Rogerson 2001; Blossfeld and Timm 2003; Mare and Schwartz 2006; Esping-Andersen 2007; Blossfeld 2009).

Explaining educational sorting

The recurrent finding of a positive correlation between partners' attainments suggests that the intervention of various mechanisms imposes a deviation from random matching. By and large, homogamy can be understood as a manifestation of the homophily principle, which states that contacts in social networks occur at a higher rate with similar, rather than with dissimilar, people (McPherson et al. 2001). A useful distinction when discussing the mechanisms of spouse selection is that between opportunity- and preference-driven explanations. Homogamy is likely to result from a combination of the two, that is, from the interplay of structural forces, most notably the demography of the candidate pool in the marriage market, and individual preferences for characteristics in a spouse over and above these constraints[7]. Education is closely connected to both these constraints and choices[8].

With regard to the role of opportunities, the aggregate distribution of educational attainment constitutes the most obvious constraint on marital matching at the macro level. According to Blau (1994), the degree of heterogeneity in a given dimension is set by two structural conditions: the number of existing groups and their relative size based on the population distribution across them. As the number of out-group associations must be the same in relations between any two groups, rates of out-marriage are critically determined by variation in group size. In the case of education, the availability of potential partners with a given level of schooling becomes an immediate constraint. For instance, for decades gaps in education between the sexes used to restrict the opportunities of university educated men to marry equally educated women of the same age. Thus, as the gender gap decreased over time, structural theories predict a reduction in the share of men marrying downwards.

Further, and relative to other social settings such as neighbourhoods or the workplace, educational institutions are

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[7] McPherson et al. (2001) use the analogous distinction of 'baseline' and 'inbreeding' homophily.

[8] It is important to underline that observed assortative marriage patterns per se do not reveal the reasons that drive spousal matching. On the one hand, the multidimensionality of homogamy challenges the sufficiency of any single attribute to account for partner selection. Further, both constraints and preferences are likely to be operating simultaneously, and disentangling their effects is an intricate empirical task. In this respect, the focus of current homogamy research on the upper categories of the educational scale tends to stress the preference character of union formation among high-status individuals and neglect the restricted marriage opportunities among low-status groups. However, an aggregate pattern of homogamy may result from the joint operation of different generating mechanisms at the top and bottom levels.

usually considered highly efficient marriage markets because of their homogeneity with respect to age and heterogeneity with respect to sex. Homogeneity in age becomes a critical factor as school completion, entry into the labour force and family formation are typically contiguous stages of the life course. In addition, transitions in the educational system constitute a stepwise process of selection that results in increasing homogeneity in terms of credentials and status for those who survive them (Mare 1980). This produces a structurally increasing likelihood of partnering with a similarly qualified candidate, especially among the highly educated for whom the average gap between the ages of school completion and family formation is typically shorter. Together with the fact that those who leave education earlier tend to join more diverse networks outside school, this filtering often results in higher levels of homogamy among individuals with superior levels of attainment (Mare 1991; Blossfeld and Timm 2003; Blossfeld 2009).

A second set of factors in marital selection relate to personal choice, that is, to preferences for specific characteristics in a partner. Cognitive psychology argues that individuals follow a likes-attract decision rule in their choice of partners based on self-perception and comparable selectivity for attributes (Buston and Emlen 2003). From an economic point of view, provided the presence of resource pooling and public goods in marriage, individuals shall desire spouses with valued production-related resources and similar consumption-related tastes. Individuals who attain similar qualifications tend to command similar earning power; likewise, shared experiences in school are likely to induce homophily in values and behaviours (McPherson et al. 2001). In so far as education is correlated with both economic prospects and lifestyles, it is thus a logical dimension to match on[9].

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[9] There are of course many other characteristics of partners that can loom large in one's preferences and which need not be strongly related to

Economic arguments suggest that, since resources are to a large extent shared by spouses, people will try to maximise them by searching for a partner with high income or occupational status. However, people often marry at an age when they have just started their careers and therefore uncertainty about their future income and status can be high (Oppenheimer 1988); in this situation current income may be a poor indicator of economic prospects over the life course. People may instead rely on education as a good signal for a partner's potential contributions to the family's economic standing.

However, specialisation and trading models of marriage (Becker 1991) predict differential interest in a partner's earning power for men and women[10]. The traditional MBFC model posits that women are mainly concerned about marrying a good provider and men mainly interested in women who will focus on the domestic sphere. As far as education constitutes a market trait, the trading model predicts negative assortative mating in education. However, this argument has been intensely challenged both on theoretical and empirical fronts. The work of Oppenheimer (1988, 1994, 1997) identified changes in marriage patterns as female participation in paid work has increased since the 1950s. Oppenheimer argued that women's greater economic independence does not reduce incentives to marry, but allows working women to set a higher standard for the minimally acceptable match. Women's more intense attachment to their professional careers would then modify the expectations of both sexes about marriage, enhancing homogamy as men's and

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education, such as physical beauty or personality. A valuable distinction in marital matching is that between market-related and non-market traits.

[10] Evolutionary psychology also assumes that mating preferences differ by gender, mainly due to an asymmetry in reproductive strategies – i.e. men seeking to maximise the frequency of encounters, women their quality (e.g. Buss 1994). Hence, men would give more value to beauty and youth in their partners and women more importance to earning power.

women's views of the marriage market become increasingly symmetrical[11].

The role of preferences in partner selection has also been stressed by Hakim (1996, 2000) who maintains that, even if the educational gap between men and women disappears, the tendency of women to marry better-educated husbands would persist because a sizable proportion of women are family- rather career-focused. Breen and Cooke (2005) argue that the erosion of the traditional division of labour adds uncertainty into the marriage market by blurring expectations about marriage roles. For this reason, insofar as it constitutes a good signal of a partner's willingness to specialise in unpaid work, education may become increasingly important in marital selection, especially for men.

Furthermore, education is also a strong correlate of lifestyles and cultural tastes. People with similar educational backgrounds are more likely to share values, opinions, behaviour, and style of discourse, all of which are likely to ease mutual understanding and enhance participation in shared leisure activities (Hyman and Wright 1979; Kalmijn and Bernasco 2001). When it comes to tastes and worldviews, spouses most often seek matches rather than exchanges, that is, intimacy based on cultural similarity (DiMaggio and Mohr 1985)[12]. Most importantly in the context of this thesis, similarity of preferences should arguably facilitate parental agreement and coordination in the rearing of children.

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[11] Using attitudinal data for the US, Buss et al. (2001) provide evidence of a convergence in the ordering of desirable mate qualities as men began to attribute far less salience to domestic skills, and both sexes -but men in particular- attributed more importance to good economic prospects.

[12] Schumpeter (1951: 140-41) identified affinity as a key component of tendency to marry within one's social class: "Social intercourse within class barriers is promoted by the similarity of manners and habits of life, of things that are evaluated in a positive or negative sense, that arouse interest. In intercourse across class boundaries, differences on all these points repel and inhibit sympathy".

To summarise, traditional homogamy scholarship has largely focused on analysing the patterns of educational sorting and identifying the processes that generate such patterns of mate choice. By and large, these lines of inquiry have documented an increase in the propensity of partners to resemble each other in educational attainment in many industrialised societies, driven by both opportunity and choice factors. However, documenting patterns of mate choice and examining their consequences are different analytical tasks. To date, most studies pursuing the latter line of work have attempted to measure the contribution of assortative mating to economic inequality (e.g. Burtless 1999; Breen and Salazar 2010). However, surprisingly little is known to date about its intergenerational impact.

1.3. Data and methods

1.3.1. Data

In this thesis I make use of the unique wealth of birth and school cohorts studies existing in the UK. My first empirical chapter combines data from four different datasets in order to carry out an inter-cohort comparison of parental couples. The second and third empirical chapters use data from the most recent study only. All the original data files and supporting documentation were obtained from the UK Data Archive.

The three longitudinal birth cohort studies used are the National Child Development Study (NCDS), the British Cohort Study (BCS) and the Millennium Cohort Study (MCS). The NCDS takes as its subjects almost 17,500 children born in Great Britain in one week of 1958 (for an overview, see Shepherd 1995). The BCS surveyed over 17,000 babies born in Britain in one week of 1970 (for an overview, see Bynner et al. 1997). The MCS follows the lives of over 18,000 children born over a twelve-month period starting in September 2000 (for an overview, see Hansen 2012). The three datasets are currently housed at the

Centre for Longitudinal Studies (CLS) of the Institute of Education at the University of London. The fourth dataset is the Longitudinal Study of Young People in England (LSYPE), which surveyed about 16,000 young people aged 13-14 and schooled in England in 2004 (for an overview, see NatCen 2009). Unlike the birth cohort studies above, the LSYPE sample was constructed via schools. Further information on each of these datasets is provided in the empirical chapters alongside a description of the variables used in each of them.

All four datasets provide nationally representative samples of UK populations. In the case of the birth cohort studies, the population for inference is all children born in Britain in the corresponding year. In the case of the LSYPE, it is all children in the English school system in that year. Two qualifications are nonetheless in order. In Chapter 2, I analyse trends in homogamy and educational attainment amongst the parents of the cohort children and therefore my conclusions pertain to parental couples only -and not to the population of adult couples at large. Moreover, in Chapters 3 and 4, my focus on educational homogamy and its implications for parenting practices and children's outcomes requires that I limit my attention to families with two parental figures present in the household. I readily acknowledge that the exclusion of single-parent families also limits the generalisability of my findings in these chapters. However, as discussed in further detail in each of them, I contend that my conclusions apply to the large proportion of British children who spend their early childhoods living with two parents (ONS 2007).

1.3.2. Methods

This thesis relies on a variety of quantitative methods. Alongside descriptive evidence presented in the form of percentages from cross tabulations, I apply three specific techniques.

In Chapter 2, I use Log-linear models to analyse relative rates of homogamy. Log-linear models belong to the family of methods designed for the analysis of categorical data and are the most common specification of association models in assortative mating and social mobility research (Xie 2003; Powers and Xie 2008).

In Chapters 3 and 4, I first use factor and principal component analysis to obtain composite indicators when the outcomes of interest are measured by multiple subscales. The objective of these techniques is to detect the presence of underlying traits and condense information into fewer constructs, thereby reducing the incidence of measurement error and multicollinearity (Treiman 2009). I then use Diagonal Reference Models (DRMs) to assess the effects of parental inconsistency in education. Introduced by Sobel (1981, 1985) in the context of mobility research, DRMs have gained acceptance as the best suited method for the analysis of the effects of educational differences between partners (Hendrickx et al. 1993; Eeckhaut et al. 2013).

Each empirical chapter provides a more detailed discussion of the foundations of these techniques as well as formal specifications of the models I apply in my analyses.

1.3.3. A note on causality

From a methodological point of view, this thesis adopts a modest stance. Essentially, my analyses have an exploratory character, relying on descriptive statistics and the measurement of association between the variables of interest. The use of survey, non-experimental data and the demographic nature of my explanatory variables limit the possibility of making strong causality claims as if in a counterfactual framework (Winship and Morgan 1999; Currie 2005). Throughout the thesis, however, I recurrently use the terms 'effect' and 'impact'. This is mainly for convenience and I do not presume a strict causal relationship in any of the models I estimate.

Empirical research has consistently documented a positive correlation between parents and children's education[13] and an extensive literature discusses whether or not this association is of a causal nature (for reviews, see Feinstein et al. 2008: 17-22; Holmlund et al. 2008). Haveman and Wolfe's study of the determinants of children's attainments concludes that "[t]he most robust –and the strongest—finding concerns the effects of the education of the parents on the children we have studied. For all of the outcomes, more years of parental schooling are associated with greater success and attainments" (1994: 251-2). Yet, they acknowledge that the multiple correlates of schooling pose a formidable challenge to the identification of causal effects. The literature devoted to the assessment of these effects, mostly from economics, has introduced new identification strategies to overcome the endogeneity of individual schooling and (often unobserved) own ability, partner's schooling and a variety of other family characteristics. Making use of counterfactual models and data improvements[14], these approaches tend to yield smaller estimates than those from conventional regression techniques yet confirm that parental education does exert a causal impact on children's outcomes net of ability bias.

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[13] Hertz et al. (2007) analyse 50-year trends across 42 nations; in Europe and North America, intergenerational correlations of years of schooling are reported to range between .30 and .54.

[14] Despite their superiority with respect to conventional designs, these strategies are not exempt of problems either. For instance, studies using samples of adopted children must carefully consider non-random parental selectivity into the adopting pool. Also, the use of instrumental variables, typically changes in legislation inducing variation in school leaving ages, imposes restrictive assumptions: most importantly, observed effects are likely to be rather localised –i.e. apply only to those for whom the exogenous shock alters attainment. Twin-samples present better conditions for identification purposes; however, samples tend to be small and obtained from sources that contain little information on parental practices with children.

All in all, it is safe to align with the conservative claim that parental education remains consequential for children's outcomes without taking for granted a neat causal relationship. Instead, I subscribe to the modest statement that the impact of parental education will be partly due to the knowledge gained from formal schooling, and partly due to parental ability and other unobserved factors.

1.4. Structure of the thesis

The core of this thesis is composed of three independent empirical chapters, each of which is concerned with different outcomes. This sequence of dependent variables follows the intergenerational perspective that informs the thesis and that involves taking families with children as my unit of analysis. The first empirical chapter investigates trends in educational attainment and educational assortative mating amongst parental couples (1.4.1). In connection with the couples' educational makeup, the outcomes of interest in the second chapter are parents' childrearing values and stimulation-oriented interactions with children (1.4.2). Finally, the outcomes of interest in the third empirical chapter are children's early cognitive and behavioural skills (1.4.3). I further summarise a related piece of work that is not included in the thesis but complements some of its findings (1.4.4).

1.4.1. First empirical chapter: Trends in parental educational attainment and educational assortative mating in Britain, 1958-2000

Chapter 2 adopts a predominantly descriptive approach and establishes the basis for the remainder of the thesis. It discusses trends in educational attainment and educational assortative mating amongst parents of the 1958, 1970, 1990-91 and 2000-01 birth cohorts in Britain. These trends are of critical interest as they shape the educational composition of the family environments where successive cohorts of British children have been brought up. The chapter combines data from four different birth cohort studies to build up a series of comparable data that allows me to extend prior research on homogamy trends in Britain. In particular, very little is known on the evolution of homogamy in the 1990s. My analyses produce new evidence on this period and thereby provide new insights into the partnership formation patterns of parents of children who have recently completed or are presently undergoing their schooling in the UK.

With regards to educational attainments, the chapter asks to what extent changes in average levels of schooling since the late 1950s have been similar for men and women, and thus whether the traditional gap in favour of men has narrowed or disappeared. However, the main focus remains on the degree of educational resemblance between partners and whether it has increased or decreased over time. Both absolute and relative rates of homogamy are presented, the former via outflow and inflow percentages and the latter via log-linear analyses. Absolute homogamy rates illustrate, for instance, what percentage of mothers and fathers have married a more or less educated partner. Relative rates, in turn, assess the propensity of individuals to marry someone with a specific level of education, as opposed to a different level, after taking into account the supply of candidates with each level of schooling. Taken together, my analyses illustrate the degree of heterogeneity in the educational composition of contemporary UK families with young children.

1.4.2. Second empirical chapter: Educational heterogamy and parenting attitudes and behaviours

Chapter 3 switches the analytical focus from the pattern of parental similarity in education to its implications for family life.

It uses data from the MCS to examine how different combinations of parental educational attainments are linked to individual parenting values and behaviours in families with young children. My interest in examining the effects of parental similarity in education on parenting practices is due to the role of the latter in the inter-generational reproduction of inequalities. Both parenting attitudes and behaviours are major pathways for the influence of parental education on children, a mediation that occurs through the proximal family environment that children experience. However, Chapter 3 is only concerned with the first part of this conceptual model, and not with the impact of parenting practices on children's outcomes.

The point of departure for the chapter is the well-documented positive association between parents' levels of education and their endorsement of and involvement in developmental parenting. However, this relationship is most often posited at the individual level and little is known about parenting in educationally mixed unions. Therefore, and based on the evidence presented in Chapter 2 that substantial heterogeneity exists in educational assortative mating, Chapter 3 asks about the extent to which partners with different levels of education think and act in unison with respect to childrearing. The specific hypotheses that I address relate to the pattern of influence between partners, to whether it is characterised by male or female dominance, or by educational-status dominance: do mothers align their parenting values and behaviours with those of their male partners, or vice versa? Does any adjustment occur between the lesser-educated parent and the better-educated parent and, if so, in which direction?

The chapter is one of the first empirical investigations, employing UK data, on the relative salience of partners' levels of education in determining their parenting practices, and on the patterns of *mutual influence* between mothers and fathers. Furthermore, it is one of the first applications of DRMs to these topics in the UK.

1.4.3. Third empirical chapter: Educational heterogamy, gender and children's early development

Chapter 4 investigates the influence of parental education on children's early development and hence brings to the foreground the inter-generational ties that ultimately motivate this thesis. It uses MCS data to examine two dependent variables: children's early cognitive and behavioural skills between the ages of 3 and 7. Positive development on both of these domains lays the foundations for later achievements.

Furthermore, Chapter 4 pays special attention to the role of gender in the intergenerational transmission of educational success. It addresses hypotheses related to the relative salience of maternal and paternal education in shaping children's development, specifically to the issue of whether the effects of parental education are more pronounced along same-gender lines. In addition, it explores whether specific forms of parental dissimilarity in education are related to the developmental outcomes of sons and daughters, for instance whether children do better when the same-gender parent is more educated than the opposite-gender parent.

All these questions are connected to the overarching theme of the differential parental treatment of sons and daughters and the impact it may have on their schooling outcomes. This concern is motivated by extensive evidence of gender gaps in education and by a series of studies suggesting the persistence of gender biases in parental involvement with children. These arguments are formulated against the general null hypothesis that gender egalitarianism in interactions with and preferences over children should result in no differences in the impact of fathers' and mothers' education for sons and daughters.

Chapter 4 contributes to research on the role of parental education and gender in the family-based formation of human capital by exploring a richer set of model specifications than most previous studies and, on the methodological front, by making a novel application of DRMs to this area of research using UK data.

1.4.4. Related work

Throughout the course of the thesis I have also completed a related piece of work that I planned to present as an additional empirical chapter but was finally not included due to space constraints. This is a joint article with Dr. Audrey Beck (San Diego State University) that is currently under review for publication.

The article explores the association between parental educational homogamy and children's school readiness at age 5 using American data from the Fragile Families and Children Wellbeing Study. It attempts to shed light on the variety of family arrangements and parenting strategies that mediate this association. Our key hypothesis in the article is that parental resemblance in education increases the agreement between partners regarding the organisation of family life, mutual support and the symmetry of partners' contributions to childrearing during the critical period of early childhood. We posit these as mechanisms linking parental educational homogamy and children's cognitive and behavioural skills by age 5. Therefore, the research design and variables of interest of this related piece of work are largely similar to the ones employed in the thesis. However, it differs from the latter in that it uses American data and examines children's outcomes and their parenting-related mediators jointly.

Our descriptive analyses confirm that educationally homogamous partners are more likely to report high levels of mutual support and cooperation in childrearing and lower levels of arguing. When we look at both the overall and relative symmetry of partners' time dedication to children, we find that although the total amount of time spent is not appreciably different, intra-couple differences in the amount of time each parent spends with the child are less pronounced in homogamous unions.

Secondly, we use ordinary least-square models to examine in a multivariate context the extent to which homogamy, net of the respective education levels of parents, is associated with greater school readiness. Controlling for parental education and an extensive set of demographic and household characteristics, our models indicate that homogamy works in the expected direction of boosting children's outcomes, thus supporting the idea that children benefit from consistency in their family environments and more consistent parenting.

In extending the models to include the mediators, we find that the positive impact of homogamy is partially accounted for by our indicators of parental agreement and coordination —the ratio of the father's to the mother's developmental care, parental supportiveness, cooperation in childrearing and frequency of arguments, which all prove to be relevant predictors of several components of children's school readiness. We interpret these results as supportive of our hypothesis that parental educational similarity fosters the efficacy of family investments in children's human capital by enhancing parental coordination and diminishing specialisation in parenting tasks.

Finally, the article examines whether the marginal impact of homogamy varies by the total level of educational resources in the home. For verbal ability, we find some evidence that the positive impact of homogamy is concentrated among more educated households, but no evidence that homogamy has a negative impact on children's outcomes in households with fewer resources. With regards to behavioural outcomes, we find no evidence of differential effects of homogamy between more and less educated households and detrimental effects among less educated families for behavioural outcomes. It thus appears that our results speak to the impact of homogamy regardless of the level of education at which it occurs; and we find very few differences with alternative modelling strategies for education.

CHAPTER 2. TRENDS IN PARENTAL EDUCATIONAL ATTAINMENT AND EDUCATIONAL ASSORTATIVE MATING IN BRITAIN, 1958-2000

2.1. Introduction

In this chapter I analyse trends in educational attainment and educational assortative mating amongst parents of the 1958, 1970, 1990-91 and 2000-01 birth cohorts in Britain. While research on educational attainment and homogamy mostly focuses on the whole adult population, my analyses are restricted to a specific subset of the population, namely two-parent families containing one or more young children –i.e. parental couples[15]. This is due to the nature of my data and consistent with my concern about the impact of *parental education on the intergenerational transmission* of inequality. Couples with young children are, arguably, the unit of analysis best suited to assess how the family environments of British children have changed over time in terms of parental education.

In the following sections, I first examine trends in parental attainments and whether changes have been similar for mothers and fathers. I then address my main research interest, namely the

[15] This choice is guided by the characteristics of the samples with which I later analyse the impact of partners' dissimilarity in education on a variety of outcomes.

degree of educational resemblance amongst these parental couples and whether the strength of homogamy has increased or decreased over time.

The longitudinal perspective adopted in this chapter emerges from an inter-cohort comparison. I identify four 'parental cohorts' combining data from the National Child Development Study (NCDS), the British Cohort Study (BCS), the Longitudinal Study of Young People in England (LSYPE) and the Millennium Cohort Study (MCS). The subjects of my analyses are the parents of the birth and school cohorts followed in these four datasets. In corresponding order, the parental cohorts are composed of: a) partners born in 1923-40 who had a child in 1958; b) partners born in 1935-52 who had a child in 1970; c) partners born in 1955-72 who had a child in 1990-91; and d) partners born in 1965-82 who had a child in 2000-01. This constitutes a unique series of comparable data that allow me to extend previous studies of homogamy trends in Britain. I run separate analyses for all parental couples and for couples where the cohort child is the mother's firstborn. The latter subsample closely resembles the population of newlyweds, therefore enhancing comparability with prior research on assortative mating. The restriction of the analyses to firstborn children also reduces the degree of overlap between parental cohorts, thus providing a clearer picture of trends in schooling.

The chapter is structured as follows: in Section 2.2, I review the most prominent theoretical and empirical contributions to the literature on educational assortative mating. In Section 2.3, I provide a detailed description of my data sources, analytic samples and education variables. In Section 2.4, I discuss the main features of the methods employed for my empirical analyses. My results are then presented in Section 2.5: trends in educational attainment are illustrated first through contingency tables of mothers' and fathers' levels of education for each parental cohort; the general pattern of homogamy is presented next through percentages (absolute rates) and goodness-of-fit statistics for a variety of log-linear models (relative rates); lastly, the trend in the strength of homogamy is summarised by plotting the parameters of the best fitting models. The chapter concludes with Section 2.6, where I develop the potential implications of changes in educational attainment and homogamy trends for the intergenerational persistence of socio-economic inequalities.

2.2. Background and theory[16]

This section first discusses trends in schooling in Britain over the last few decades and the reasons why changes in patterns of educational attainment have an impact on rates of educational homogamy. It concludes by reviewing recent research on trends in assortative mating in Britain and comparing its findings to those obtained for other countries.

2.2.1. Trends in educational attainment in Britain

Throughout the last century, industrialised societies have experienced sustained growth in average levels of education and a gradual narrowing of the gender gap in attainment. Levels of schooling rose across successive cohorts as a changing economy demanded an increasingly educated workforce and political reform fuelled the expansion of educational systems. The case of Britain provides a good illustration of these trends (for overviews, see Smith 2000; Halsey 2000; Jones 2003). Changes during the first half of the century were most visible at basic levels of schooling. Between those born in 1900-09 and 1950-59, the proportion of

[16] For convenience, throughout the text the terms 'assortative mating', 'homogamy' and 'sorting' are used interchangeably. The same holds for 'partners', 'spouses', 'marriages' and 'couples', which I loosely use to refer to cohabiting parental dyads without attention to their marital status or biological bonds to children.

individuals leaving school with no qualifications in each cohort declined from more than two-thirds to about a fourth amongst men, and from about five-sixths to a third amongst women. As expansion continued, changes during the post-war era were largest at post-compulsory levels of attainment, with two-thirds of the 1970-79 cohort members completing up to secondary schooling. This represented a three-fold increase for men and a six-fold for women, relative to their counterparts born four decades earlier (Smith 2000: 209; also Kiernan and Levièvre 1995: 136). By the end of the century almost a third of men and women in their mid-twenties and thirties were completing tertiary education, culminating a century-long trend of increases in average attainment and growing similarity in the amounts of schooling obtained by men and women (OECD 2001; Makepeace et al. 2003: 38-9).

Trends in educational attainment speak to changes in the stock of qualifications in the adult population. As such, they illustrate changes in the educational makeup of the families in which successive generations of children are raised. As long as parental education remains an important determinant of the financial and cultural resources that families can invest in their children, the trends reviewed above suggest that successive cohorts of British children have grown up in more favourable family environments. Subsequent chapters of this thesis address the link between parental education and investments in children.

2.2.2. Theories on educational assortative mating

Changes over time in aggregate levels of schooling provide the context in which parental sorting on education occurs. Patterns of educational homogamy can be taken as an indicator of the permeability of social boundaries. This is suggested by a large body of research that finds a strong degree of resemblance between the education of spouses across countries and time periods (for reviews, see Kalmijn 1998; Blossfeld 2009). This pattern results from the interplay of the composition of the pool of candidates in the marriage market and of individual preferences for partner characteristics over and above these structural constraints. On the one hand, the aggregate distributions of attainment for each sex constitute the most obvious constraint on marital matching at the macro level. For instance, differentials in higher education between the sexes used to restrict the opportunities of highly educated men to marry equally educated women of the same age; as the gaps narrowed down across cohorts, explanations based on structural constraints predict a reduction in male hypogamy (Blau 1994). On the other hand, explanations based on individual choice emphasise the strong correlation of education with values, lifestyles and cultural tastes and the tendency of spouses to seek intimacy based on cultural similarity, as this eases mutual understanding and enjoyment (DiMaggio and Mohr 1985; Kalmijn and Bernasco 2001). Whereas the distinction between structure and choice may be theoretically relevant, it is important to underline that observed homogamy patterns per se do not reveal the mechanisms behind spousal matching but merely the strength of the association between their levels of education[17].

There are multiple reasons to expect changes in educational attainment to have an impact on trends in educational homogamy. A first set of arguments relates to the economic incentives for marriage. Given its positive correlation with success in the labour market, individuals may regard education as a positive sign of ability to contribute to a family's economic standing. The

[17] Analyses of trends in educational assortative mating focusing on the upper categories of the educational distribution tend to stress the role of preferences in union formation among high-status individuals and to neglect the role of restricted marriage opportunities among low-status groups. As Kalmijn notes, in a market-like competition for spouses "the most attractive candidates select among themselves while the least attractive candidates have to rely on one another" (1998: 398). Hence, aggregate patterns of homogamy result from the joint operation of different generating mechanisms.

traditional specialisation and trading model of the household predicted differential interest in partners' earning power for men and women (Becker 1991). However, competition for high-earning mates is likely to have extended to both sexes as their economic positions became more symmetrical and their expectations about marriage converged around the same valued qualities in mates (Oppenheimer 1997; Buss et al. 2001). The argument is that relative to the traditional scenario of female hypergamy, increased gender symmetry in educational attainments and preferences would enhance assortative mating as more highly educated men seek to - and are able to - marry equally educated partners. Further, enhanced economic independence allows women to set higher standards for acceptable matches. Alternatively however, sorting on education may diminish if women's reduced dependency on males leads to a growing relevance of non-market traits in partner selection (Oppenheimer 1994; Fernández et al. 2005). Changes in preferences are also central to Smits, Ultee and Lammers' (1998) argument about the relationship between homogamy and national economic development (also Raymo and Xie 2000; Smits et al. 2000). This should translate into an inverted-U shaped trend in homogamy as the importance of education for socioeconomic attainment increases in the early stages of the modernisation process and decreases once prosperity allows individuals to choose partners on the basis of non-economic considerations. Economic arguments therefore yield conflicting predictions about trends in homogamy as levels of schooling rise over time and gender differentials become smaller.

A second set of arguments relates to changes in the timing of life-course transitions. Most relevant in this respect is Mare's (1991) hypothesis about the time gap between the completion of schooling and marriage. Mare argues that homogamous partnerships are more likely for individuals who marry shortly after leaving school and for the highly educated. This is because schools and universities structure individuals' social circles in the years prior to marriage and because higher levels of schooling are increasingly homogenous. Relative to other social settings, modern educational institutions can be considered highly efficient marriage markets because of their homogeneity with respect to age and heterogeneity with respect to sex (Blossfeld and Timm 2003). Grouping by age becomes important because school completion, entry into work and family formation are typically contiguous transitions. Readiness to marry is uncommon before individuals attain economic independence, and participation in full-time education ordinarily implies that young adults do not work. These forces would produce a structurally increasing likelihood of entering a relationship with a similarly qualified partner the longer one stays in the educational system. Inversely, individuals' exposure to more educationally heterogamous contexts, such as workplaces, increases with the lag between school departure and marriage. The life-course argument therefore predicts an inverse relationship between the strength of homogamy and the time gap between the two transitions.

2.2.3. Empirical studies on trends in educational assortative mating

The wealth of empirical studies about trends in educational homogamy across time and countries has produced ambiguous findings, partly due to inconsistencies in methodology and analytical focus (Hou and Myles 2008: 342-43; Blossfeld 2009: 516). The comparative study coordinated by Blossfeld and Timm (2003) suggests an increase in spousal educational resemblance in seven of the eight societies where analyses were carried out with a consistent approach.

The largest body of research focuses on North American societies. Most studies on the US find overall increases in homogamy but yield notable differences in its timing and incidence across social groups (Kalmijn 1991; Mare 1991; Qian 1998; Schwartz and Mare 2005). Mare's (1991) study, which employed data for the 1940-80 period, shows that the shortening of the gap between school leaving and marriage ages accounts for the bulk of the increase in the association between spouses' attainments up to the 1970s. These analyses were later extended by Schwartz and Mare (2005), who report a decrease in homogamy between 1940 and 1960 and a substantial increase over the next four decades, with the odds of entering a homogamous rather than a heterogamous union growing from 3.0 to 4.0 over that period. Their decomposition of the trend also reveals that declines in intermarriage at both the top and the bottom of the educational pyramid are the major components of the overall rise in homogamy since 1970. Hou and Myles (2008) obtain similar findings when comparing trends in Canada and the US.

Research on trends in educational assortative mating in the UK is surprisingly scarce. The longest series of absolute rates is reported in Chan and Halpin's (2003) study with data from the British Household Panel Study (BHPS). They show that the proportion of homogamous marriages declined from about 45% to 35% for men, and fluctuated around 40% for women, in cohorts born between 1924 and 1973, while upward marriages increased by more than 10% for men and declined by 5% for women (2003: 181). Further, their individual-level analyses indicate that greater time lags between school and marriage depress the chances of entering a homogamous partnership. Two studies using older data but reporting relative rates are that of Ultee and Luijkx (1990), which suggests a small decrease in the changes of heterogamy between 1949 and 1972 (1990: 135), and that of Smits, Ultee and Lammers (2000), which finds a decrease in homogamy between the older and younger cohorts of a sample drawn from cross-sectional data in 1979 (2000: 785-86).

Most similar in spirit to the analyses carried out in this chapter are Halpin and Chan's (2003) study and Chan's (2004) unpublished paper. Halpin and Chan (2003) compare trends in homogamy amongst newlyweds between the mid-1970s and mid-1990s in Ireland and Britain. For the latter country they rely on the

General Household Surveys (GHS) of 1973, 1986 and 1995. The British data reveal a decrease from 57% to 40% in the proportion of recently married couples who were educationally homogamous in 1973 and 1986, and virtually no change in the following decade. Relative rates reveal a similar trend, with the strength of homogamy declining sharply in the first period and rebounding slightly in the second. This stands in sharp contrast to the trend of a large and sustained increase in Ireland. Moreover, in both countries log-linear analyses support a quasi-symmetry pattern of association between the qualifications of spouses, and no tendency for women to marry upwards over and above gender differences in marginal distributions of attainment. Halpin and Chan (2003: 480) contend that the results for Britain are in line with Mare's argument about the time-gap between school completion and first marriage. In a follow-up paper Chan (2004) uses GHS data spanning from 1972 through 2001 to analyse trends in homogamy amongst newlyweds by marriage order and experience of cohabitation. The finding applying to all recent marriages is that the strength of the association between husbands' and wives' qualifications declined in a linear fashion between 1970 and the mid-1980s, and then stabilised at a lower level. This trend also holds for first marriages, although a minor difference is observed at the end of the series as homogamy rebounds during the 1990s for the latter group. However, the most substantial deviation is found in the steady and large decline of homogamy for remarriages. Chan also concludes that female hypergamy does not help characterise the general pattern of association.

The limited amount of research on trends in educational assortative mating in Britain can thus be summarised by noting the decrease in both absolute and relative rates of homogamy since the early 1970s and a slight increase for the post-1990 period. These findings place Britain as an outlier in relation to the trend towards increasing educational resemblance observed in many other industrialised societies.

My work in this chapter draws on insights from both the theoretical and empirical studies reviewed above. Specifically I analyse trends in educational attainment and educational homogamy amongst four cohorts of British parents between the late 1950s and early 2000s. I first seek to characterise changes in parental levels of schooling, paying special attention to the evolution of gender gaps. I then explore the overall pattern of association between mothers' and fathers' qualifications and trends in the strength of assortative mating and assess the goodness of fit of various models of association. By virtue of my data I am able to provide a more detailed characterisation of trends in attainment and extend the time period covered by prior studies on assortative mating. However, it must be borne in mind that my findings pertain to parental couples only. The sections below describe the special features of my samples and the modelling strategies I adopt to enhance comparability with prior research.

2.3. Data, analytic samples and variables

2.3.1. Data

My analyses rely on data from four longitudinal British cohort studies tracking the physical, educational, and socio-economic development of the aforementioned birth cohorts and containing extensive information on their families of origin. I use data relating to the ages, years of schooling and qualifications of the parents of the cohort members. In all four studies information is obtained directly from parental questionnaires, completed most often by each parent separately. I give priority to data from waves closest to the birth of the cohort child in order to minimise biases emerging from divorce and remarriage patterns, and because I am most interested in the effects of parental education during the children's early years. When information at baseline is missing or incomplete, I resort to data from latter surveys provided that parental figures remain the same across waves.

The first parental cohort is drawn from the NCDS, which takes as its subjects almost 17,500 children born in Great Britain in one week of 1958 (for an overview, see Shepherd 1995). Information on the second parental cohort comes from the BCS, which, replicating the design of the NCDS, surveyed over 17,000 babies born in Britain in one week of 1970 (for an overview, see Bynner et al. 1997). For both studies the population of inference is all children born in Britain in the corresponding year, as the target samples can be regarded as random samples of all births in the period of interest. I use NCDS data from the baseline (1958), second (1965) and third (1974) waves, all with response rates above 90%. From the BCS I use the baseline (1970) and second (1975) surveys, both with cross-sectional response rates over 80% (Plewis et al. 2004).

The third parental cohort is drawn from the LSYPE, a panel surveying about 16,000 youth aged 13-14 living in England in 2004[18]. The LSYPE cannot technically be considered a birth cohort study as its sample was constructed via schools; further, it followed a stratification procedure aimed at oversampling disadvantaged student groups (for an overview, see NatCen 2009). Nonetheless, the study fits the purpose of my inter-cohort comparison since, by construction, all children included in the LSYPE were born in 1990-91. The data I use here was collected in the initial 2004 survey, which achieved a 74% response rate.

The parents in the fourth cohort are those of the children of the MCS, which surveyed over 18,000 births in the UK over a twelve-month period starting in September 2000. The MCS sample was clustered geographically and disproportionately stratified to over-represent areas with high child poverty and higher proportions of ethnic minorities, as well as the smaller constituent countries (for an overview, see Hansen 2012). The data I employ come from the

[18] The fact that information on parental characteristics was collected 13-14 years after the child's birth has implications for the comparability of the LSYPE analytic sample with those from the other datasets, as discussed in the next section.

baseline (2001-02) and second (2004) surveys, yielding 68% and 78% response rates, respectively.

Given their complex design features, I apply weights to my analyses of LSYPE and MCS data[19], whereas no weighting is required when using NCDS or BCS data. Statistics reported in this chapter are therefore representative of the parents of children born (schooled in the case of the LSYPE) in Britain during the sampling periods.

Lastly, and for the sake of comparability across datasets, I restrict my analyses to England, Wales and Scotland. This entails excluding couples from Northern Ireland in the MCS, the only study providing data for the whole of the UK. Besides, because of the design of the LSYPE, the results obtained with its sample pertain to England only.

2.3.2. Analytic sample

Ultimately, the concern that guides this thesis relates to partners' resemblance in education and its implications for the intergenerational transmission of inequality. I hence construct my analytic samples for this chapter maintaining consistency with the eligibility criteria used in later chapters where other outcomes are examined. Given the very definition of assortative mating, the most relevant exclusion is that of single-parent households, and hence samples contain two-parent families only. Further, in restricting my analyses to couples with children I deviate, firstly, from the traditional focus of homogamy studies on prevailing marriages or newlyweds, and, secondly, from analyses of schooling patterns for different age groups of the adult population

[19] I adjust for these features by using STATA 'svy' survey commands and the sampling and non-response weights provided in the original data files, following recommendations by the Centre for Longitudinal Studies.

without reference to their relationship status or the presence of children in the household. These choices will have important implications for the interpretation of my analyses.

On the one hand, differences in both attainment and homogamy patterns will exist between couples with and without children given the impact of education on the likelihood and timing of childbearing (Martin 2004; Ratcliffe and Smith 2006). For instance, more educated women tend to bear fewer children and to do so at later ages. Given my reliance on birth cohort studies, the transition to parenthood operates as a critical filter for my analytic samples. My findings therefore pertain to parental couples only, and I claim no generalisation to childless couples even though they might be within the same age range.

Other likely sources of divergence, this time between subsets of the population of parental couples, are differential rates of divorce, remarriage and homogamy given remarriage across education groups (Harkonen and Dronkers 2006; De Graaf and Kalmijn 2003; Gelissen 2004). For example, for a given interval between data collection and either partnership formation or parenthood, we may lose from our sample more couples containing individuals with low levels of attainment than couples with higher levels of attainment if education is inversely related to the likelihood of marital dissolution. Similarly, homogamy estimates may vary between samples with partners in different age ranges if the prevalence of divorce and remarriage is high and the probability of entering a homogamous second marriage is higher for the highly educated than for those with low levels of schooling. These concerns are behind the convention in assortative mating research to differentiate between prevailing and recent unions, as the latter group is less exposed to selective dissolution and re-partnering by education. In other words, attainment and homogamy patterns for the overall stock of unions reflect the combined effects of all these processes, whereas patterns amongst recent unions are not confounded by selectivity on education at later transitions. In line with these premises, Kalmijn (1991) reports that the percentage of homogamous unions in the United

States rises as marriage cohorts age, suggesting that heterogamous couples dissolve at a higher rate. Likewise, Chan (2004) finds diverging trends in the association between spouses' qualifications when comparing first and higher-order marriages in Britain, suggesting that homogamy estimates will vary between samples including and excluding the latter.

With regard to my analyses, these biases are likely to affect the LSYPE sample most. This is because participants in this study only started being interviewed when aged 13-14 and parental information pertains to resident parental figures at that time and not necessarily to parents present during the child's early years. That is, in the LSYPE sample we observe either couples who have survived about 13 years together since the birth of the cohort child, or couples where the primary carer (most often the mother) has re-partnered after dissolution of the original union in the course of these 13 years. This should result in a higher degree of selectivity relative to the samples obtained from the other three datasets, where the time of survival is shorter[20].

My strategy to deal with these potential biases is to carry out separate analyses for two analytic samples, one including all

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[20] Furthermore, a greater loss of information occurs in the LSYPE given my exclusion of lone-parent families. About a third of all families in the original LSYPE sample are excluded from my analytic sample (15,570 vs. 9,948). This is mainly because at the time when information was first collected a large number of LSYPE children were living in lone-parent households and information is missing for more than 4,000 non-resident fathers. Therefore, despite having information on most mothers, the cross-tabulation of parental attainments yields 9,948 observations only. However, analyses (that are not shown here) revealed that the education attainment patterns of all mothers for whom information at baseline is available and those who remain in the cross-tabulation were surprisingly similar. This suggests that, amongst mothers, dissolution and/or remarriage episodes between the birth of their child and the 2004 survey did not greatly distort their attainment pattern in the analytic sample.

parental couples and another including parents of firstborn children (to the mother) only. For convenience, I henceforth refer to them as the overall and firstborn samples. Given prior selection on parenthood, the comparison between these two groups is analogous to that between prevailing and newlywed couples in their temporal exposure to union dissolution and assortative remarriage.

Table 2.1 presents the mean ages of parents at the birth of the cohort child for each sample and data point. As expected, the table reveals that parents in the firstborn sample tend to be younger. Further, it shows a reduction in the age gap between mothers and fathers in the overall and firstborn samples and an increasing prevalence of the latter type of families across datasets, trends which are consistent with the decline of fertility rates in Britain over the last few decades (Coleman 2000). The number of observations for each analytic sample is also presented in the first two columns of the table. These sizes result from missing data limitations and the additional selection criteria discussed below.

In both samples I further require mothers to be in the prime childbearing age range of 18-35 at the birth of the cohort child. This implies that the years of birth of the parental cohorts are 1923-40, 1935-52, 1955-72, and 1965-82, respectively[21], and therefore there is some temporal overlap between the first and second cohorts, on the one hand, and the third and fourth, on the other[22]. This overlap is likely to be minimal when the subsamples

[21] The age restriction is applied to mothers only. Consequently, some fathers' ages lie outside the 18-35 range, most often those between 36 and 45. I relaxed this restriction in the case of fathers to increase sample sizes, given a traditional age gap in favour of husbands. Hence, the year of birth of a minority of fathers lies outside the ranges indicated for each parental cohort.

[22] It is theoretically possible that parents in these overlapping year-of-birth ranges have children who are eligible for inclusion in two of the cohort studies. The issue of age ranges affects the study of trends in EAM by inducing temporal lags, although bands wider than the gap

of parents of firstborns are compared. With respect to marital status, the samples include both marital and cohabiting unions. Research on assortative mating tends to find few differences between the two groups with respect to sorting patterns (Blackwell and Lichter 2004; Chan 2004). Further, both couples with two biological parents and with one biological and one step-parent are included in my samples.

Table 2.1. Sample sizes and average parental ages at birth of the cohort child, by cohort

Parental cohort	All couples	Parents of firstborn children		Mean age of mothers at child's birth			Mean age of fathers at child's birth		
	N	N	%	All	First-born	*Diff.*	All	First-born	*Diff.*
1923-40	12,014	4,093	34.1	26.8	24.1	2.7	29.4	26.8	2.6
1935-52	15,899	5,106	32.1	26.0	23.3	2.7	28.9	26.3	2.6
1955-72	9,948	4,203	42.2	28.7	27.1	1.6	31.5	29.8	1.7
1965-82	12,890	6,139	47.6	29.5	28.3	1.2	31.9	30.7	1.1

Source: NCDS, BCS, LSYPE and MCS.

The issue of ethnic differences falls beyond the scope of this chapter. Ideally, given the pervasive influence of ethnicity on both attainment and intermarriage patterns (for evidence on Britain, see Modood 2005; Muttarak and Heath 2010) separate analyses would be carried out for each ethnic group. However, the small size of these ethnic subsamples in my datasets, particularly in the older ones, precludes this type of approach. Consequently I do not investigate these potential differences; nonetheless as a robustness check I replicate all analyses for a subsample of white parents only. These results can be found in the Appendix.

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between data points are conventionally used in EAM research (e.g. Schwartz and Mare 2005).

2.3.3. Parental educational attainments

The measurement of education poses various challenges to inter-cohort comparisons of attainment and homogamy trends. A consistent classification is required to ensure comparability over time, yet harmonisation tends to result in a loss of information given differences in schooling experiences between historical periods or, more simply, in the way that information is collected across datasets.

Inconsistent classifications of educational categories can prevent any meaningful interpretation of homogamy trends. Aggregation bias may arise as highly aggregated classifications lead to inflated homogamy estimates by grouping individuals at different levels of attainment (Wong 2003). In the case of temporal comparisons, heterogeneity in education amongst older cohorts is generally reduced when the bottom categories of the distribution are aggregated. Inversely, lack of differentiation at the top most often neglects heterogeneity in schooling experiences amongst recent cohorts (Hou and Myles 2008).

By spanning more than five decades, the attainment patterns of the parental cohorts covered in this chapter are subject to these problems. A fine-grained differentiation of attainment categories at both ends of the educational pyramid is problematic, in that these levels may yield very low cell frequencies (e.g. post-graduate degree holders in the cohorts born before WWII), which in turn generate estimation problems. Moreover, such detailed distinctions may not always be relevant for marital sorting. Given the practical impossibility of avoiding aggregation bias at one end of the distribution, I opt for a classification likely to err (i.e. reduce heterogeneity) on the side of older cohorts. This is justified given the focus in later chapters on parenting practices and child outcomes in families participating in the MCS. Furthermore, information on parental education is of better quality in later sources, and poorest in the NCDS.

After having experimented with different schemas, I base my analyses on a five-fold classification which recodes educational attainment into the following categories: [1] 'Below O-level or equivalent', [2] 'O-level or equivalent', [3] 'A-level or equivalent', [4] 'Non-degree higher education' and [5] 'University degree'. This schema is richer than those of previous homogamy studies using British data. By distinguishing between degree and sub-degree qualifications at the tertiary level, my five-fold classification adds one category to that of Halpin and Chan (2003), who grouped all types of post-secondary education. Nevertheless, differentiation between the lowest levels of attainment is admittedly poor in my schema; this is problematic for the NCDS and BCS cohorts, for whom the norm was to leave the educational system when the minimum school leaving age was reached. Thus, for these two cohorts the bottom category 'Below O-level or equivalent' groups respondents with less schooling than that established by law and respondents who only completed that minimum level. This aggregation was necessary in order to preserve comparability with later cohorts.

Another relevant issue concerns the specific measure of education. When available, in constructing my attainment variable, I prioritise information on specific qualifications as opposed to years of schooling. Relying on qualifications minimises the possibility that experiences of the same duration are coded as equivalent when occurring on different educational tracks. The focus on transitions between different stages of the school system reflects a hierarchy of educational experiences not just in terms of duration but also of curricular content and ability to validate learning. In this light, the educational career is seen as a sequence of 'branching points' at which individuals can either make the corresponding transition or leave. This is in line with the prevailing understanding of the attainment process in research concerned with social selection in education (Mare 1980). Comparative research on socio-economic attainment has also shown that the explanatory power of educational levels is consistently higher than that of years of schooling (Braun and Müller 1997; Schneider 2010), a finding consistent with a signalling interpretation of the effect of qualifications. Certificates are also more informative about the type of institutions attended, which arguably constitute different socialisation and marriage market settings (Blossfeld and Timm 2003). Furthermore, the high degree of differentiation in the British educational system in terms of programmes across countries and historical periods (e.g. comprehensive vs. tracking models at the secondary level; universities vs. polytechnics at the tertiary level; see Schneider 2008 for an overview) makes years of schooling a less informative indicator of attainment than qualifications for the purpose of my analyses[23].

In accordance with the above, my classification takes into account differences between academic and vocational tracks. When respondents report both types of credentials, attainment is assigned according to the highest of these; however, academic credentials are taken to reflect higher achievement in the education system. As such, category [5] in my final classification corresponds to university-level, academic only qualifications, encompassing both first and higher degrees. Category [4] groups certificates in higher education at the sub-degree level, such as teaching or nursing diplomas, plus the highest vocational certificates. Category [3] captures the highest layers of attainment at the secondary level as it includes A-level academic certificates and equivalent vocational diplomas. Category [2] corresponds to lower secondary education, encompassing O-levels and high GCSE grades, and intermediate vocational certificates. Lastly,

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[23] I nonetheless constructed a classification based on completed years of schooling similar to that most commonly used in the North American literature, comprising the following categories: <=9, 10-11, 12, 13-15, 16>=. The results were unsatisfactory because transitions between stages of schooling in the British system are not adequately captured by duration cut-offs such as the 12 years required for high school completion in the US system, with minimal streaming and standardised credentials at the secondary level.

category [1] groups respondents with the lowest certificates or no qualifications at all. There are two exceptions to the above guidelines. The first relates to the lack of information of specific qualifications in the NCDS, and in this case I rely solely on the number of completed years of schooling[24]. The second pertains to the 'university' category in the original BCS variable, which does not differentiate between degree and non-degree qualifications. In order to preserve the distinction, here I rely on years of education instead. The recording procedures and names of the original variables used in each dataset are detailed in Table A.2.1 in the Appendix.

Within-couple measures of educational similarity are derived from the five-fold classification. Homogamy is operationalised as a dichotomous indicator adopting value 1 when both partners have attained the same level and 0 otherwise. Educational distance is captured by a series of dummies indicating absolute numerical difference between partners' categories of attainment (1, 2, 3 or 4), keeping homogamy as the reference category.

2.4. Methods

I identify trends in educational attainment and educational homogamy by analysing cross-tabulations of parental qualifications for each cohort. On the other hand, I rely on log-linear models designed for the analysis of categorical data and

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[24] Changes in the age of minimum school leaving age complicate matters further. Some members of the NCDS parental cohort completed their schooling under the 1918 Education Act, which enforced compulsory education up to age 14. The younger members of the cohort, however, experienced the changes introduced by the 1944 Education Act in England and Wales, which included the raising of the school leaving age to 15. When constructing the attainment variable for the NCDS parents, I take into the account their year of birth in order to assign them to either of these groups.

conventionally applied to assortative mating and social mobility research (Xie 2003; Powers and Xie 2008). These tools enable the observation of relationships in cross-tabulations constructed from sample data, and I employ them to assess whether these relationships are likely to exist in the populations from which the samples are drawn.

Formally, let the tables be defined by two response variables R and C classifying mothers' and fathers' education in i and j categories, respectively, such that their marginal and joint frequency distributions are displayed in the row and column totals and in the cells of the R x C matrix, respectively. Further, let f_{ij} denote the observed frequency for the cell of the ith row and the jth column, and F_{ij} denote the expected frequency under some model of association to be specified. Examples below refer to the simplest case of a *2* x *2* table, but all properties hold for cases where $i = j > 2$.

The first stage of my analysis will describe attainment patterns by way of a comparison of the marginal distributions of these contingency tables. These marginals show the proportion of mothers and fathers with given levels of education in each cohort, thus illustrating which parental levels of schooling are becoming more and less prevalent and how gender differentials are evolving over time.

The second stage involves describing homogamy patterns in various steps following the conceptual distinction between absolute and relative rates of homogamy. Absolute rates are expressed by the percentage of respondents that marry homogamously (i.e. along the diagonal cells of the contingency table, whenever i=j) or heterogamously ($i \neq j$), as well as the proportions marrying upward (i>j) or downwards (i<j) amongst the latter. Further, depending on the number of categories defined, distinctions can be made between short-range ($|i-j|=1$) and long-range ($|i-j|>1$) heterogamous matches. I use these simple homogamy and outflow percentages as they are convenient tools for showing different propensities to form partnerships with individuals at the same or other levels of education and can be readily derived from the cross-tabulation of R and C.

A critical limitation of these percentages is their dependence on the marginal distributions of R and C. For instance, when attainment category [1] is highly prevalent amongst men, the probability that a woman in either category [1] or [2] partners up with a man in category [1] increases automatically. By the same token, the overall percentage of homogamous unions increases if the same categories of attainment are highly prevalent amongst both sexes and decreases if different categories become the norm. The same holds for expected frequencies under independence. However, it is important to note that, despite their eye-balling simplicity, both the marginal distributions of parental attainments and absolute rates of homogamy are indicative of the composition of children's families in terms of education. Thus, they are of primary interest when the focus is placed on the effects of parental education on the outcomes of the next generation.

Research on assortative mating is however mainly concerned with relative rates. These measure the chances that respondents with different levels of education have of entering specific marriages. For instance, we may want to know how the chances of marrying a man in attainment category [1], rather than category [2], differ between women in attainment categories [1] and [2]. The fundamental building blocks of this type of analysis are odds-ratios (θ), defined as the ratio of the odds of a match occurring in one category to the odds of it occurring in another category. Two features of odds-ratios are particularly useful for the study of educational homogamy. Firstly, they are easily interpretable vis-à-vis a numerical reference: when $\theta > 1$ the match at stake is more likely to occur in the first category than in the second, whereas $\theta < 1$ indicates the opposite and $\theta = 1$ implies an equal likelihood. Secondly, and most importantly, odds-ratios allow a comparison of homogamy rates across categories because they are invariant to changes in the total sample size and in the row and column marginal distributions. It is in this respect that odds-ratios can be taken to capture the association between the mothers' and fathers' education (Kalmijn 1998).

In order to measure the strength of the association between these two variables and its evolution over time, the main stage of my analyses involves fitting a series of log-linear models to their observed frequencies in cross-tabulation. Log-linear models build on odds-ratios and are the most common specification of association models in homogamy research. They can be formalised as generalised linear models assuming a Poisson distribution for count data (Powers and Xie 2008: 83-87). A general log-linear model can be written as:

$$log\ (F_{ij}) = \lambda_0 + \lambda^R_i + \lambda^C_j + \lambda^{RC}_{ij} \qquad (2.1),$$

where F_{ij} denotes the expected frequency of the ij cell, λ_0 is the grand mean effect, λ^R_i and λ^C_j are the marginal row and column effects (i.e. the effects of the marginal distributions of schooling), respectively, and λ^{RC}_{ij} the interaction effect between R and C (i.e. the association between mothers' and fathers' education). It is common practice to saturate the marginal distributions of R and C by leaving λ^R_i and λ^C_j unconstrained so that the observed marginal totals exactly match those estimated under the model. This implies that the association between the two variables is then captured by the λ^{RC}_{ij} interaction term, which is a function of the odds-ratios in the table.

The interest therefore centres on the pattern of association between R and C, whose extreme forms are independence (i.e. $\lambda^{RC}_{ij} = 0$) and full saturation of the model yielding exact predictions (i.e. $F_{ij} = f_{ij}$ for all i and j) but leaving no residual degrees of freedom. Models with specifications of λ^{RC}_{ij} lying between these two extremes can be fitted with the aim of getting closer to reproducing the frequencies using as few degrees of freedom as possible.

Theoretically informed hypotheses about the pattern of association between R and C come into play in the design of these models. In line with the discussion in Section 2.2 and replicating prior research, I first explore the general pattern of association fitting the following sequence of models: M1 tests the independence of parental attainments in the sorting process by fitting only their marginal distributions at each of the time periods. M1 is hence used as a baseline relative to which additional hypotheses are introduced, with these marginal effects maintained in all subsequent models. M2 ('Single-diagonal') and M3 ('Variable-diagonal') capture the general tendency to marry with similarly educated individuals by fitting parameters for the cells on the main diagonal of the table. Hence, the models address the hypothesis that, once the tendency towards homogamy has been taken into account, matching occurs at random in the off-diagonal cells. M2 introduces a single parameter for the whole diagonal, assuming this tendency does not vary in its strength across educational categories. M3 removes this constraint by fitting a separate parameter for each cell on the main diagonal –i.e. for homogamy at each level of attainment.

The next two models explore another force likely to play a role in the matching process, namely the avoidance of partnerships with those distant in status. Adding to the tendency towards homogamous partnerships, M4 ('Absolute-distance') and M5 ('Crossings') capture effects in the off-diagonal regions of the table. M4 specifies distance as the absolute numerical difference between the parents' categories of attainment, assuming that the gap is equivalent between any pair of adjacent categories. M5, on the contrary, relaxes this assumption and allows the difficulty of crossing these boundaries to vary by fitting a separate parameter for each specific transition. M6 ('Female hypergamy') introduces the complementary hypothesis that the propensity to marry upwards on the educational scale differs between men and women, contrary to the assumption of 'no difference' in this respect made by all preceding models. It does so by fitting an additional parameter for the cells where the male partner is more educated. Finally, M7 ('Quasi-symmetry') explores the equality of row and column probabilities without imposing constraints on the differences in marginal distributions. This is a less demanding condition than perfect symmetry, which assumes the same row and column probabilities for all pairs of cells and therefore identical main effects.

The association parameters fitted by each of these models are shown in matrix form in Figure 2.1. The lack of interactions with the time variables implies that none of these models allows for temporal variation in the association between *R* and *C*.

The next step of my analyses is to incorporate a temporal dimension to the pattern of association between spouses' qualifications. This involves extending the general set-up by introducing a time layer denoted by *L* and indexed by *k* categories. In the case at stake $k=(1, \ldots, 4)$ representing each of the four parental cohorts. The interest now shifts to the pattern of association of *R* and *C* across *L*, which can be modelled adopting a conditional approach generalised from the models above (Powers and Xie 2008: 109-113). Let F_{ijk} denote the expected frequency in the *i*th row, the *j*th column, and the *k*th layer. A saturated log-linear model with all possible interactions between *R*, *C* and *L* would thus adopt the form:

$$log\ (F_{ijk}) = \lambda_0 + \lambda^{R}_{i} + \lambda^{C}_{j} + \lambda^{L}_{k} + \lambda^{RC}_{ij} + \lambda^{RL}_{ik} + \lambda^{CL}_{jk} + \lambda^{RCL}_{ijk} \qquad (2.2),$$

where the recurring terms are as above and where λ^{RL}_{ik} and λ^{CL}_{jk} represent the variation over time in the row and column marginal effects, respectively, and λ^{RCL}_{ijk} represents the three-way interaction. The association of *R* and *C* and its variation over time are captured by the terms λ^{RC}_{ij} and λ^{RCL}_{ijk}. The baseline model for conditional independence thus becomes:

$$log\ (F_{ijk}) = \lambda_0 + \lambda^{R}_{i} + \lambda^{C}_{j} + \lambda^{L}_{k} + \lambda^{RL}_{ik} + \lambda^{CL}_{jk} \qquad (2.3).$$

Figure 2.1. Models of association. Parameters fitted

INDEPENDENCE

0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0

SINGLE-DIAGONAL

1	0	0	0	0
0	1	0	0	0
0	0	1	0	0
0	0	0	1	0
0	0	0	0	1

VARIABLE-DIAGONAL

1	0	0	0	0
0	2	0	0	0
0	0	3	0	0
0	0	0	4	0
0	0	0	0	5

ABSOLUTE DISTANCE

0	1	2	3	4
1	0	1	2	3
2	1	0	1	2
3	2	1	0	1
4	3	2	1	0

FEMALE HYPERGAMY

0	1	1	1	1
0	0	1	1	1
0	0	0	1	1
0	0	0	0	1
0	0	0	0	0

CROSSING 1

0	1	1	1	1
1	0	0	0	0
1	0	0	0	0
1	0	0	0	0
1	0	0	0	0

CROSSING 2

0	0	1	1	1
0	0	1	1	1
1	1	0	0	0
1	1	0	0	0
1	1	0	0	0

CROSSING 3

0	0	0	1	1
0	0	0	1	1
0	0	0	1	1
1	1	1	0	0
1	1	1	0	0

CROSSING 4

0	0	0	0	1
0	0	0	0	1
0	0	0	0	1
0	0	0	0	1
1	1	1	1	0

QUASY-SYMMETRY

1	0	0	0	0
0	2	6	7	8
0	6	3	9	10
0	7	9	4	11
0	8	10	11	5

Source: Own elaboration.

By conditioning on equation (2.3), it is the specification of $\lambda^{RC}{}_{ij}$ and $\lambda^{RCL}{}_{ijk}$ that defines the pattern and trend of homogamy. A straightforward way of testing whether the posited pattern of association can be assumed to remain constant over time is to interact the association parameters with the layer variable, as done by models M8 to M11. Despite revealing whether variation over time exists or not, these specifications come at the expense of substantial drops in the remaining degrees of freedom and do not provide a single summary measure of changes to the strength of such an association.

A more parsimonious way to examine variation over time in the association between *R* and *C* is to specify a log multiplicative layer-effect or uniform difference model (Xie 1992) –'unidiff' for short. Unidiff models are the standard methodological choice for the study of overall trends in homogamy (e.g. see Halpin and Chan 2003; Hou and Myles 2008). They assume that the association between *R* and *C* adopts the same pattern across layers but allows its strength to differ across them. Technically, a set of baseline odds-ratios is assumed for all tables while a layer-specific parameter modifies the strength of these odd-ratios in a uniform manner. This is a parsimonious specification as only (k-1) degrees of freedom are used to test for three-way interactions between *R*, *C* and *L*. The model becomes:

$$log\,(F_{ijk}) = \lambda_0 + \lambda^{R}{}_{i} + \lambda^{C}{}_{j} + \lambda^{L}{}_{k} + \lambda^{RL}{}_{ik} + \lambda^{CL}{}_{jk} + \gamma_{ij}\,\theta_k \qquad (2.4),$$

where γ_{ij} denotes the two-way association between *R* and *C* and the θ_k parameters indicate the layer-specific deviations in the strength of the association from an arbitrarily chosen reference point. Temporal differences in the strength of homogamy can therefore easily be described according to these layer parameters. Models M12 to M15 test four patterns of association above (M4 to M7) with a unidiff specification.

The logic behind this sequence of models is to evaluate, on the analytic sample, models of association that are hypothesised to exist in the population from which the latter is drawn. This is done by assessing the fit of the observed to the expected frequencies if the posited model were true within the limits of sampling error. In other words, assuming that a given pattern of association exists in the population, what is the probability of observing the values in the sample data?

In order to decide whether to accept a given model, I report its residual degrees of freedom alongside three conventional measures of goodness-of-fit. The first is the likelihood-ratio chi-squared statistic (G^2), which compares the log-likelihoods of the restricted model under assessment and of an implicit saturated model (G^2=0) that parameterises all observed frequencies and fits the data perfectly. G^2 can therefore be understood as the deviance in log-likelihood between the two models. Always non-negative, larger values of G^2 indicate larger discrepancies between the observed and the fitted values, and thus a poorer model fit. As an indication of the increases in explanatory power brought about by each successive model, I report the percentage reduction in the log-likelihood relative to the model of conditional independence (rG^2). This indicates how much of the association between *R* and *C* is accounted for by each particular model.

The second measure is the Bayesian Information Criterion (BIC), which compares the adequacy of two models as a ratio in likelihood rather than a departure from a specific benchmark (Raftery 1995). BIC proposes an alternative approach to identifying improvements in model fit from the inclusion of additional variables. By imposing a heavier penalty than G^2 on the use of additional degrees of freedom, BIC favours simpler, more parsimonious model specifications. The divergence between the two measures is most evident when dealing with large samples, a situation in which model comparisons using G^2 tends to be inconclusive given the poor fit of most specifications. Another advantage of BIC is that it can also be used to compare non-nested models[25]. Lower values of the BIC statistic indicate a better fit – i.e. a greater likelihood of the model being true given the data.

The third measure is the Index of Dissimilarity (ID) between observed and expected values in the hypothesised model of association. The ID indicates the percentage of observations that are misclassified under the latter or, in other words, that would have to change cells in order for the observed and expected distributions to be identical. The ID is commonly used as a descriptive device with no measure of associated uncertainty. As shown by Kuna and Firth (2011), the approximate variance formula of the ID works well with large sample sizes that can provide clear evidence of lack of fit, which is the situation in this chapter. With smaller sample sizes and non-significant evidence against the model of interest, however, the ID may suffer from problems of accuracy.

2.5. Results

This section discusses the results of my analyses of trends in educational attainment and educational homogamy amongst four parental cohorts in Britain from the late 1950s through to the early 2000s. First, a comparison of the marginal distributions of parental qualifications in each cohort allows me to illustrate changes over time in levels of parental schooling and to explore whether their magnitude was similar for mothers and fathers. I subsequently investigate levels of homogamy and hypergamy in each cohort, as well as the pattern of association between spouses' qualifications, and whether its strength changed over time. I answer the latter questions by analysing both absolute and relative rates of

[25] The virtues and shortcomings of BIC as a criterion for model selection have been thoroughly discussed. See, for example, the February 1999 issue of *Sociological Methods and Research,* which is devoted to this subject.

homogamy. Lastly, I discuss potential interpretations of my findings.

2.5.1. Parental educational attainments

Tables 2.2 and 2.3 present the cell, row and column percentages resulting from the cross-tabulation of partners' levels of education in each cohort for the overall and firstborn samples, respectively. Distributions are unweighted for the NCDS and BCS cohorts, and weighted for their LSYPE and MCS counterparts. A comparison of row and column totals across sub-tables illustrates the well-known upward shift in average levels of educational attainment throughout the twentieth century. Changes between the first two cohorts mainly reflect the expansion of participation in lower and upper secondary education. Changes since 1970 are most pronounced in higher education. It must be noted that the intervals between data points are not uniform, the largest being that between the BCS and LSYPE cohorts. Their comparison may thus magnify the pace of change.

As shown in Table 2.2, the percentage of fathers and mothers leaving school with minimum or no qualifications declined drastically between 1958 and 2000 from over 60% to around 20% members of each parental cohort. The reduction was greatest in the earlier period of the series and initially larger for fathers; by the end of the century, though, a smaller proportion of mothers than fathers were leaving the system with basic or no formal educational certificates.

Elementary schooling was replaced as the most common level of attainment with the 1970 cohort as about 50% of its members completed up to secondary levels of education. This percentage then declined as higher education became more common but remained over 40% for both sexes in subsequent cohorts. A significant difference at intermediate levels of schooling is that in all four cohorts more fathers than mothers completed A-level or equivalent qualifications, the opposite being true for O-level qualifications or equivalent. This does not translate into differential transition rates to higher education but suggests different track choices at the secondary level between men and women, with more fathers than mothers completing vocational qualifications that classify them into category [3].

Tertiary levels of attainment grew consistently over time, from about 10% of parents of the 1958 cohort to around 40% by 2000. Until 1970 higher education remained the privilege of a minority and was dominated by non-degree programmes such as teaching or nursing. Throughout the 1980s and 1990s, however, the upward trend was driven by the growing numbers of university graduates. The increase was most striking amongst mothers, as female degree holders tripled between the 1970 and 1990 cohorts and doubled again by 2000.

Gender gaps in average levels of schooling peaked in 1970. The prevalence of basic qualifications in the previous cohort limited the scope for differential patterns of attainment. As secondary education expanded greatly in the post-war era, though, males initially outpaced females in the overall rise in qualifications. Relative attainment gaps in favour of fathers were highest in the 1970 parental cohort, especially with respect to basic (fathers 34% vs. mothers 41%) and A-level qualifications (29% vs. 22%). Later on, differences became minimal or even reversed in the 2000 cohort.

Trends in attainment are remarkably similar for parents of firstborn children, as shown in Table 2.3. The largest differences between samples are visible with respect to basic qualifications in the NCDS cohort, as its youngest members were affected by a rise in the minimum school leaving age introduced by the Education Act of 1944.

Table 2.2. Cross-tabulation of parental educational attainments, by cohort. Cell, row and column percentages. All parental couples

				Father			
NCDS (N=12,014)		[1]	[2]	[3]	[4]	[5]	Total
Mother	[1]	48.00	7.74	4.39	1.83	0.52	62.48
Mother	[2]	9.31	7.99	2.27	1.19	0.49	21.25
Mother	[3]	2.73	1.76	2.22	1.47	0.43	8.62
Mother	[4]	1.17	0.78	1.24	1.91	0.95	6.05
Mother	[5]	0.15	0.08	0.12	0.27	0.98	1.60
	Total	61.36	18.36	10.24	6.67	3.37	100.00
BCS (N=15,899)				Father			
		[1]	[2]	[3]	[4]	[5]	Total
Mother	[1]	26.25	7.54	4.90	1.32	0.59	40.61
Mother	[2]	5.80	10.18	6.44	2.35	1.37	26.13
Mother	[3]	0.72	2.87	15.00	2.41	0.96	21.96
Mother	[4]	0.62	1.00	2.26	2.24	1.47	7.59
Mother	[5]	0.12	0.28	0.45	0.38	2.48	3.70
	Total	33.52	21.87	29.05	8.70	6.87	100.00
LSYPE (N=9,948)				Father			
		[1]	[2]	[3]	[4]	[5]	Total
Mother	[1]	13.52	7.86	3.83	1.97	1.31	28.50
Mother	[2]	8.20	10.96	6.83	3.21	2.48	31.70
Mother	[3]	2.57	4.10	3.49	2.16	2.10	14.41
Mother	[4]	2.00	3.31	2.93	2.62	2.91	13.78
Mother	[5]	0.84	1.17	1.77	1.41	6.42	11.61
	Total	27.14	27.41	18.85	11.37	15.22	100.00
MCS (N=12,890)				Father			
		[1]	[2]	[3]	[4]	[5]	Total
Mother	[1]	8.34	4.53	3.16	1.71	0.96	18.71
Mother	[2]	6.85	8.90	6.92	4.46	2.24	29.37
Mother	[3]	2.41	3.54	3.72	2.36	1.74	13.78
Mother	[4]	2.22	3.30	3.78	4.13	3.61	17.03
Mother	[5]	0.88	1.54	2.56	3.04	13.09	21.11
	Total	20.71	21.80	20.15	15.70	21.64	100.00

Notes: [1]=Below O-level or equivalent, [2]=O-level or equivalent, [3]=A-level or equivalent, [4]=Non-degree higher education, [5]University degree. Entries in the first five columns and rows are cell percentages. Entries in the last column and row, in bold character, are row and column percentages, respectively.

Table 2.3. Cross-tabulation of parental educational attainments, by cohort. Cell, row and column percentages. Parents of firstborn children

NCDS (N=4,093)		Father					
		[1]	[2]	[3]	[4]	[5]	Total
Mother	[1]	36.72	10.70	4.45	1.69	0.54	54.09
	[2]	11.07	11.87	3.10	1.78	0.78	28.61
	[3]	2.76	1.91	2.52	1.47	0.49	9.14
	[4]	1.20	0.93	1.39	2.03	1.00	6.55
	[5]	0.10	0.07	0.22	0.17	1.05	1.61
	Total	51.84	25.48	11.68	7.13	3.86	100.00
BCS (N=5,106)		Father					
		[1]	[2]	[3]	[4]	[5]	Total
Mother	[1]	20.94	7.74	4.92	1.14	0.57	35.29
	[2]	6.35	10.95	7.72	3.02	1.59	29.61
	[3]	0.72	2.15	14.38	2.82	1.21	21.29
	[4]	0.69	1.04	2.78	2.80	1.74	9.05
	[5]	0.20	0.35	0.55	0.43	3.23	4.76
	Total	28.89	22.23	30.34	10.20	8.34	100.00
LSYPE (N=3,792)		Father					
		[1]	[2]	[3]	[4]	[5]	Total
Mother	[1]	11.65	6.91	3.29	2.00	1.29	25.14
	[2]	8.44	11.63	7.04	3.60	2.30	33.01
	[3]	2.35	4.49	3.83	2.06	2.35	15.08
	[4]	2.31	3.65	2.86	2.55	3.01	14.38
	[5]	0.88	1.20	1.71	1.57	7.04	12.40
	Total	25.64	27.88	18.72	11.77	15.99	100.00
MCS (N=6,139)		Father					
		[1]	[2]	[3]	[4]	[5]	Total
Mother	[1]	6.19	3.98	3.14	1.58	0.73	15.62
	[2]	6.19	8.69	6.59	4.00	2.24	27.71
	[3]	2.95	4.22	4.24	2.36	1.76	15.54
	[4]	2.41	3.34	4.09	4.02	3.75	17.60
	[5]	0.98	1.74	3.26	3.78	13.77	23.53
	Total	18.71	21.97	21.32	15.74	22.26	100.00

Notes: [1]=Below O-level or equivalent, [2]=O-level or equivalent, [3]=A-level or equivalent, [4]=Non-degree higher education, [5]University degree. Entries in the first five columns and rows are cell percentages. Entries in the last column and row, in bold character, are row and column percentages, respectively.

Overall, the temporal comparison between the average levels of parental education reveals a trend towards increasing heterogeneity in qualifications and higher stocks of human capital in the adult population. Children born at the end of the century are growing up with parents evenly distributed across the five attainment categories. In sharp contrast, about four fifths of the children born four decades earlier were raised by parents who had completed only basic lower secondary schooling. *Moreover, mothers' and fathers' qualifications have become increasingly symmetrical since 1970.*

Although comparisons with other studies are hindered by different age bands and number of attainment categories, the marginal distributions shown in Tables 2.2 and 2.3 are broadly consistent with the figures reported by Chan and Halpin (2003: 175) and Smith (2000: 209). This provides reassurance that the attainment patterns obtained for my parental cohorts do not deviate from the overall trends for the British population.

2.5.2. Absolute rates of educational homogamy

Tables 2.4 and 2.5 offer a first approximation to the trend in educational sorting by presenting absolute rates of homogamy in each parental cohort for the overall and firstborn samples, respectively. These absolute rates take the form of percentages of marriages with different combinations of parental attainments.

The first column in both tables unambiguously signals a decreasing trend in the proportion of spouses sharing their level of education across cohorts, from more than half of all parental couples being educationally homogamous in the post-war decades down to between a third and a fourth in the more recent years. Whereas the prevalence of homogamy already declined between 1958 and 1970, it was during the following twenty years that the trend became most pronounced, dropping from 56% to 37% in

1990. Between the last two parental cohorts, however, there is no change in the proportion of homogamous unions. The trend is similar for the firstborn sample albeit the starting level in 1958 is lower. This suggests that the high percentage of NCDS mothers and fathers sharing their level of qualifications owes much to a distribution of attainment largely skewed towards the lowest levels of schooling, especially in the overall sample. In fact, another look at Tables 2.2 and 2.3 confirms that top-left cells of the diagonal of the NCDS panel accounts for the majority of the homogamous couples, with 48% of all couples in the overall sample being composed by two parents with only elementary qualifications. As the marginal distributions of schooling became increasingly uniform over time, however, the percentage of homogamous couples first declined and then stabilised throughout the 1990s. Further, in 2000 it is the bottom right cell of the main diagonal, representing couples where both partners hold university degrees, that makes the largest contribution to the overall rate of homogamy. It must be recalled that these percentages are highly sensitive to the number of, and cut-offs between, the categories of education used in the analyses. Even so, my absolute homogamy rates for 1970, 1990 and 2000 are clearly in line with those obtained by Halpin and Chan (2003: 484) for 1973 (57%), 1986 (41%) and 1995 (40%) using GHS data and a four-fold classification.

The evolution of heterogamy is of course the inverse of that of homogamy, but its division into short- and long-range heterogamy has more interest. This analysis is presented in columns 2 to 4 of Tables 2.4 and 2.5. Remarkably, the overall increase in the percentage of heterogamous couples appears to be predominantly accounted for by the growth in the share of couples where partners are two or more educational categories apart, as opposed to just one level away. For both the overall and firstborn samples long-range heterogamy nearly doubled between the first and last two parental cohorts, representing more than a fourth of all couples in both 1990 and 2000. This is surprising given the more modest increase in short-range heterogamy and the fact that partners two or more categories apart have crossed at least one of the divides between elementary, secondary and higher education. Short-range heterogamous marriages, by contrast, may occur within such broadly-defined attainment levels. Long-range heterogamy is therefore more likely to correlate with larger differences in the earnings power or cultural tastes of spouses.

Table 2.4. Percentage of homogamous, heterogamous and hypergamous marriages, by cohort. All parental couples

	Homogamy	Heterogamy			Hypergamy	Hypergamy
	$i=j$	$i \neq j$	$\lvert i-j \rvert=1$	$\lvert i-j \rvert>1$	$i<j$	as % Het.
NCDS	61.11	38.89	25.01	13.88	21.28	54.72
BCS	56.15	43.85	29.17	14.68	29.35	66.93
LSYPE	37.04	62.96	36.40	26.56	34.66	55.05
MCS	38.19	61.81	34.63	27.18	31.69	51.27

Notes: i =mother's education, j=father's education. Entries are percentages of the total number of couples in each type of marriage in each cohort.

Table 2.5. Percentage of homogamous, heterogamous and hypergamous marriages, by cohort. Parents of firstborn children

	Homogamy	Heterogamy			Hypergamy	Hypergamy
	$i=j$	$i \neq j$	$\lvert i-j \rvert=1$	$\lvert i-j \rvert>1$	$i<j$	as % Het.
NCDS	54.18	45.82	30.81	15.01	26.00	56.74
BCS	52.27	47.73	31.73	16.00	32.47	68.03
LSYPE	36.69	63.31	36.38	26.93	33.85	53.47
MCS	36.91	63.09	34.96	28.13	30.13	47.76

Notes: i =mother's education, j=father's education. Entries are percentages of the total number of couples in each type of marriage in each cohort.

The pattern of heterogamy with respect to sex is revealed in the last two columns of Tables 2.4 and 2.5. In the overall sample female hypergamy increased between 1958 and 1990 from about

21% to about 35% of couples and decreased slightly by 2000. While the proportion of unions where the wife is less educated than the husband peaks in 1990, hypergamy as a proportion of heterogamous couples reached its height (67%) in 1970, as previously discussed differences in attainment patterns would suggest. Given a match where spouses have different amounts of schooling, the traditional pattern of female hypergamy is more common than its opposite (i.e. the female partner marrying downwards) in all cohorts and for both samples, with the exception of parents of firstborn children in 2000. Moreover, the gender asymmetry in heterogamous marriages is rather small, in the magnitude of 5%, in all periods but 1970, when female hypergamy becomes clearly dominant. These patterns must again be linked to changes in the marginal distributions of attainment across cohorts.

A detailed breakdown of trends in homogamy and heterogamy by gender and level of attainment is presented in Tables A.2.2 and A.2.3 in the Appendix. On the one hand, the tables confirm that the main component of the reduction in the overall rate of homogamy is the decrease of couples where both partners have elementary schooling. At intermediate and high levels of attainment, on the other hand, fluctuations do not show any clear pattern. The most relevant exception is the increasing tendency of males with higher education to secure marriages with equally educated women; for instance, in the overall sample homogamy amongst male university graduates increased from 29% in the 1958 cohort, up to 60% in the 2000 cohort. Over the same period, downward marriages decreased (from 67% to 54%) and upward marriages went up (from 4% to 19%) for husbands with non-degree higher qualifications. In both cases, the sorting patterns for husbands evolved to approach the corresponding patterns for wives. These trends suggest increasing assortative mating amongst individuals with higher education, and therefore less permeability in the boundary between secondary and post-secondary levels. Another interesting feature is the difference in the propensity of individuals with A-level qualifications to marry downwards, consistently higher amongst men.

In summary, *absolute rates of homogamy suggest a decline in the strength of assortative mating in Britain between the middle and the end of the past century*. Of particular significance is the *growth in the share of couples where parental qualifications are dissimilar by more than one category, and the even share of heterogamous couples where the mother is more educated and where the father is more educated since the 1980s*. However, the pattern of educational sorting revealed by these absolute rates cannot be disentangled from shifts in parental levels of attainment across cohorts. By construction, as the latter change, so does the likelihood and significance of a particular combination of parental qualifications. Relative rates of homogamy, on the contrary, measure the strength of the association between partners' education net of changes in their overall distributions.

2.5.3. Relative rates of educational homogamy

As discussed in the methodology section, relative rates of homogamy are revealed by log-linear models applied to contingency tables of spouses' levels of education. The sequence of models I explore was described in Section 2.4 and Figure 2.1. Goodness-of-fit statistics for these models are now presented in Tables 2.6 and 2.7 for the overall and firstborn samples, respectively. Unless stated otherwise, the discussion below refers to results for the overall sample.

The general pattern of association. Models M1 to M7 in Panel A explore the general pattern of association between parental qualifications, ignoring the possibility of variation over time. M1 posits conditional independence –i.e. a complete lack of association— adjusting solely for the marginal distributions of parental attainments in each cohort and serving as a yardstick for the assessment of more complex models. In line with the evidence presented above, the model of independence provides a very poor fit to the data on all three measures. Models M2 and M3 build on the former by capturing individuals' propensity to enter homogamous marriages (strictly defined). M2 fits a single parameter for the main diagonal under the assumption that this tendency does not vary across attainment categories, whereas M3 fits a separate parameter for each level of education.

Both models represent a substantial improvement over the baseline but M3 is to be preferred as it further reduces G^2, BIC and ID relative to M2 at the expense of only 4 additional degrees of freedom (G^2_{M2} -G^2_{M3}=3,040.3; df_{M2}-df_{M3}=4; *p*: .000). Since the data clearly supports the hypothesis that the strength of homogamy differs across levels of education, subsequent models build on the variable-diagonal specification.

M4 and M5 model the difficulty of marrying between different categories of education. M4 fits a parameter for each value of their absolute numerical difference, whereas M5 fits a parameter for each specific crossing (e.g. between O-level and A-level qualifications). Both models now account for about 90% of the residual G^2 under independence and misclassify only around 7% of the cases. More importantly, they bring about further improvements in fit relative to the variable-diagonal model. The performance of M4 and M5 is very similar according the BIC and ID measures, although the G^2 test would suggest that M4 fits the data slightly better (G^2_{M5} -G^2_{M4}=12.9; df_{M5}-df_{M4}=1; *p*: .001). Both the absolute distance and crossing specifications are nonetheless kept for subsequent tests. The hypergamy model M6 introduces an additional parameter for matches where the wife is less educated than the husband. This translates into a minimal improvement in fit relative to M5 but no change vis-à-vis M4. Lastly, M7 explores the symmetry of row and column probabilities. According to G^2, this quasi-symmetry model yields a minimal improvement in fit over M4 (G^2_{M4} -G^2_{M7}=7.6; df_{M7}-df_{M4}=2; *p*: .020), although the BIC statistics would favour the latter instead.

Table 2.6. Goodness-of-fit of log-linear models of association. All parental couples (N=50,755)

A. Pattern of association	Terms	d.f.	G^2	rG^2	BIC	ID
M1: Conditional independence	[MY] [FY]	64	19,396.8	-	18,703.3	23.4
M2: M1 + Single-Diagonal	[MY] [FY] [H]	63	7,406.2	61.8	6,723.6	14.2
M3: M1 + Variable-diagonal	[MY] [FY] [V]	59	4,365.9	77.5	3,726.7	10.7
M4: M3 + Distance	[MY] [FY] [V] [D]	56	1,942.5	90.0	1,335.8	7.3
M5: M3 + Crossings	[MY] [FY] [V] [C]	57	1,955.4	89.9	1,337.8	7.4
M6: M5 + Hypergamy	[MY] [FY] [V] [C] [P]	56	1,944.7	90.0	1,337.9	7.3
M7: M1 + Quasi-symmetry	[MY] [FY] [Q]	54	1,934.9	90.0	1,349.8	7.3
B. Temporal trend	**Terms**	**d.f.**	G^2	rG^2	**BIC**	**ID**
M8: M4 * Time	[MY] [FY] [VY] [DY]	32	165.0	99.1	-181.7	1.4
M9: M5 * Time	[MY] [FY] [VY[[CY]	36	184.1	99.1	-206.0	1.5
M10: M6 * Time	[MY] [FY] [VY] [CY] [PY]	32	177.5	99.1	-169.2	1.4
M11: M7 * Time	[MY] [FY] [QY]	24	109.3	99.4	-150.8	1.0
C. Uniform difference models	**Terms**	**d.f.**	G^2	rG^2	**BIC**	**ID**
M12: Unidiff M4 pattern	[MY] [FY] [V, D, f]	59	1,300.8	93.3	661.5	5.4
M13: Unidiff M5 pattern	[MY] [FY] [V, C, f]	56	865.3	95.5	258.6	4.4
M14: Unidiff M6 pattern	[MY] [FY] [V, C, P, f]	55	865.3	95.5	269.4	4.4
M15: Unidiff M7 pattern	[MY] [FY] [Qf]	51	674.3	96.5	121.7	3.5

Notes: M=mother's education (5); F=father's education (5); Y=year/cohort (4); H=homogamy as single parameter for all diagonal cells (1); V=homogamy as different parameters for diagonal cells (5); D=absolute distance parameters (4); C=crossing parameters (4); P=hypergamy parameter (M<F); Q=quasi-symmetry parameters (11); f=layer parameter in Unidiff specifications.

Table 2.7. Goodness-of-fit of log-linear models of association. Parents of firstborn children (N=19,554)

A. Pattern of association	Terms	d.f.	G^2	rG^2	BIC	ID
M1: *Conditional independence*	[MY] [FY]	64	6,783.6	-	6,151.3	21.8
M2: M1 + Single-Diagonal	[MY] [FY] [H]	63	2,936.9	56.7	2,314.5	14.8
M3: M1 + Variable-diagonal	[MY] [FY] [V]	59	1,767.9	73.9	1,185.0	11.0
M4: M3 + Distance	[MY] [FY] [V] [D]	56	739.8	89.1	186.5	7.0
M5: M3 + Crossings	*[MY] [FY] [V] [C]*	57	756.0	88.9	192.9	7.2
M6: M5 + Hypergamy	[MY] [FY] [V] [C] [P]	56	747.5	89.0	194.3	7.1
M7: M1 + Quasi-symmetry	[MY] [FY] [Q]	54	734.6	89.2	201.1	6.9
B. Temporal trend	Terms	d.f.	G^2	rG^2	BIC	ID
M8: M4 * Time	[MY] [FY] [VY] [DY]	32	114.3	98.3	-201.9	1.9
M9: M5 * Time	[MY] [FY] [VY[[CY]	36	111.9	98.4	-243.8	1.8
M10: M6 * Time	[MY] [FY] [VY] [CY] [PY]	32	97.3	98.6	-218.9	1.8
M11: M7 * Time	[MY] [FY] [QY]	24	49.9	99.3	-187.3	1.0
C. Uniform difference models	Terms	d.f.	G^2	rG^2	BIC	ID
M12: Unidiff M4 pattern	[MY] [FY] [V, D, f]	59	562.9	91.7	-20.0	6.2
M13: Unidiff M5 pattern	[MY] [FY] [V, C, f]	56	366.4	94.6	-186.9	4.9
M14: Unidiff M6 pattern	*[MY] [FY] [V, C, P, f]*	55	364.3	94.6	-179.1	4.8
M15: Unidiff M7 pattern	[MY] [FY] [Qf]	51	289.8	95.7	-214.1	4.0

Notes: M=mother's education (5); F=father's education (5); Y=year/cohort (4); H=homogamy as single parameter for all diagonal cells (1); V=homogamy as different parameters for diagonal cells (5); D=absolute distance parameters (4); C=crossing parameters (4); P=hypergamy parameter (M<F); Q=quasi-symmetry parameters (11); f=layer parameter in Unidiff specifications.

Overall, the comparison between models M4 to M7 does not produce conclusive evidence to support a specific pattern of association over another, since all four models account for a similar proportion of G^2 while producing almost identical BIC and ID statistics. Furthermore, as is often the case with larger samples, none of the models fits the data well by conventional standards, with all BIC values remaining positive and the likelihood-ratio remaining highly significant. Nonetheless, the results in Panel A make clear several features about the pattern of association between spousal qualifications: firstly, that *the tendency towards homogamous unions cannot be assumed to be uniform across educational levels*; secondly, that *such tendency does not suffice to characterise the pattern of association because all distance (M4), crossings (M5) and quasi-symmetry (M7) models greatly improve the fit to the data*; and thirdly, that *hypergamy (M6) does not seem to contribute meaningfully to the general pattern of association.* These conclusions also hold for the sample of parents of firstborn children, with which the overall fit of all models in terms of both G^2 and BIC is also significantly better. I next extend these models to investigate temporal variation in the pattern of assortative mating.

Trends in homogamy. Panel B in Tables 2.6 and 2.7 shows goodness-of-fit statistics for models M8 to M11 in which the previously described patterns of association are not constrained to remain constant but allowed to vary freely across parental cohorts. This is done by interacting the association parameters with the time variables. All models M8 to M11 bring about very large and significant improvements in fit relative to models ignoring temporal change. For instance, M9 brings down the G^2 statistic to less than a tenth of its value for M5 while maintaining more than half of its degrees of freedom (G^2_{M5}-G^2_{M9}=1,771.3; df_{M5}-df_{M9}=21; p: .000). Moreover, all models in Panel B leave less than 2% of the cases misclassified and yield negative BIC statistics, suggesting their overall fit to the data is now satisfactory. When compared against each other according to the G^2 criterion, M11, which interacts the quasi-symmetry parameters with time, appears to provide the best fit (e.g. G^2_{M8} -G^2_{M11}=55.7; df_{M8}-df_{M11}=8; p: .000). However, the preferred model by the largest negative value of BIC becomes M9 (-206.0.). Results for the firstborn sample are in line with those for all couples, with M11 performing best according to G^2 and M9 performing best according to BIC.

The main conclusion from Panel B of Tables 2.6 and 2.7 is that *the pattern of association between parental qualifications cannot be assumed to have remained constant across cohorts*. Interactions between the various posited patterns of association and time result in large improvements in fit suggesting that variation in the importance of these forces of attraction is an essential component of the trend in educational assortative mating between the 1958 and 2000 parental cohorts. Conclusions regarding which specific patterns fit the data best are, however, not so clear-cut. While differences in goodness-of-fit are rather small, Model M8 introducing variable-diagonal and distance parameters, and model M11 positing quasi-symmetry are to be preferred, depending on the criterion employed.

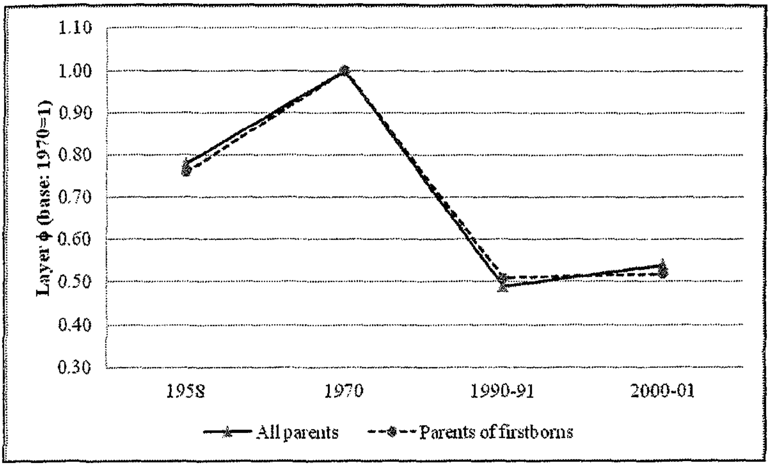
The next step of my analyses is to use unidiff models to provide a summary measure of the trend in educational homogamy. These models are more parsimonious than specifications with full interactions between the association parameters and time because they only consume (k-1) degrees of freedom to test for three-way interactions between parental qualifications and time. This is done by assuming the same pattern of association for all time periods while allowing its strength to vary across them.

Panel C of Tables 2.6 and 2.7 reports goodness-of-fit statistics for models M12 to M15 applying the best performing patterns of association to a unidiff specification. Using the sample containing all parental couples the overall fit of models M12 to M15 is notably poorer than that of models with time interactions (Panel B), yet much better than that of models assuming no variation over time (Panel A). With the firstborn sample, on the other hand, unidiff models perform only relatively worse than models with full interactions, at least when judged by the BIC. These results are not surprising given the trade-off imposed by unidiff models in favour of parsimony. Most importantly, however, unidiff models provide a summary indicator of changes over time in the intensity of educational sorting in the form of time-layer parameters (θ_k). The convention is to set the parameter for an arbitrarily chosen time period to value 1 so that it serves as the baseline for the assessment of trends. Hence, time periods whose parameters are higher than 1 show stronger assortative mating than the reference, and vice versa. I choose my baseline to be 1970 in order to compare my results to Halpin and Chan's (2003) who set theirs in 1973. Chan's (2004) study uses 1980 as the reference but since the series of data extends back to 1972, a comparison with his results is also possible.

Figure 2.2 presents the trend in educational assortative mating amongst my four parental cohorts as revealed by the unidiff parameters of model M15. The quasi-symmetry pattern of association is chosen because M15 provides a better fit to the data than other unidiff specifications for both the overall and firstborn sample[26]. Parameters for models M13 and M14 were also produced but are not shown in Figure 2.2, given their almost perfect overlap with those obtained for M15. This similarity in shape is consistent with the small differences in overall fit between models M13 to M15.

[26] Goodness-of-fit statistics for the model with the saturated pattern of interaction (not reported in the tables) suggest that the quasi-symmetry model is the only one that produces a significant improvement over the latter (BIC=144.7 for the overall sample; BIC=-169.2 for the firstborn sample).

Figure 2.2. Trend in the strength of educational assortative mating, by parental cohort



Notes: Layer parameters from unidiff models positing a quasi-symmetric pattern of association between spouses' levels of education.

Source: NCDS, BCS, LSYPE and MCS data. Own elaboration.

Figure 2.2 suggests that *parental educational homogamy in Britain first increased between the 1958 and 1970 cohorts, then decreased drastically between the latter and the 1990 cohort, and lastly increased slightly with the 2000 cohort*. Compared with the baseline year 1970 ($\theta_{1970} = 1$), the strength of homogamy in 1958, 1990 and 2000 is estimated to be 22% ($\theta_{1958} = 0.78$), 51% ($\theta_{1990} = 0.49$), and 46% ($\theta_{2000} = 0.54$) weaker for the overall sample, as shown by the solid line in Figure 2.2. Very similar results apply for the firstborn sample, represented by the dashed line. These results suggest *large changes in assortative mating across cohorts, with a first period characterised by higher levels peaking in 1970 and a second phase at a much lower level and characterised by relative stability, or slight increase, throughout the 1990s*. Confidence intervals (not shown in the graph) confirm that the homogamy estimates for 1958 and 1970 are significantly different from each other and from those for 1990 and 2000. The latter two, however, are only different for the overall sample.[27]

My results appear very much in line with those obtained by Halpin and Chan (2003: 490) of layer parameters for 1986 and 1994 with values 0.58 and 0.75, respectively. Chan's (2004: 10) estimates for the period 1972-2001 yield a similar trend of decreasing homogamy between 1970 and 1990 and stability thereafter, albeit within a far more modest range of variation (1.1 to 0.8). With regard to the increase between my first two cohorts, the result is also consistent with prior research (Ultee and Luijkx 1990: 135).

Given that the overall fit of model M15 may be considered poor, especially when applied to the overall sample, some reassurance about the general trend in homogamy is in order. I therefore test a new set of models with full interactions between various association parameters and time in order to generate estimates for the odds of different combinations of parental educational attainments. These probabilities can be readily derived from the coefficients of the log-linear models (Powers and Xie 2008: 85-99) and have been presented in the most detailed analyses of homogamy trends (e.g. Schwartz and Mare 2005).

Panel A of Figure 2.3 plots the odds of marrying homogamously rather than heterogamously across parental cohorts as derived from a model interacting the fixed-diagonal parameter with time ([MY, FY, HY]). The graph reveals that, for both samples, these odds were highest in 1970, at around 4.0. In other words, in 1970 individuals were four times more likely to be

[27] Confidence intervals (CI) for the estimated layer parameters were obtained by bootstrapping. In the overall sample, 95% CIs are as follows: 1958=[.74, .80]; 1970=[1]; 1990=[.46, .51]; and 2000=[.52, .56]. In the firstborn sample, 95% CIs are as follows: 1958=[.71, .83]; 1970=[1]; 1990=[.46, .54]; and 2000=[.48, .56]. I thank Prof. Maurizio Pisati for providing me with the 'unidiff' STATA syntax required for these estimations.

married to an equal in education than to someone with a different level of attainment. These odds grew from around 3.0 in the 1958 parental cohort, then halved to around 2.0 in the 1990 cohort, and bounced back to around 2.5 in the 2000 cohort. *Panel A therefore confirms that the tendency towards strict homogamy over any type of heterogamy dominated strongly in each parental cohort, and that its evolution mirrors that of the general trend displayed in Figure 2.2.* Also, in most years the odds of homogamy were slightly lower for parents of firstborn children.

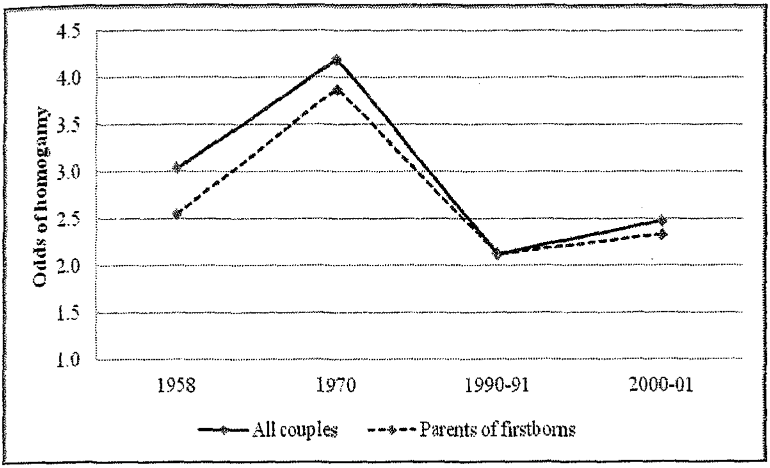
Panel B of Figure 2.3 plots the odds of entering a heterogamous rather than homogamous marriage for varying degrees of distance between spouses' qualifications. These are derived from a model interacting the four distance parameters with time ([MY, FY, DY]). Not surprisingly, *the magnitude of the odds correlates with the degree of dissimilarity, being lowest for the most distant matches (4 levels apart) and increasing as spouses' levels of education become more similar*. Of most relevance are the changes in the odds of marriages two levels apart as these vary the most between the first three parental cohorts. Slight differences between the two analytical samples are visible in the earlier period, with the odds of marriages one or two categories apart being higher for parents of firstborn children. More importantly, the trend in the probabilities of these heterogamous combinations also mirrors the general trend revealed by the unidiff parameters.

Panels C and D of Figure 2.3 present the odds of crossing specific educational barriers relative to homogamy for the overall and firstborn samples, respectively. These odds are derived from a model interacting the four crossing parameters with time ([MY, FY, CY]). A comparison of the magnitude of these odds confirms that *the barriers involving top and bottom educational categories are the least likely to be crossed*. For instance, the odds that a university graduate marries someone with higher education non-degree qualifications remained between 0.30 and 0.45 times smaller than the odds of marrying another university graduate across the whole period. The odds for the crossing between elementary qualifications and O-levels were higher and varied more than the latter, yet also remained below the odds of intermarriage between intermediate categories of attainment. Another important feature of the data revealed by these graphs is that *the main drivers of the changes in the strength of homogamy between 1958 and 1990 appear to be changes in the odds of marriages across the bottom half of the educational distribution* – i.e. between individuals with no qualifications and partners with O-levels, or between individuals with O-levels and partners with A-levels. *These odds first decreased notably between the first two parental cohorts and then bounced back strongly between the second and the third.* On the contrary, *the odds of crossing the internal and external boundaries of higher education grew consistently up to 1990 and decreased in the following decade. The latter suggests increasing closure amongst individuals with higher education in recent cohorts.*

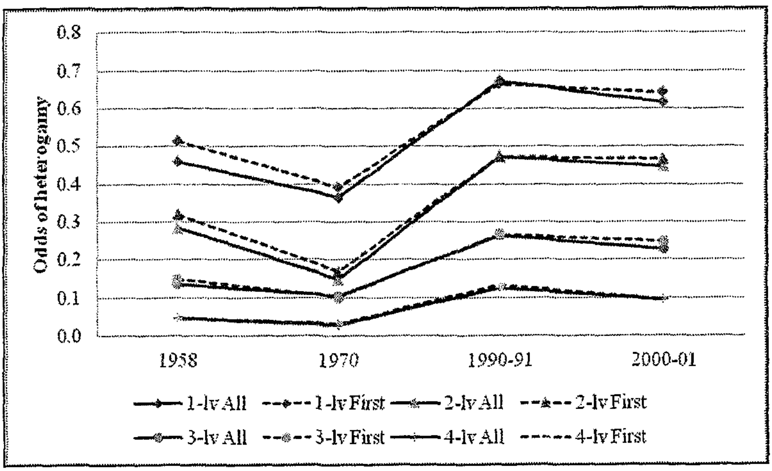
Overall, the main conclusion to be drawn from Panels A to D of Figure 2.3 is that changes in *the odds of specific educational matches are largely consistent with the shape of the general trend in the strength of educational assortative mating presented in Figure 2.2.* The latter can therefore be taken as an accurate summary or trends in homogamy amongst parental couples in Britain between the mid-1950s and early 2000s.

Figure 2.3. Trends in the selected measures of homogamy, by parental cohort

2.3.A. Odds of homogamy relative to heterogamy

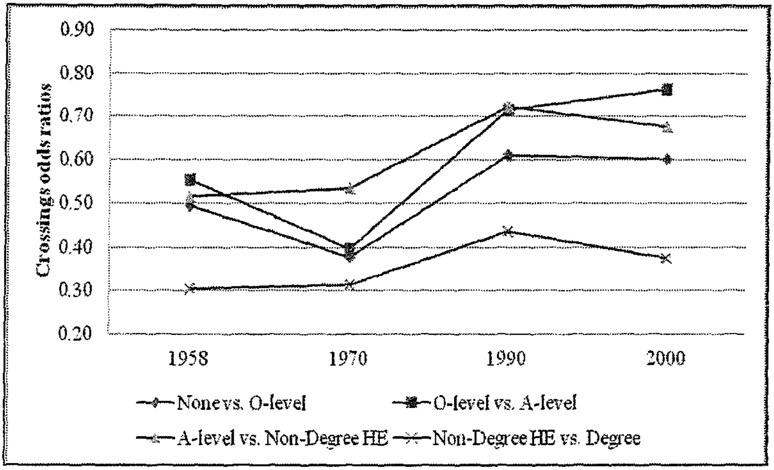


2.3.B. Odds of heterogamy by distance in education, relative to homogamy

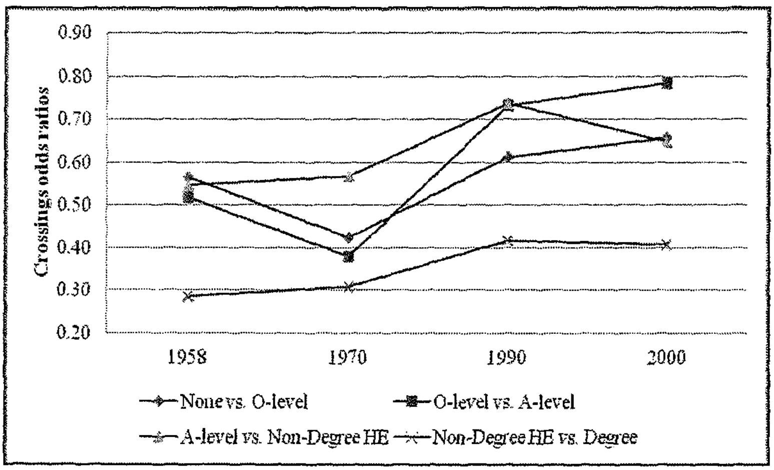


(continues)

2.3.C. Odds of crossing an educational barrier, relative to homogamy; all parental couples



2.3.D. Odds of crossing an educational barrier, relative to homogamy; parents of firstborn children



Notes: Parameters in Panel A from a model with main effects plus an interaction between homogamy along the main diagonal and time ([MY, FY, HY]).

Parameters in Panel B from a model with main effects plus interactions between absolute distance and time ([MY, FY, DY]). Parameters in Panels C and D from models with main effects plus interactions between crossing parameters and time ([MY, FY, CY]) in the overall and firstborn sample, respectively. Parameter values are graphed after exponentiation.

Source: NCDS, BCS, LSYPE and MCS data. Own elaboration.

Lastly, in order to check the robustness of these findings to potential variation in patterns of educational assortative mating across ethnic groups, I run separate analyses for a sub-sample of white parents only[28]. Tables A.2.4 and A.2.5 and Figure A.2.1 in the Appendix present the results obtained with this subsample. The analyses for white parental couples replicate almost identically the general results. Hence, there is no evidence to suspect that the results with the overall sample are the combination of different patterns of attainment and homogamy for white couples and mixed or non-white couples.

2.6. Discussion

In this chapter I analysed trends in educational attainment and educational assortative mating amongst the parents of the 1958, 1970, 1990 and 2000 birth cohorts in Britain. I first examined the increase in average levels of parental education and the evolution of gaps between mothers and fathers. These patterns in attainment established the context in which parental educational sorting takes place. The core of my analyses then aimed to characterise the pattern of association between parents' qualifications and its

[28] The number of non-white respondents in my parental cohorts varies significantly over time, being largest in the LSYPE and MCS cohorts. Quality of information on parental ethnicity also varies greatly across datasets, being particularly limited in the NCDS. All in all, as a proportion of my overall sample the white-only sub-sample represents 83.99% of the total N in 1958, 95.19% in 1970, 73.07% in 1990, and 79.40% in 2000.

evolution over time. To this end I estimated both absolute and relative rates of homogamy for each parental cohort.

My analyses rely on two analytic samples that combine data from the NCDS, the BCS, the LSYPE and the MCS. The overall sample included all the parental couples having a child who is included in these datasets and in which the mother was aged 18-35 at the time of birth. The second sample was restricted to parental couples for whom the cohort child was the firstborn. This procedure was adopted in order to reduce the temporal overlap between parental cohorts and enhance comparability with prior research on assortative mating, using samples of newlyweds. My approach diverges from related research in that my conclusions pertain to parental couples only and not to the population of adult couples as a whole. However, by focusing on parental couples I was able to provide a more accurate picture of the educational composition of the environments in which children are raised. An important caveat to this statement is that, due to the nature of homogamy, single-parent families fall outside the scope of my study.

My inter-cohort comparison of average levels of parental education in Britain is fully consistent with previous studies documenting a trend towards higher stocks of human capital in the adult population. Most children in recent cohorts are being raised by parents with upper secondary and tertiary levels of schooling, in sharp contrast to children born in the 1950s and 1970s. Furthermore, mothers' and fathers' aggregate levels of education have become increasingly symmetrical since 1970.

From a within-household perspective, however, the trend is the opposite. Absolute rates of homogamy clearly indicate a gradual decline in the proportion of couples sharing the same level of qualifications, a trend that is mostly due to the shrinking proportion of adults in the bottom category of attainment. At the same time, the increase in the share of couples where partners are two or more categories apart suggests that educational divides may have lost leverage in marital selection.

Relative rates of homogamy confirm this trend after disentangling structural shifts in levels of attainment and sorting patterns. Results for a variety of log-linear models applied to both analytic samples indicate that the strength of educational assortative mating increased between 1958 and 1970 and then decreased throughout the following two decades and stabilized during the 1990s. The peak around 1970 coincides with the lowest average ages at first marriage in an era of educational expansion.

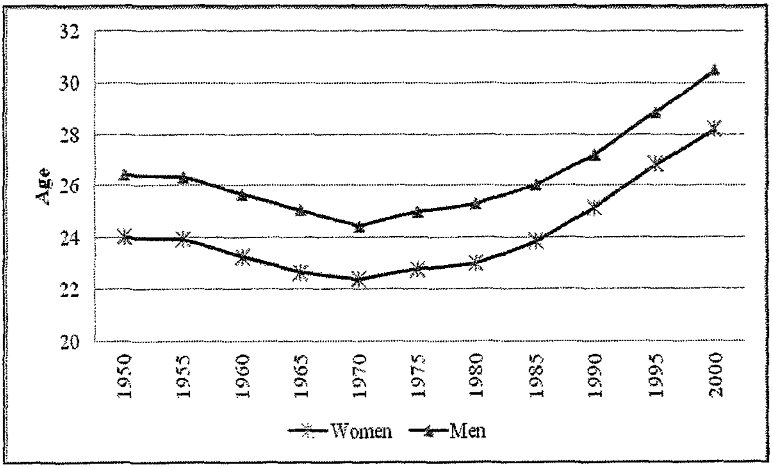
My analyses do not attempt to discriminate between competing hypotheses about the societal forces shaping assortative mating but merely to describe its evolution over time. Nonetheless, an interpretation of the trend can be offered in line with the main theoretical arguments discussed in Section 2.2.

The modernisation argument of Smits, Ultee and Lammers (1998) predicts an inverted-U-shaped trend in homogamy. This is based on the assumption that education becomes more important for status attainment and thus for spousal selection in the early stages of economic modernisation, and less relevant as societal levels of economic prosperity increase and family authority declines. Ideally, this hypothesis is to be tested through an inter-country comparison or for a single case over a time period that is long enough to differentiate various stages of economic and cultural development. Britain's economy has been growing consistently since the middle of last century. It is unclear why the level of prosperity reached around 1970 should constitute a tipping point with respect to the importance of education for socio-economic attainment and whether growth in the 1970s and 1980s can justify a drop in the relevance of education as dramatic as Figure 2.2 suggests. Furthermore, if anything economic differences across education groups seem to have increased in Britain from the middle of the 1980s onwards (Machin 2009). Also, the moderate increase in the strength of homogamy revealed by my data in the 1990s does not accord well with the notion of increasing societal openness embraced by the modernisation argument. As pointed out in the critique of Halpin and Chan (2003), even if individuals have been in recent decades less constrained by economic or familial pressures when choosing their partners, it may well be the case that purely personal choices do not translate into a decrease of educational homogamy. The correlation of education with attitudes and lifestyles indeed suggests the opposite. All in all, hence, there are no compelling reasons to think that the trend in homogamy depicted in Figure 2.2 is a result of the societal forces invoked by modernisation and individualisation theories.

A more convincing interpretation of the trend in assortative mating suggested by my analyses is based on Mare's (1991) argument about changes in the timing of the school completion and marriage transitions. As the gap between these two events narrows, individuals' exposure to educationally heterogamous contexts would be expected to reduce, leading to an increase in the incidence of homogamy. Figure 2.4 plots trends in the mean age at first marriage for men and women in Britain between 1950 and 2000. The data show that average ages at marriage were lowest around 1970 at 24.4 and 22.4 for men and women, respectively, culminating in a reduction of almost two years for each sex relative to 1958. Since 1970 the trend is just the opposite: a sustained increase which accelerates from 1985 onwards and results in average ages of 27.2 and 25.2 in 1990, and 30.5 and 28.2 in 2000 for men and women, respectively.

Given a steady increase in the average number of years spent in the educational system by British cohorts over this period, the conclusion is that the average time gap between school departure and marriage must have been shortest around 1970, precisely when the strength of assortative mating peaks. The homogamy trend matches well the prediction of the life-course argument for the period 1958-1990, for which Figures 2.2 and 2.4 are close to showing inverse shapes. A similar interpretation is proposed by Halpin and Chan (2003: 747). The data suggest that the gap first reduced between 1958 and 1970 as levels of schooling increased and ages at marriage declined. Then, the weakening of homogamy would have to be explained by a growing gap, which implies that the increase in mean ages at marriage must have outpaced largely that in school leaving ages for this logic to hold. The increase in homogamy between 1990 and 2000, however, requires the opposite to have happened. That is, during this decade the length of schooling experiences must have grown at a slightly faster pace than ages at marriage.

Figure 2.4. Trend in mean age at first marriage in Britain, by sex.



Source: ONS Marriage, Divorce and Adoption Historical Series.

Data on educational attainment for this latter period is thus required to assess Mare's argument, even if indirectly. It is the case that tertiary education expanded dramatically in Britain during the 1990s. For instance, expected years of tertiary education for 17-year-olds went up from 1.2 to 2.4 between 1990 and 1997 as rates of enrolment doubled (OECD 2000: table C3.4). Likewise, my own analyses (cf. Tables 2.2 and 2.3) suggest large increases in the attainment of higher education qualifications between the LSYPE and MCS parental cohorts. Hence, if growing participation in tertiary education had led to a growth in education leaving ages concomitant to that in ages at marriage, then the gap between the two transitions would have remained stable or even decreased. This might explain the minor increases in the homogamy parameters between 1990 and 2000. This line of reasoning relies on the hypothesis that changes in the timing of these transitions drive trends in assortative mating. My findings therefore support Mare's argument about the link between these two demographic phenomena.

The trend is also consistent with previous studies for Britain, amongst which Halpin and Chan (2003) was the most comprehensive. Relative to the latter, my study has made several contributions. Firstly, to extend the time period under investigation. Secondly, to compare two analytic samples and to include cohabiting couples. And thirdly, to disaggregate the trend at different levels of the educational distribution and to show its consistency for pairings at various levels of dissimilarity.

Subsequent chapters of this thesis will explore potential implications of educational sorting for parenting practices and children's outcomes. The relevance of assortative mating for social stratification lies mainly in its intergenerational character, as partnership patterns bear the potential of enhancing social mobility or reproduction through the family-based transmission of resources from one generation to another.

It is well established that parental educational attainments are one of the key determinants of a family's capacity to invest in children and shape their aspirations (for a review, see Feinstein et al. 2008). In contemporary societies, education is a crucial component of the relationship of people to income-generating resources of various sorts. Credentials crucially shape occupational trajectories and earning opportunities in the labour market, therefore establishing unequal economically defined life chances and standards of living between families. Schooling also begets skills and provides individuals with resources to navigate the social world, allowing them to make more informed choices.

Hence, educational assortative mating has the potential to shape inequality across families by concentrating or redistributing the (dis)advantages associated with varying levels of education. In as much as these resources determine families' investment capacity in the human capital of their children, the study of educational homogamy provides an opportunity to examine the accumulation within households of (un)favourable characteristics affecting children's outcomes.

CHAPTER 3. EDUCATIONAL HETEROGAMY AND PARENTING ATTITUDES AND BEHAVIOURS

3.1. Introduction

In this chapter I use data on couples with young children born in the UK in 2000-01 to examine the association between parents' educational attainments and degree of heterogamy, on the one hand, and their parenting attitudes and behaviours, on the other. While the tenet that both mothers and fathers play a key role in the rearing of children is widely subscribed to, few empirical investigations exist on the relative salience of their attributes and their patterns of mutual influence in the provision of parenting. My aim is to shed light on these couple-level associations by exploring the effects of educational attainment and educational heterogamy on mothers' and fathers' parenting practices.

Social researchers are interested in parenting due to it being a central element in the functioning of families and because of its significant and lasting consequences for children. Broadly understood, the concept of 'parenting' encompasses aspects of the parent-child relationship that range from behavioural genetics to parental values, disciplinary styles and investments in children's sustenance and stimulation (e.g. Alwin 2001; Bradley and Corwyn 2004). In this chapter my focus is specifically restricted to two of these dimensions: a) parents' beliefs about childrearing approaches, which I will refer to as *parenting attitudes* or *values*, and b) parents' stimulation-oriented interactions with children, which I will refer to as *parenting behaviours* or *activities*.

Sociologists have long been concerned with the role of parenting in the inter-generational reproduction of inequalities (e.g. Bourdieu 1973; Bernstein 1975; Kohn 1977; Lareau 2003). The family-based model of transmission of educational success proposed by Feinstein et al. (2008: 25-36) identifies both parenting attitudes and behaviours as major pathways for the influence of parental education on children. This mediation occurs through the proximal family environment that children experience and varies with the degree to which the home milieu provides intellectual stimulation and fosters socio-emotional adjustment. Parents' beliefs about their role in child development and the educational activities they effectively engage in with children are critical components of that learning environment. Empirical studies have consistently shown that the quality of parenting accounts for a substantial part of the overall effects of parental education on children's outcomes (e.g. Davis-Kean 2005; Sammons et al. 2007; Bodowski and Farkas 2008). However, in this chapter I am only concerned with the first part of this conceptual model, that is, with the association between parental education and parenting practices.

There are good reasons to suspect that educational attainment is a key determinant of parenting attitudes and behaviours. Longer and more complex schooling experiences are likely to provide parents with both a better understanding of the environmental factors that contribute to children's development and enhanced skills to provide these positive inputs. The list of such competencies includes a better grasp of the dynamics of child development, greater accuracy in assessing children's needs, parents' own linguistic and mathematical abilities, their experience in planning and executing tasks, and confidence in their own parenting skills (for a review, see Feinstein et al. 2008: 67-71; 86-89).

However, while many studies document a positive association between parents' education and their endorsement of and involvement in developmental parenting, little is known about this relationship at the couple level and, more specifically, about parenting in educationally mixed unions. These issues deserve to be investigated given structural changes in the social and economic organisation of contemporary families, in particular changes in women's roles and the growing incidence of co-parenting (e.g. Deutsch 1999; Alwin 2004; Crompton 2006; Esping-Andersen 2009). Furthermore, in the case of the UK trends in assortative mating indicate that the strength of educational homogamy has decreased over the last decades. As a result, about two thirds of all parental couples in the early 1990s and 2000s were educationally mixed, and similar proportions contained a mother more educated than the father and vice versa (cf. Chapter 2). Given these facts and the consistent association of educational attainment with parenting attitudes and behaviours, an examination of parenting in educationally heterogamous couples seems fully justified. In this regard, I pose the following questions: *Do partners with different levels of education provide a consistent learning environment for children? Do partners in these couples think and act in unison with respect to childrearing?* Moreover, and given that there will be mutual influences between mothers and fathers, in an educationally heterogamous couple, *does the lesser-educated parent exhibit attitudes and behaviours common amongst more educated parents, or does the adjustment occur in the opposite direction –the more educated parent adopting the attitudinal and behavioural norms of the lesser educated? Are these patterns of influence symmetrical in educationally female- and male-headed couples?*

I explore these questions using data from the first three surveys of the Millennium Cohort Study (MCS), a longitudinal dataset tracking the development and family circumstances of over 19,000 children born in the UK in 2000-01. The study provides separate maternal and paternal questionnaires and hence the opportunity to measure with great accuracy both the mother's and father's values and practices. The timing of the surveys implies that the analyses pertain to parenting of pre-school children (aged 0-5). Relative to later ages, pre-schoolers' demands for monitoring and stimulation are particularly high. Early childhood is hence a good stage for examining different parental responses to these challenges. Furthermore, the provision of parenting in early developmental stages can be critical for children's fortunes since differentials in early ability work to magnify gaps in later educational achievement (Duncan et al. 2007).My empirical analyses rely on Diagonal Reference Models (DRMs), a methodological tool designed to assess the effects of status inconsistency (Sobel 1981, 1985) and hence directly applicable to the analysis of the effects of educational differences between partners (Hendrickx et al. 1993; Eeckhaut et al. 2013). These models assume that individuals in educationally homogamous couples exhibit the attitudes and behaviours characteristic of a given education group and assess the outcomes of individuals in heterogamous couples by comparison to the former. In doing so, DRMs measure the relative salience of each partner's level of education in determining the outcome of interest and test for an effect of heterogamy over and above the main effects of educational attainment.

The chapter is structured as follows: in Section 3.2, I review the arguments and empirical evidence on the association between education and parenting that inform my working hypotheses. In Sections 3.3 and 3.4, I describe my data and analytic sample and discuss the strengths of the method chosen for my empirical analyses. In Section 3.5, I first present descriptive tables cross-classifying the outcomes of interest by levels of parental education and then discuss the results of DRMs. Additionally, I look at the inter-temporal consistency of parenting indicators to address the question of whether individual parenting behaviours change over time as a function of attitudinal consistency at the couple level. Finally, in Section 3.6, I discuss the potential implications of my findings for children's development and selection issues.

3.2. Theory and hypotheses

As stated above, the primary aim of this chapter is to examine the patterns of influence between partners' levels of education and their parenting values and behaviours, with a special focus on educationally dissimilar couples. In this regard, it is important to first note the manner in which the effects of family background on parenting have been commonly conceptualised, as this approach is likely to conceal variation in parenting practices in educationally heterogamous couples. Hence, this section begins by discussing the appropriateness of analysing the effects of parental variables at an individual level and taking education as a key determinant of parenting. It then reviews arguments on the implications of partners' similarity in education and concludes by deriving hypotheses regarding their mutual patterns of influence.

3.2.1. Conceptualising the influence of social background on parenting

Social scientists have long regarded families' socio-economic status (SES) as a crucial antecedent of children's functioning in both cognitive and behavioural domains and the quality of parenting as a major pathway for SES effects (Bornstein and Bradley 2003). Classic contributions to the study of childrearing across social strata include Bernstein's (1975) analysis of class differences in the linguistic codes used in the family and Kohn's (1977) studies on the values instilled in children by parents of different occupational status.

While instrumental in drawing attention to the advantages conferred by parenting in high SES households, a limitation of many early contributions to this literature was to take the family and not the partners individually, as the unit of analysis. The conventional practice to assign a SES position to all family members according to the position of one partner only is problematic in many respects. It often results in women being assigned a status position according to their husbands' role rather than their own, under the assumption that partners broadly share interests and life chances (for an extended discussion, see Sørensen 1994). Moreover, this approach comes hand in hand with a unitary conception of the family that neglects the possibility that partners hold different preferences regarding the organisation of family life and the treatment of children (Lundberg and Pollak 1996). On the methodological front, another key limitation is the use of aggregate indicators of SES in providing a summary measure of families' occupational, income and educational levels. This is far from ideal because these components of SES are volatile to very different degrees and, most importantly, may have different net effects on a variety of outcomes (Duncan and Magnusson 2003).

These problems reduce the ability of researchers to understand individual parental influences and the distinct contribution of different SES markers. However, unitary family approaches and aggregate indicators of SES are not infrequent in recent contributions to the literature on the association between social background and parenting. Prominent examples include Lareau's (2003) widely-cited ethnographic study *Unequal childhoods* or survey-based research by Davis-Kean (2005) or Bodowski and Farkas (2008). These studies either adopt generic characterisations of households based on combined measures of education, occupational prestige and income, or assume that parental attributes are adequately represented by the highest attainment of either parent. While these solutions are often imposed by data constraints, the objective remains to implement research designs that allow for an examination of the effects of distinct parental attributes at the individual level.

Following prior contributions, I argue that education is one of these key parental characteristics. The proposition that education contributes to more skilful parenting rests on the assumption "that parents learn something during schooling that influences the way in which they parent and interact with their children, particularly around teaching behaviours and learning-related activities in the home" (Feinstein et al. 2008: 86). This learning relates to both knowledge about children's needs and to the ability to support their cognitive and social development effectively. On the one hand, participation in education is likely to influence parenting values. It may do so, first and foremost, by providing parents with first-hand experience about the attributes that are rewarded in the educational system. As a result, more educated parents tend to be more accurate in predicting their children's performance in school (Alexander et al. 1994). Additionally, education tends to increase parents' familiarity with general aspects of child development theory (Benasich and Brooks-Gunn 1996) and helps them identify sources of competent advice when the need arises. In the same vein, evidence from ethnographic studies suggests that highly educated parents, especially fathers, are more receptive to the contemporary standards of involved parenting than their less educated counterparts (Coltrane 1996). In addition, parents who have invested more time in education themselves can be expected to be more proactive in engaging in stimulation-oriented activities with children such as joint book reading or number-practising in early childhood, and in helping them with homework or discussing school-related matters at later ages (Sammons et al. 2007; Bodovski and Farkas 2008). Nonetheless, there are grounds to suspect that the association between extended schooling and the quality of parenting inputs is not entirely causal but partly accounted for by underlying traits such as parents' own cognitive ability (Feinstein and Sabates 2006).

In addition, it must be emphasised that many factors other than education have an impact on parenting attitudes and behaviours. Central amongst these is gender, as the caring of children has historically been a deeply gendered activity for which women have taken the main responsibility (Sayer et al. 2004). Traditional conceptions of family roles assume that women have a natural disposition towards caring for children and praise arrangements in which mothers remain full-time homemakers and care providers while fathers assume the role of primary breadwinners and have little direct involvement in childcare (Allen and Hawkings 1999; Davis and Greenstein 2009). Notwithstanding its erosion in recent decades, traditional gender ideology and situational constraints continue to favour differential socialisation towards parenting for men and women across levels of education. Hence, parenting attitudes and levels of involvement with children are still likely to differ between mothers and fathers at any level of educational attainment.

3.2.2. Parenting in educationally homogamous and heterogamous couples

This chapter aims to advance our understanding of the links between education and parenting by analysing the dynamics of parenting across couples with different combinations of educational attainments. Relative to the wealth of studies exploring such association either for the family unit or one parent only, our knowledge about the effects of (dis)similarity in education at the couple level is remarkably underdeveloped. This is puzzling given the concern that sociologists have shown about the potential implications of educational assortative mating for inequality both within and between families (e.g. Esping-Andersen 2007; Blossfeld 2009).

Family sociologists have long argued that partners' similarity in education and other status dimensions is associated with greater consensus, goal-sharing and convergence in cultural tastes and time-use preferences (e.g. DiMaggio and Mohr 1985; Oppenheimer 1997; Furstenberg 2005). These aspects may increase in importance when childrearing stresses the need for collaboration between partners. Coleman (1988) argued that embeddedness in social systems where norms are supported in a consistent manner is one of the key mechanisms through which social capital facilitates children's acquisition of human capital. According to this author, family-based social capital is embodied in relations between family members such as "the attention given by the adults to the child" or "strong relations between children and parents" (1988: S109-113). As noted by Furstenberg (2005), Coleman's argument rests on the assumption that values and practices are widely shared in groups with high levels of social capital. Furstenberg maintains that contemporary families are often formed "under conditions that do not necessarily confer high social capital ([i.e] a congruence of beliefs, shared meanings, and common expectations)", and that families' internal congruence tends to be higher "when both partners share common educational, religious, and political values" (2005: 812). Taken together, these arguments suggest that the role of families in promoting children's development is mediated by the consistency of the parenting inputs they provide, and that such consistency cannot be taken for granted but must be investigated in connection to parental attributes. It is in this respect that educational homogamy can be expected to enhance the congruence in partners' parenting values and behaviours.

Nonetheless, empirical evidence on the effects of couples' educational (dis)similarity on parenting practices is surprisingly scarce. With regard to childrearing values, on the one hand, Van der Silk et al. (2002) analysed the effects of education on the dominance of one partner over another regarding the value placed on children's conformity. Using a sample of Dutch families, they found that in educationally heterogamous couples mothers' beliefs are closer to those expected on the basis of their husband's level of education than to those expected on the basis of their own education, hence supporting a 'male dominance' interpretation. With regard to parenting activities, on the other hand, most studies rely on time-use data to examine the amount of time parents spend with children and, eventually, the specific activities they engage in with them. For instance, Bloemen et al. (2009) found that fathers' time allocation to childcare in Italy was sensitive to their wives' level of education, whereas women's time in childcare was hardly affected by their husbands' education. However, like most other authors, Bloemen et al. did not examine the potential effects of educational differences but merely whether the education of the spouse had an effect on one's own time use. An exception to this approach is the study of Bonke and Esping-Andersen (2011), whose analysis of Danish data suggest that assortative mating reinforces the effects of education for both mothers and fathers. All in all, however, research on the effects of partners' (dis)similarity in education on children-related outcomes is inconsistent in its definitions and plagued by methodological problems (Eeckhaut et al. 2013). I attempt to advance this area of research by examining in a single study a variety of parenting outcomes using high-quality data and a consistent and suitable methodology.

3.2.3. Hypotheses

The arguments reviewed above can be combined to derive expectations about patterns of influence in parenting attitudes and behaviours across couples with different levels of education and different degrees of educational similarity[29]. This is posited on the

[29] It must be emphasised that my interest relates to the *influence* of partners on their parenting practices rather than to the intra-household *allocation* of parenting tasks. I hence depart from the large body of sociological literature that examines the effects of differences in partners' levels of human capital on the division of household labour (e.g. Shelton and John 1996). Most of these studies adopt a framework of analysis in which spouses bargain over unrewarding tasks such as routine housework. This stream of research has generally supported the hypothesis that relative resources within the couple (e.g. income or education) are negatively associated with the share of domestic labour assumed by each partner. This literature has hence advanced our knowledge about the determinants of the balance of power in contemporary families. However, the bargaining framework has not

basis that education shapes parenting values and behaviours, and hence that sorting on education can be taken as an indicator of congruence in partners' approaches to parenting. *A starting assumption, therefore, is that partners in educationally homogamous couples largely agree on their parenting values and engage in similar activities with children.*

The first specific hypothesis relates to *differences in parenting values and behaviours across levels of parental education.* Based on the large number of studies documenting a positive association between parental education and both the endorsement of the principles of active parenting and actual engagement in stimulation-oriented activities with children (for reviews, see Sammons et al. 2007; Feinstein et al. 2008), *I expect a positive educational gradient in all my indicators of parenting for both mothers and fathers.* This is also in line with the argument, supported by evidence on time-use patterns, that highly educated parents place a higher value on investments in children than their less educated counterparts (Guryan et al. 2008). Furthermore, based on previous research on the stability of parenting practices over time (Holden and Miller 1999) and on the fact that, for most

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proven equally fruitful for the analysis of childcare or parenting practices. While differentials in childcare time between mothers and fathers persist, the fact that parents tend to consider time with children a highly pleasant activity (Hallberg and Klevmarken 2003) casts serious doubts on the application of a bargaining framework to the analysis of parental time allocations to children. In fact, parents with higher levels of education, and hence with higher opportunity costs in the labour market, devote less time to housework but *more* time to children than their less educated counterparts. This strongly suggests that the intensity of preferences for 'child quality' plays a key role in these decisions. Arguably, thus, childcare and parenting should be modelled as distinct from other household production activities (Guryan et al. 2008). This is important for the purpose of this chapter because parents are unlikely to bargain away from the dimensions of parenting that constitute my dependent variables -i.e. beliefs and the more enjoyable interactions with children.

individuals, education is a stable attribute after the transition to parenthood, *I expect a general pattern of consistency across time and domains of parenting at the individual level*.

Of more interest are however predictions about the dynamics of parenting in educationally dissimilar couples. The rest of my hypotheses relate thus to the *patterns of influence between partners*. Provided that a union is heterogamous, the hypothesis of *male dominance* predicts that *mothers will adopt parenting values and behaviours in greater accordance with their male partners' levels of education than with their own levels of education*. This is derived from the cultural expectation that the views of husbands dictate the organisation of family life given the traditional imbalance of resources in the male breadwinner model of the family (England and Farkas 1986), and on previous empirical research reporting that husbands' class and education have greater salience in determining their wives' voting behaviour or childrearing values than the wives' own status variables (De Graaf and Heath 1992; Van der Silk et al. 2002). Inversely, the hypothesis of *female dominance* states that *fathers' outcomes will be more in line with their female partners' educational levels than with their own*. This is based on the arguments that parenting has traditionally remained a female sphere of activity and that women tend to be more knowledgeable about childrearing because of greater exposure to its principles during socialisation years and greater expectations about their direct involvement with children (Allen and Hawkins 1999). Hence, it is predicted that fathers will align with mothers in their approach to parenting. It must be stressed that both male and female dominance are formulated irrespective of each partner's level of education. In other words, the greater salience of mothers' or fathers' education in shaping attitudes and behaviours is postulated on the basis of gender and not on their relative levels of education.

On the contrary, the hypothesis of *educational superiority* posits that *the lesser-educated partner will adjust to the values and behaviours expected at the level of education of the more* *educated partner,* irrespective of sex. This is analogous to the dominance argument proposed by Erikson (1984) for the assignment of social class positions to families where both spouses participate in the labour market. In the context of education, higher levels of attainment can thus be expected to influence to a greater extent the parenting practices of the members of the couple than lower levels of attainment.

A subsidiary hypothesis applies to all these predictions about the pattern of influence between partners' levels of education: *the greater the degree of educational dissimilarity, the more pronounced its effects*. This is based on the argument that greater distance between partners' attainments will induce more substantial differences in their parenting attitudes and behaviours, and hence a greater need for adjustment from one partner to the other.

The benchmark for the interpretation of any potential effects of heterogamy is a null hypothesis of *independence* stating that the direction and degree of the dissimilarity of partners' qualifications are irrelevant and hence that no adjustments in attitudes or behaviours will occur.

3.3. Data, analytic sample and variables

3.3.1. Data

I examine the associations between both individual and couple-level education and parenting practices using data from the MCS. The MCS is the latest addition to the series of birth cohort studies providing longitudinal and nationally representative data of the British population. The study was commissioned by the Economic and Social Research Council (ESRC) and has received financial support from a variety of government departments and the Wellcome Trust.

The MCS drew its sample population from all live births in the UK over a period of 14 months beginning in September 2000. It gathers information from 19,244 families selected through Child Benefit Records. This ranges from their social and economic circumstances to parenting attitudes and behaviours and children's early cognitive and behavioural development. The first wave was carried out when the cohort children were 9 months old (2000-01). Subsequent surveys took place when the children were 3 (2004-05), 5 (2006) and 7 (2008) years old. The sample was selected from a random set of electoral wards and is clustered geographically and stratified to over-represent ethnic minorities, areas of high poverty and the smaller UK countries (for an overview, Hansen 2012)[30].

The MCS offers multiple advantages for my purposes. First, it provides a large sample of parental couples with substantial variation in terms of educational sorting (see Chapter 2). Second, it offers extensive information on parental values and actual engagement in child development. Third, and most importantly, it provides separate self-completed maternal and paternal questionnaires[31] and hence allows me to explore differences in partners' parenting attitudes and behaviours and their association to educational resemblance. As noted by Furstenberg (2005: 818), collecting information from multiple family members separately is essential to measure "system properties of families" that tap into

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[30] Electoral wards (398 in total; 200 in England, 73 in Wales, 62 in Scotland, and 63 in Northern Ireland) were the first-stage sampling units. The geographical clustering is taken into account by using STATA 'svy' commands for complex survey design and sampling weights. Statistics presented in this chapter are therefore representative of UK births during the sampling period.

[31] Both structured Computer Assisted Personal Interview (CAPI) and Computer Aided Self-completion Interview (CASI) modules were administered to each parent residing in the household. In most cases mothers completed the 'main' questionnaire and fathers the 'partner' questionnaire. Information on all the variables used in this chapter was collected from each adult separately.

the dimensions of "value consensus, perceived obligations and exchange", which lie at the heart of my theoretical interests.

Variables used in this chapter come from the first three waves of the MCS. The baseline survey (2000-01) yielded a fieldwork response rate of 82% translating into a sample of 18,552 families. The second MCS survey (2003-04) had an overall response rate of 78% after re-interviewing 80% of the participants in the first survey and recruiting an additional set of families who would have been eligible for inclusion at baseline but could not be contacted. This process resulted in a sample of 15,590 productive families. The third survey (2006) had an overall response rate of 79% and achieved a sample of 15,246 families (for technical details, see Plewis 2007). The number of families participating in at least one of the first three MCS surveys was 19,244, while 13,234 families participated in all three surveys and 3,676 did so in two of them.

3.3.2. Analytic sample

My sample selection criteria in this chapter are in line with those employed in the rest of the dissertation. My analytic sample is composed of families containing at least one MCS child and two parental figures in a heterosexual union. I impose no restrictions regarding the ages and marital status of the partners or whether they are the biological, adoptive or step-parents of the cohort children. Nonetheless, these family characteristics are controlled for in my multivariate analyses.

Given my interest in the effects of partners' degree of similarity in education, I exclude single-parent households where, by definition, this couple-level variable cannot be measured. The exclusion of families other than co-residential couples is based on the argument that physical co-residence is a precondition for the potential implications of parental educational similarity to emerge. Furthermore, information on several outcome variables was neither directly nor indirectly collected for non-resident parental figures.

My assessment of the association between parental education and parenting values and behaviours will therefore pertain to two-parent households only. I acknowledge this may limit the generalisability of my findings given that over recent decades increasing proportions of British children have either been born to a lone-mother or experienced spells of lone-parenthood throughout their childhoods. In 2006 the proportion of dependent children living in lone-parent families in the UK reached 24% (ONS 2007). Cross-sectional analyses of MCS data indicate that about 14% of the cohort children were living with a single parent 9 months after birth, and that 17% were in that situation by the age of 5. However, while the number of children experiencing lone parenthood grew between waves, family trajectories in the opposite direction must also be noted. For instance, about a third of the lone-parent families at the time of the child's birth had gained a second co-resident partner five years later, in the majority of cases the child's natural father (Calderwood 2008: 25-30). I therefore choose not to exclude families with episodes of lone-parenthood between waves. Instead, all two-parent families at the time of outcome measurement remain eligible for my analytic sample. Since the provision of parenting by two co-resident adults continues to be, by a large margin, the dominant experience amongst British children, I contend that the exclusion of single-parent families does not devalue the relevance of my analyses.

Inclusion in the sample is also driven by the availability of information for both partners at each wave and for each dependent variable. That is, my analyses correspond to the subset of families for which both mothers' and fathers' outcomes can be examined simultaneously. I impose this condition to enhance the comparability of the results obtained for each partner (Shuman and Presser 1996). Nonetheless, it is important to note that variation in response rates between mothers and fathers poses a challenge to the interpretation of my results. The statistics literature distinguishes between different conditions in relation to missing data (Little and Rubin 2002). Selection biases arise when missing responses to a particular variable do not occur randomly (i.e. missing not at random or MNAR) but are dependent on the true value of the variable in question and possibly on other variables in the explanatory model as well[32]. In the case of the MCS, attrition across waves and differential response rates across survey modules and items may introduce selection biases, especially in the case of fathers.

Plewis (2007: 39-47; Appendix 4) has shown that unit non-response in wave 1 was low with partner response rates remaining at 88% (virtually in all cases, male parental figures are considered 'partner' respondents). Correlates of partner non-response include living in disadvantaged wards, low income, additional children in the family, cohabitation, Asian and Black ethnicity and educational qualifications. With respect to the latter, partners of main respondents with qualifications below degree level were about 20% less likely to respond (odds=0.82). Although systematic differences exist between respondents and non-respondents at waves 1 and 2, Plewis (2007) found that these differences in the probability to respond were small compared to the unequal selection probabilities built into the sample design. Analyses of wave 3 data arrive to the same conclusion (Hansen 2012: 105; Ketende 2010: 18-25). With regards to item non-response, information on educational qualifications is hardly missing as completion rates of the 'Education and employment' survey module are 98.6% for main respondents and 99.5% for partner respondents (Plewis 2007: 47). More problematic, however, are response rates for the 'Self-completion' modules where the outcome variables used in this chapter are typically included (the variables are described in detail in subsection 3.3.3 below). My analyses confirm higher response rates to these

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[32] The other two conditions are *missing completely at random* (MCAR), where missing responses are independent of the true value of the variable and of the values of any other variables in the model; and *missing at random* (MAR), where missingness is independent of the true value of the variable but not of all the other variables in the model.

variables among mothers. Nonetheless, provided that information on education is available and respondents are in a two-parent family at the corresponding wave, response rates are higher than 85% in all cases[33].

It is likely that missing information on my outcome variables is associated with low levels of education among respondents. Further, it is possible that missingness is concentrated in couples where partners hold more divergent parenting attitudes and practices. Therefore, my decision to require information from both partners to qualify for sample inclusion may introduce biases in my results, in the direction of higher standards of parenting, on the one hand, and lower levels of disagreement within couples, on the other. In order to minimize these possibilities, and following the technical recommendations of the Centre for Longitudinal Studies (CLS), my analyses use longitudinal weights which are the product of sampling and non-response weights. Sampling weights take into account the unequal selection probabilities of wards derived from sample design and are fixed across waves. Non-response weights, estimated from logistic regression models on the predictors of unit non-response, vary across waves. It must also be noted that variation in both unit and item non-response rates leads to variation in the sizes of my analytic samples across waves; these sample sizes are shown in Table 3.1 below.

[33] Response rates are as follows: for beliefs about the importance of parental stimulation for child development at 9 months, 95.8% for mothers and 91.8% for fathers; for beliefs about the effects of maternal employment for child development at 9 months, 92.1% for mothers and 88.8% for fathers; for the frequency of reading to the child at age 3, 99.8 for mothers and 85.9 for fathers; for stimulation-oriented activities with children at age 5, 98.9% for mothers and 89.5% for fathers.

Table 3.1. Summary statistics of main dependent variables

Variable	**N**	**Mean**	**s.d.**	**Min**	**Max**	**α**
Beliefs about the importance of stimulation at 9 months (scale)						
Mothers	11,361	0.07	0.93	-3.65	0.50	0.75
Fathers	11,361	0.05	0.96	-3.15	0.66	0.68
Beliefs about the impact of maternal employment at 9 months (scale)						
Mothers	10,607	0.04	0.99	-2.16	2.00	0.68
Fathers	10,607	0.01	0.99	-2.00	2.08	0.68
Frequency of reading to the child at age 3 (count)						
Mothers	9,844	5.34	1.08	1.00	6.00	-
Fathers	9,844	4.37	1.33	1.00	6.00	-
Stimulation-oriented activities with child at age 5 (scale)						
Mothers	9,173	-0.01	0.94	-4.06	2.32	0.72
Fathers	9,173	-0.01	0.97	-3.75	2.61	0.74

Notes: All outcomes except frequency of reading standardized to a mean of 0 and a standard deviation of 1. All statistics weighted to adjust for sample design.

Source: MCS, Waves 1 to 3.

3.3.3. Dependent variables

The survey-based indicators of parenting commonly available to social researchers are known to suffer from measurement error and social desirability bias (Holden and Miller 1999). While not exempt from these problems, two features of the MCS help mitigate the extent to which reporter biases distort the measurement of parent practices at the couple level. On the one hand, the availability of separate parental questionnaires allows an assessment of the consistency of parental views and behaviours based on individual and confidential reports from the two actors involved, as opposed to one of them only. On the other hand, the MCS provides an array of variables reflecting the underlying concepts of parenting values and behaviours that I take as my outcomes of interest, which allows for improvements in the reliability of their measurement. In this respect, I take full advantage of the wealth of information on beliefs about and activities with children and construct multiple-item scales capturing these dimensions of parenting. Provided that all items on a scale reflect the same underlying concept, multiple-items scales are generally more reliable than single-item scales because they average out idiosyncratic factors that affect response to any one item. More reliable scales are thus better suited to examine associations with other variables since the portion of the observed measurement uncorrelated with the underlying concept decreases relative to the correlated component (Treiman 2009: 242-44).

My first indicator of parenting values aims to capture endorsement of the modern ideals of involved and stimulation-oriented parenting. To this end, I select a series of questions from the first MCS survey on how parents should treat a baby. The candidate items ask, for instance, about the importance of talking, cuddling and regular sleeping and eating patterns, the need for parental stimulation for a child's development, or whether children need their fathers to be as closely involved in their upbringing as their mothers. Respondents expressed agreement with these statements using a Likert-type 5-point scale with the categories "Strongly agree", "Agree", "Neither agree nor disagree", "Disagree", and "Strongly disagree". I recode items so that higher values on any one question, and thus on the scale, denote stronger beliefs in the importance of parental stimulation for child development.

My second indicator of parenting attitudes attempts to measure rejection of the traditional model of the family in which the role of full-time homemakers and carers of children is prescribed for mothers. With that aim I use relevant questions about the impact of early maternal employment on child development and family life. In the baseline survey, participants were asked their opinions on topics such as whether pre-school children suffer if their mothers work or the impact of full-time maternal employment on the happiness of family members. Agreement with these statements was measured using the same 5 response categories as above. I recode items to make high values on any given item, and thus on the scale, indicate lack of adherence to the ideal of the traditional sex-role specialisation. Additional MCS questionnaire items related to childrearing attitudes were discarded after no empirical support was found for their inclusion into these or other scales[34].

My third and fourth dependent variables seek to capture the intensity of stimulation-oriented parenting practices when the children are 3 and 5 years old, respectively. Items used in the construction of these indicators measure the frequency with which each parent engages in developmental activities with the child. Due to data limitations, only a single-item scale about the frequency of reading to the child can be used at wave 2[35]. On the

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[34] More specifically, I explored a battery of questions in the first survey about out-of-wedlock childbearing, the upbringing of children in cohabiting or single-parent families, and delaying separation for the sake of children. The initial stage of my analyses involved an exploratory factor analysis of all potentially relevant items together. The analyses with iterated principal factors and varimax rotation provided clear evidence for the existence of two factors only, as described in the text and tables. For mothers, a third factor emerged at marginally significant levels underlying the items about family structure and marital status listed at the beginning of this footnote. For fathers, however, such factors did not emerge. I constructed the third scale for mothers but it failed to yield any meaningful association with parental levels of education in subsequent bi-variate analyses.

[35] In the second MCS survey, this was the only question asked separately to the mother and the father. Additional items about other activities were asked to the main respondent only and did not specify which parent engaged in such interactions (i.e. "How often does someone at home try to teach [name] numbers or counting?").

contrary, a multiple-item scale is constructed at wave 3, using questions about activities such as reading, drawing, singing or taking the child to the playground. Each of these items offers the following 6 response categories: "Not at all", "Less than once a month", "Once or twice a month", "Once or twice a week", "Several times a week" and "Every day". I apply reverse coding to make higher values on any given item, and thus on the scales, reflect higher frequency of interactions with the child.

To empirically determine whether each proposed set items can be taken as reflecting a single underlying concept, I submitted their correlation matrix to an exploratory factor analysis. The full list of items under inspection and their factor loadings are reported in Table A.3.1 in the Appendix. The factor matrices confirmed the emergence of only one factor with Eigenvalue >1.0 in each case[36]. I selected the items with factor loadings >.40 for inclusion in the scales and discarded those with the lowest observed correlations. Lastly, I constructed the scales using the factor scores of the retained items as weights[37], and standardised the scale scores to a

[36] The proportion of variance accounted for the first emerging factors is as follows: 72.5% for mothers' items and 70.8% for fathers' items regarding beliefs about the importance of stimulation; 98.7% for mothers' items and 97.1% for fathers' items regarding beliefs about the impact of maternal employment; and 82.4% for mothers' and 76.6% for fathers' items regarding stimulation-oriented activities at age 5.

[37] This procedure maximises the association between the underlying concepts and the constructed scale in the sample. As such, correlations between the scales and other variables are likely to be smaller if analyses are replicated on different data sets. As a robustness check I constructed a second version of the scales following a factor-based scaling procedure suggested by Treiman (2009: 245-50) in which the selected items are standardised and equally weighted so that the scales are less subject to sample variability. The two versions of my scales are very highly correlated (over .94 for the belief scales and over .98 for the activities scales). I also run all models reported in this chapter using the second version of the scales and obtained virtually identical results. This

mean of 0 and a standard deviation of 1. I repeated this procedure for mothers and fathers separately by cross-checking the identity of the main and partner respondents in each household. Table 3.1 presents summary statistics for the four scales of parenting attitudes and behaviours used in this chapter. For the scales constructed from multiple items, the table also reports values of Cronbach's alpha, a measure of internal-consistency or correlation between items. All reliability coefficients for my multi-item scales are around the .70 cut-off that is generally accepted in social science (Bryman 2004: 72). This provides reassurance that each set of items reflects a single underlying concept.

3.3.4. Parental educational attainments

The MCS measures parental educational attainments as completed years of schooling and qualifications obtained up to data collection. As in the previous chapter, my analyses rely on the latter to minimise the possibility that trajectories of the same time length are coded as equivalent when occurring on different educational tracks. Transitions between different stages of the schooling system are richer indicators of attainment in that they reflect a hierarchy of experiences not only in terms of duration but also of curricular content and ability to validate learning. Furthermore, qualifications consistently show larger explanatory power than years of schooling in models of socio-economic attainment (Braun and Müller 1997) and are more informative about the type of institutions attended, which arguably constitute distinct socialisation and marriage market settings (Blossfeld and Timm 2003).

In line with these arguments, I operationalise parental educational attainments using a 5-category classification that takes

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provides reassurance that my findings could be replicated if the similar scale constructing procedure was used with other data.

into account differences between academic and vocational qualifications. When a respondent reports both types of credentials, final attainment is equated to the highest of these; however, academic qualifications are taken to reflect higher achievement. As such, the top category [5] corresponds to academic only, university level, qualifications encompassing both graduate and post-graduate degrees. Category [4] groups certificates in higher education at the sub-degree level such as teaching or nursing diplomas plus the highest professional certificates. Category [3] refers to the upper levels of attainment at the secondary level including A-levels, trade apprenticeships and Level 3 National Vocational Qualification (NVQ) certificates. Category [2] corresponds to lower secondary education and encompasses O-levels, GCSEs grades A-C and Level 2 NVQs. Respondents with GCSEs grades D-G, Level 1 NVQs or no qualifications are assigned to category [1][38, 39].

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[38] This is the same scheme used in Chapter 2. I did not use the derived highest NVQ attainment variable in the original MCS data files due to inconsistency in question wording and NVQ banding between survey waves.

[39] A small proportion of respondents (3%) reported 'Overseas qualifications' without further detailing their credentials. I assigned respondents with those qualifications to one of the 5 attainment levels described above based on the proximity between their completed years of schooling and the average for the respondents with national certificates in each level. I did not assume that respondents with non-UK qualifications belong in the residual category 'None' because, on average, they have completed a significantly higher number of years of schooling than those who report no qualifications (at baseline, 13.88 vs. 11.63 in the case of mothers, and 14.34 vs. 12.52 in the case of fathers). Analyses of MCS data show that overseas qualifications are negatively associated with a variety of economic outcomes to a similar extent as lack of qualifications are (Hansen and Joshi 2008: 205, 238). However, this is likely to result, at least in part, from the penalty experienced by individuals of immigrant origin in the labour market, as many of the holders of overseas credentials were born outside the UK. Such penalties

I derive couple-level measures of educational dissimilarity from the five-fold classification above. *Heterogamy* is operationalised as a dichotomous indicator adopting value 1 when partners have attained a different level of education and 0 otherwise (i.e. *homogamy* is taken as the reference category). I construct additional dummy variables for heterogamous couples indicating whether the more educated partner is the mother (i.e. *hypogamy*) or the father (i.e. *hypergamy*)[40]. Educational distance is measured by a set of dummies reflecting the absolute numerical difference between partners' levels of attainment: *short-range heterogamy* is defined as partners being 1 level apart, and *long-range heterogamy* as partners being 2 or more levels apart. The latter implies that partners are crossing at least one of the divisions between elementary, secondary and higher education, whereas short-range heterogamy may still occur within such broad categories. Differences in partners' individual economic and cultural resources are thus likely to be more pronounced in long-range heterogamous couples. I expect these measures of educational dissimilarity to capture my arguments about attitudinal accordance and effective engagement in parenting given the different socialisation experiences that these educational qualifications tend to imply.

Table 3.2 shows the distribution of the educational attainment and dissimilarity variables at wave 1. A noteworthy feature of my sample is the even distribution of both mothers and fathers across the 5 attainment categories, and hence their similarity in average levels of education. This stands in opposition to the traditional attainment gap in favour of males in older cohorts (Smith 2000: 209; also Table 2.2 in Chapter 2). The only substantial difference exists in the percentages of mothers and fathers attaining lower

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need not apply in the process of family-based transmission of human capital.

[40] By convention, hypogamy and hypergamy are defined from the perspective of the female partner. This definition holds throughout the thesis.

and upper secondary qualifications and is due to the higher number of men completing trade apprenticeships and Level 3 vocational certificates.

As for dissimilarity in education, almost two thirds of parental couples in my sample are heterogamous, and as expected short-range heterogamy is more common than long-range heterogamy (about 35% vs. 27%, respectively)[41]. All in all, a clear tendency towards positive educational sorting prevails, with almost three fourths of all couples being either in the same or in adjacent attainment categories. Another interesting feature of the data is that amongst educationally heterogamous couples, about one half contains a more educated mother and the other half contains a more educated father (each accounting for about 30% of the total). This again represents a deviation from the traditional pattern of female hypergamy that resulted from higher attainment levels amongst men. Short- and long-range heterogamous matches are then equally prevalent in hypergamous and hypogamous couples, which suggests that there are no significant gender differences in the tendency to enter more or less dissimilar unions.

[41] A disaggregation of long-range heterogamy by distance (not shown in the table) reveals that couples in which partners are 2, 3 and 4 levels apart represent 17.66%, 7.66% and 1.87% of the total, respectively.

Table 3.2. Summary statistics of main independent variables at baseline

Variable		Mean	s.d.
Mother's education (%)	Below O-level	18.70	
	O-level or equivalent	29.32	
	A-level or equivalent	13.81	
	Non-degree higher education	16.96	
	University degree	21.20	
Father's education (%)	Below O-level	20.76	
	O-level or equivalent	21.74	
	A-level or equivalent	20.37	
	Non-degree higher education	15.56	
	University degree	21.57	
Similarity in education (%)	Homogamy	38.00	
	Heterogamy (any)	62.00	
	Short-range (1 level)	34.71	
	Long-range (2+ levels)	27.29	
	Hypogamy (mother>father)	30.33	
	Short-range (1 level)	17.30	
	Long-range (2+ levels)	13.03	
	Hypergamy (mother<father)	31.67	
	Short-range (1 level)	17.41	
	Long-range (2+ levels)	14.26	
Control variables (%)	Child's sex (male)	51.12	
	Mother's age at child's birth (years)	28.78	5.87
	Father's age at child's birth (years)	32.05	6.27
	Number of dependent children	1.90	0.98
	Equivalised family income (£/week)	339.07	246.60
	Ethnicity: White	88.90	
	Ethnicity: Mixed	2.56	
	Ethnicity: Indian	1.99	
	Ethnicity: Pakistani-Bangladeshi	3.97	
	Ethnicity: Black	1.45	
	Ethnicity: Other	1.14	
	Two natural parents	99.00	
	Step-father	1.00	
	Married couple	72.90	
	Cohabiting couple	27.10	
	Mother's weekly hrs. of paid work[a]	12.05	14.22
	Father's weekly hrs. of paid work[a]	39.39	17.45
	Mother's weekly hrs. of paid work[b]	13.46	14.52
	Father's weekly hrs. of paid work[b]	38.79	16.43

Notes: All statistics weighted to adjust for sample design. [a] Measured at Wave 2. [b] Measured at Wave 3.

Source: MCS, Wave 1. N= 12,606.

3.3.5. Socio-demographic controls

Table 3.2 also provides summary statistics, as measured in wave 1, of a set of relevant family characteristics that I use as control variables in the multivariate analyses. These include the cohort child's sex, the number of dependent children in the household, the equivalised family income, the parental ages, ethnicity and marital status, the bond to the cohort child and number of hours supplied to non-domestic work (the latter, at waves 2 and 3). Following Mensah and Kiernan (2010), I imputed income based on socio-demographic characteristics for less than 10% of families who failed to report it. All income data is equivalised to adjust for the number and ages of the people in the family home using OECD equivalence scales. This equivalised income is approximate since it is derived from banded income data.

The sample is heavily dominated by White married couples formed by the biological parents of the cohort child. Mothers tend to be about 3 years younger than their male partners and to work outside the home a number of hours consistent with part-time employment arrangements, whereas men tend to be employed full-time. Although statistics in Table 3.2 correspond to wave 1, my models take into account changes in family characteristics by measuring controls at the same wave as each of the outcome variables.

3.4. Methods

I use DRMs to assess the association between partners' education and parenting attitudes and behaviours. Originally developed by Sobel (1981, 1985) in the context of social mobility research[42], DRMs belong to the family of 'status inconsistency' models whose generic purpose is "to ascertain whether having different ranks on two (or more) status variables affects attitudes and behaviour" (Hendrickx et al. 1993: 335). DRMs are most often applied to square tables where rows and columns are defined by two status variables and the main matrix is populated by the cell-specific means of a third, dependent variable. Diagonal cells therefore represent cases of status consistency while off-diagonal cells embody status inconsistency in various directions and degrees[43].

DRMs are the most widely accepted method to study the effects of experiencing status inconsistency. Sociologists have applied DRMs to a wide range of outcomes including fertility (e.g. Sobel 1985; Sorenson 1989), political attitudes and voting behaviour (e.g. De Graaf and Heath 1992; Breen 2001; Tolsma et al. 2009), psychological well-being and distress (e.g. Houle 2011; Houle and Martin 2011), self-assessed health and risky behaviours (e.g. Monden et al. 2003), lifestyle and cultural consumption (e.g. Van Berkel and De Graaf 1995) or child-rearing values (e.g. Van der Silk et al. 2002). On the right-hand side of the equation, most studies have focused on social mobility as a case of inter-temporal status inconsistency over the course of an individual's life. However, both conceptually and methodologically DRMs can be applied to discrepancy on any given status dimension at either the individual or dyadic level, and as such to the study of marital heterogamy in education (Sobel 1985: 710). In this latter respect, Eeckhaut et al.'s (2013) comparison of a variety of approaches forcefully advocates DRMs as "the best fitting method for analysing the effects of educational differences" between partners,

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[42] Sobel labelled his model using the term 'mobility' instead of 'reference', but the latter is more commonly used to avoid confusion with Goodman's 'log-linear diagonal mobility' models.

[43] At a general level, DRMs are most accurately described using the abstract terms status 'consistency' and 'inconsistency'. For the purpose of this chapter, though, these terms can be considered straightforward synonyms of educational 'homogamy' and 'heterogamy'.

and hence for addressing questions on education effects at the couple level.

Sobel's original formulation of DRMs emerged in response to perceived flaws in previous models designed for the analysis of mobility effects (see Hendrickx et al. 1993 for an overview of this debate). Most prominent amongst those was the square-additive model (Duncan 1966), which for two status variables X_1 and X_2 with categories j and k (j=1, ..., R; k=1, ..., R) can be formulated as follows:

$$Y_{ijk} = \mu + \alpha_j X_1 + \beta_k X_2 + \gamma_{jk} X_1 X_2 + \varepsilon_{ijk} \qquad (3.1),$$

where Y_{ijk} is the value of the outcome variable for the ith individual in status categories j and k; coefficients α and β are the main effects of the status variables; coefficient γ is an interaction effect between the two status variables; and ε_{ijk} is a stochastic error term with expected value 0. In this standard ordinary least-squares (OLS) framework the interaction term is taken to represent status inconsistency effects. The latter are understood as deviations from the expected outcomes for each combination of statuses, which are in turn a function of the average outcomes of the two status categories involved. Put differently, the interaction term of the square-additive model tests whether specific combinations of statuses account for additional variance in the dependent variable relative to a baseline linear additive model with the main status variables X_1 and X_2 but no interactions.

The key objection to the square-additive model was first formulated by Hope (1975) and relates to the identification problem emanating from the linear dependency of the inconsistency variable on the row and column status variables[44]. This means that the effects of experiencing status inconsistency

[44] A useful analogy is the identification problem of age, period and cohort effects encountered in demographic research, as any one of these three variables is a perfect linear function of the other two.

cannot be disentangled from the effects of occupying a given status position, making it impossible to provide a conceptually different interpretation of the coefficients for the main and interaction variables[45]. As stated by Hope, the square-additive model "cannot test for the presence of a mobility (status-discrepancy) effect because it incorporates such an effect within its own variance" (1975: 332).

DRMs solve this identification problem by modelling status inconsistency independently of status positions. Sobel (1981; 1985) proposed that the outcomes of individuals in inconsistent status categories are analysed in reference to the outcomes of individuals who have consistently experienced the two corresponding statuses. Hence, the approach of DRMs is to take as a benchmark the outcomes of individuals in diagonal cells, based on the argument that these status consistent situations best reflect the normative attitudes and behaviour of each status category. The effect of status inconsistency on a given outcome is then assessed by the relative congruence with the average outcomes of status consistent individuals. In the context of mobility research, Sobel referred to this process as 'acculturation', that is, "a social process whereby individuals adopt the relevant behaviours (values, attitudes) which typify the reference aggregate. Thus, there must be some values of the dependent variable which typify the appropriate referents" (1981: 896).

Parental dissimilarity in education is the form of status inconsistency this chapter is concerned with. Hence, in a DRM framework the outcomes of partners in educationally homogamous couples are assumed to encapsulate the attitudes and behaviours of the corresponding education category, as they are arguably less contaminated by the attitudes and behaviours typical of other

[45] Eeckhaut et al. (2013) frame their discussion around the measures of educational difference used by alternative methods. Square-additive models are equivalent to what they label 'compound' measures -i.e. categorical variables representing all possible combinations of educational attainments. When these are added to models that include individual education, the same identification problem applies (2014: 64).

educational groups.[46] In other words, individuals in diagonal cells are assumed to be less subject to potentially divergent influences associated with different levels of education than individuals in off-diagonal cells whose own level of education and that of their partner effectively differ. This is not to say that educationally homogamous partners do not influence each other, but simply that the mutual influences exerted by virtue of their education are not theoretically different from those occurring at the individual level.

The functional form of a baseline DRM without inconsistency effects is:

$$Y_i = p\mu_j + q\mu_k + \varepsilon_{ijk} \qquad (3.2),$$

where Y_i is the outcome variable for the ith individual; μ_j and μ_k are the estimated means for status consistent individuals in categories j and k of the status variables X_1 and X_2, respectively; p and q are weight parameters; and ε_{ijk} is as above. The weights p and q measure the relative salience of X_1 and X_2 in determining Y_i and are conventionally constrained to be $p + q = 1$. That is, these parameters estimate the relative similarity of the outcomes of status inconsistent individuals to the outcomes of individuals in the two status categories that define such inconsistency. If $p > .5$, then the outcomes of individuals in off-diagonal cells resemble the outcomes of individuals consistent on X_1 more than the outcomes of individuals consistent on X_2. If $p < .5$, the opposite holds.

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[46] For instance, Chan and Goldthorpe (2005) show that, in England, the level of educational qualifications is a strong determinant of patterns of cultural consumption and that individuals with low levels of education tend to be 'univore' consumers with a less varied exposure to cultural products than highly-educated 'omnivores'. Hence, poorly educated individuals who partner up homogamously would be likely to show a distinct pattern of cultural consumption, whereas their counterparts in educationally mixed couples would be more likely to get exposure to a greater range of activities and to develop a mixed cultural taste.

When DRMs are applied to dissimilarity in education, the estimated means $\mu_{1,...,R}$ represent the average outcomes of individuals in homogamous couples at levels of education *1* to *R*, whereas the weights *p* and *q* indicate whether individuals in educationally heterogamous unions exhibit behaviours characteristic of their own educational level rather than that of their partners. That is, *p* and *q* measure the relative salience of each partner's level of education in determining the value of the dependent variable under examination.

The baseline DRM can then be extended to incorporate status inconsistency effects:

$$Y_i = p\mu_j + q\mu_k + \beta' Z' + (\delta' C') + \varepsilon_{ijk} \tag{3.3}$$,

where all recurring terms are as above and β' denotes a vector of coefficients for the status inconsistency variables Z' which take the form of dummies identifying specific cells or groups of cells in the off-diagonal sections of the matrix. Optionally, the model may include a set of control variables C' with their corresponding coefficients δ'.

In the case of dissimilarity in education, various forms of inconsistency present theoretical interest. As discussed in Section 3.3, my analyses include general measures of educational *heterogamy*, *hypogamy* and *hypergamy*, as well interactions of the latter two with *short-* and *long-range heterogamy*. The dummy for *heterogamy* adopts value 1 whenever $X_1 \neq X_2$, whereas the dummies for *hypogamy* and *hypergamy* adopt value 1 when $X_1 > X_2$ and $X_1 < X_2$, respectively. *Short-* and *long-range heterogamy* are defined as instances when $|X_1\text{-}X_2| = 1$ and $|X_1\text{-}X_2| > 1$, respectively. In line with the theoretical basis of DRMs, all these measures are constructed keeping educational *homogamy* as the reference category relative to which the effects of inconsistency are assessed.

The goodness-of-fit of nested DRMs can be measured by the standard likelihood-ratio test, which compares the log-likelihood of the model under assessment relative to the baseline model and the additional degrees of freedom consumed (Sobel 1981). Additionally, for each model I report the Bayesian Information Criterion (BIC), which compares the adequacy of two models as a ratio in likelihood rather than a departure from a specific benchmark (Raftery 1995). Lower values of BIC signal a better fit.

Two final considerations concerning the application of DRMs are in order. Firstly, it must be noted that the analysis of salience or inequality of the main status effects is conceptually different from the analysis of status inconsistency (Hendrickx et al. 1993: 348-49). Salience, as expressed by the weight parameters p and q, indicates solely whether one of the two status variables has a stronger effect on the outcome. Hence, when applied to the study of educational heterogamy the salience parameters provide an indication of which partner's level of the education determines more strongly the value of the outcome, provided that their levels of education differ. The heterogamy variables, on the other hand, test whether educational differences at the couple level have an effect on the dependent variable over and above the main (individual) effects of education.

Secondly, the validity of the assumption that status consistent individuals establish the defining attitudes and behaviours of a given status position may be questioned if consistency is infrequent or if those who experience it fail to set well differentiated socio-cultural norms (Sobel 1981: 904). In terms of educational dissimilarity, the first problem relates to the visibility of each education group and is reflected empirically in cell sparsity. Descriptive statistics in Table 3.2 confirm that this problem does not apply to my analytic sample. The second problem pertains to differentiation in terms of the dependent variable across levels of education and is illustrated by the magnitude of the differences in the marginals of the square tables. In other words, arguments about educational dissimilarity at the couple level lose ground if differentiation between education categories with respect to the outcome of interest is poor. However, descriptive evidence presented below strongly suggests that such differences are indeed observed in my analytical sample.

The following section presents results for my DRMs. All models were estimated using the 'diagref' package in STATA, which fits regression models incorporating Sobel's (1981) non-linear parameterisation of status inconsistency effects via maximum likelihood[47].

3.5. Results

I organise the presentation of my empirical results in three sub-sections. The first section provides a description of the joint distribution of the outcome variables across parental levels of education. These cross-tabulations are useful to examine differences in marginal scores on the parenting variables, and hence to address the question of how much differentiation exists in parenting beliefs and behaviours between parents with different levels of schooling. Further, the diagonal cells in these tables display the average values of the outcome variables for parents in homogamous couples, which serve as the benchmark for the second step of my analyses. This second stage involves running a sequence of DRMs to assess the salience of mothers' and fathers' education in shaping parenting practices in heterogamous couples and to test the effects of specific forms of educational heterogamy. The third section examines the consistency of parenting over time by means of a comparison of activities with the child in year 5 for partners in situations of maximal and minimal attitudinal consistency in year 1.

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[47] The programme was written by Omar Lizardo (University of Notre Dame) and is available for download in STATA (*net from http://www.nd.edu/~olizardo/Stataprogs/diagref/* [last accessed: 2nd May 2011]). As a robustness check, I also estimated some of my models using the 'dref' subcommand of the 'gnm' package in R, obtaining virtually identical results.

3.5.1. Descriptive evidence

Tables 2.2 and 2.3 present the cell, row and column percentages resulting from the cross-tabulation of partners' levels of education in each cohort for the overall and firstborn samples, respectively. Distributions are unweighted for the NCDS and BCS cohorts, and weighted for their LSYPE and MCS counterparts. A comparison of row and column totals across sub-tables illustrates the well-known upward shift in average levels of educational attainment throughout the twentieth century. Changes between the first two cohorts mainly reflect the expansion of participation in lower and upper secondary education. Changes since 1970 are most pronounced in higher education. It must be noted that the intervals between data points are not uniform, the largest being that between the BCS and LSYPE cohorts. Their comparison may thus magnify the pace of change.

Beliefs about the importance of parental stimulation for child development at 9 months. Tables 3.3.A and 3.3.B present maternal and paternal scores for my first indicator of parenting attitudes. Higher scores on the scale denote a stronger endorsement of the belief that what parents do with children is critical to boost their development. A clear positive gradient is observed for both maternal (row means in Table 3.3.A) and paternal scores (column means in Table 3.3.B) with respect to own education. That is, *the evidence confirms that MCS parents are no exception to the well-documented positive association between schooling and attitudes towards increased parental involvement with children*. Row and column means further suggest that differentiation in the strength of these beliefs is most clear between parents at both ends of the educational distribution and parents with intermediate levels of schooling. This suggests that the education gradient is non-linear in its extremes, and that *the greatest differentiation occurs between parents with qualifications below O-level and the rest*. Most importantly, differences in the marginal means of both parents are not large, suggesting that *at each level of attainment mothers and fathers have similar levels of adherence to the ideals of involved parenting.*

Grey-shaded cells on the tables correspond to mothers and fathers in educationally homogamous unions. The same positive slope with regard to education is observed, and average values for the diagonals are broadly similar to the maternal and paternal marginal scores. For instance, the score for mothers holding lower tertiary qualifications and having partners with the same level of education is .232, whereas the average score for mothers in that category, irrespective of their partners' education, is .170. For fathers, the corresponding figures are .168 and .166. This provides support for the assumptions that maternal and paternal values are broadly shared in homogamous couples, on the one hand, and that values are in line with the marginal averages for the corresponding levels of education, on the other.

Beliefs about the impact of maternal employment at 9 months. Tables 3.4.A and 3.4.B present maternal and paternal scores for the second dimension of parenting attitudes. Higher scores on this scale indicate dismissal of the argument that maternal employment has a negative impact on child development in early childhood. In the case of mothers (row means in Table 3.4.A), the same positive gradient observed for beliefs about stimulation is found with regard to views on maternal employment. As education increases, mothers express less concern about the potential consequences that participating in the labour market may have for children. Mothers with the lowest level of qualifications show a much lower level of approval, and at the top mothers with some form of higher education express more favourable attitudes towards combining work and childrearing. However, amongst fathers (column means in Table 3.4.B) the pattern becomes less clear. Mean values for intermediate categories of attainment fail to display the expected ordering and the only substantial differences in scores are found between the two extreme levels of qualifications. Furthermore, differences in the marginal means for mothers and fathers are now larger than in the case of attitudes on stimulation.

Hence, *the data suggest that differentiation by education with respect to views on maternal employment is much greater amongst mothers than amongst fathers*. This is consistent with the argument that women who invest more in their education aim to keep a more continuous attachment to the labour market after childbearing, and that amongst men education is a poorer indicator of expected participation in paid employment during the child's early years. Interestingly, fathers' views on maternal employment vary significantly across levels of mothers' education (row means in Table 3.4.B). On the contrary, little variation in mothers' beliefs is observed as a function of their partners' education (column means in Table 3.4.A). In other words, the tables suggests that *for both members of the couple the education of the female partner is more important in determining attitudes towards maternal employment than the male partner's education*. Accordingly, means for partners in homogamous couples at any level of education tend to be closer to the average scores for mothers with these qualifications than for their male counterparts. For instance, the score for fathers with university degrees and equally educated partners is .193, while the score for mothers in such unions is .160. Both values are more in line with the average score for female degree holders irrespective of their partners' education (.188) than with the corresponding value for male degree holders (.095). The same is true for parents with low qualifications.

Table 3.3.A. Mother scores: Beliefs about the importance of parental stimulation for child development at 9 months (scale)

	Father's education					
Mother's education	Below O-level	O-level or equivalent	A-level or equivalent	Non-degree higher educ.	University degree	*Row means*
Below O-level	-.270	-.115	-.081	-.345	-.037	*-.191*
O-level or equivalent	-.057	.018	-.040	.049	.159	*.004*
A-level or equivalent	.042	.094	.126	.055	.137	*.093*
Non-degree higher educ.	.050	.102	.170	.232	.231	*.170*
University degree	.157	.275	.239	.318	.269	*.268*
Column means	*-.100*	*.037*	*.062*	*.112*	*.229*	N=11,361

Notes: Entries are mean scale scores. Higher scores denote a stronger belief in the importance of parental stimulation. All statistics weighted to adjust for sample design.

Source: MCS, Wave 1.

Table 3.3.B. Father scores: Beliefs about the importance of parental stimulation for child development at 9 months (scale)

	Father's education					
Mother's education	Below O-level	O-level or equivalent	A-level or equivalent	Non-degree higher educ.	University degree	*Row means*
Below O-level	-.396	-.100	-.051	.104	.297	*-.172*
O-level or equivalent	-.213	-.026	-.064	.149	.127	*-.036*
A-level or equivalent	-.228	.053	.082	.166	.262	*.061*
Non-degree higher educ.	-.036	.101	.169	.168	.270	*.151*
University degree	-.056	.328	.193	.222	.287	*.255*
Column means	*-.253*	*.019*	*.043*	*.166*	*.266*	N=11,361

Notes: Entries are mean scale scores. Higher scores denote a stronger belief in the importance of parental stimulation. All statistics weighted to adjust for sample design.

Source: MCS, Wave 1.

Table 3.4.A. Mother scores: Beliefs about the effects of maternal employment for child development at 9 months (scale)

	Father's education					
Mother's education	Below O-level	O-level or equivalent	A-level or equivalent	Non-degree higher educ.	University degree	*Row means*
Below O-level	-.295	-.143	-.200	-.337	-.546	*-.256*
O-level or equivalent	.060	.052	.007	.000	.044	*.034*
A-level or equivalent	.134	.186	.102	-.035	-.135	*.075*
Non-degree higher educ.	.123	.208	.166	.107	.015	*.123*
University degree	.321	.320	.174	.216	.160	*.188*
Column means	*-.035*	*.084*	*.048*	*.031*	*.073*	N=10,607

Notes: Entries are mean scale scores. Higher scores denote a stronger belief in the importance of parental stimulation. All statistics weighted to adjust for sample design.

Source: MCS, Wave 1.

Table 3.4.B. Father scores: Beliefs about the effects of maternal employment for child development at 9 months (scale)

Mother's education	*Father's education*					
	Below O-level	O-level or equivalent	A-level or equivalent	Non-degree higher educ.	University degree	*Row means*
Below O-level	-.305	-.120	-.248	-.310	-.605	*-.264*
O-level or equivalent	.035	-.014	-.098	-.093	.060	*-.031*
A-level or equivalent	-.068	.110	.071	-.077	-.122	*.007*
Non-degree higher educ.	.027	.137	.141	.031	.029	*.076*
University degree	.067	.208	.250	.242	.193	*.203*
Column means	*-.097*	*.028*	*.004*	*-.016*	*.095*	N=10,607

Notes: Entries are mean scale scores. Higher scores denote a stronger belief in the importance of parental stimulation. All statistics weighted to adjust for sample design.

Source: MCS, Wave 1.

Stimulation-oriented activities with children at age 3. Tables 3.5.A and 3.5.B present scores for the first indicator of parenting behaviours. Higher values on this scale denote a higher frequency of reading to the child at age 3. Results are again in line with the general expectation about the relationship between schooling and parenting practices. *For both mothers and fathers, higher levels of education are associated with a higher frequency of reading to the child.* Differences between adjacent categories of attainment are moderate in magnitude, and largest in relative terms at the bottom of the attainment ladder. This suggests that children of parents with less than O-levels experience a significant disadvantage in parental verbal stimulation.

Worth noting is also that *the average frequency of reading to the child is higher for mothers than for fathers at all levels of education.* Given the metric of the scale, the average 1-point differences may translate into several reading sessions per week. This also means that, while the education gradient holds, partners in homogamous couples show different levels of involvement in this activity. Means for the diagonal cells reflect this gender difference as homogamous partners adjust to their own marginal means rather than to their partners'. For instance, the score for mothers with O-level or equivalent qualifications in a homogamous union is 5.29, virtually the same as the average of 5.28 for mothers with that level of education. In turn, fathers' scores in these unions are 4.15, close to their marginal of 4.22.

Table 3.5.A. Mother scores: Stimulation-oriented activities with children at age 3 (frequency of reading to the child)

	Father's education					
Mother's education	Below O-level	O-level or equivalent	A-level or equivalent	Non-degree higher educ.	University Degree	*Row means*
Below O-level	4.40	4.75	4.92	4.97	4.84	*4.65*
O-level or equivalent	5.03	5.29	5.31	5.46	5.55	*5.28*
A-level or equivalent	5.15	5.39	5.48	5.59	5.70	*5.46*
Non-degree higher educ.	5.37	5.43	5.58	5.62	5.74	*5.57*
University degree	5.68	5.57	5.73	5.74	5.75	*5.73*
Column means	*4.85*	*5.24*	*5.39*	*5.53*	*5.69*	N=9,844

Notes: Higher scores indicate higher frequency of reading to the child (range 1-6). All statistics weighted to adjust for sample design.

Source: MCS, Wave 2.

Table 3.5.B. Father scores: Stimulation-oriented activities with children at age 3 (frequency of reading to the child)

	Father's education					
Mother's education	Below O-level	O-level or equivalent	A-level or equivalent	Non-degree higher educ.	University degree	*Row means*
Below O-level	3.42	3.93	3.99	4.11	4.13	*3.74*
O-level or equivalent	3.83	4.15	4.36	4.45	4.71	*4.22*
A-level or equivalent	4.02	4.38	4.37	4.60	4.74	*4.41*
Non-degree higher educ.	4.22	4.37	4.55	4.62	4.82	*4.55*
University degree	4.42	4.66	4.91	4.96	5.00	*4.93*
Column means	*3.75*	*4.22*	*4.41*	*4.59*	*4.88*	N=9,844

Notes: Higher scores indicate higher frequency of reading to the child (range 1-6). All statistics weighted to adjust for sample design.

Source: MCS, Wave 2.

Table 3.6.A. Mother scores: Stimulation-oriented activities with children at age 5 (scale)

Mother's education	*Father's education* Below O-level	O-level or equivalent	A-level or equivalent	Non-degree higher educ.	University degree	*Row means*
Below O-level	-.325	-.224	-.152	-.304	-.083	*-.258*
O-level or equivalent	-.101	-.044	-.031	-.023	.044	*-.044*
A-level or equivalent	.032	.096	.061	-.006	.175	*.068*
Non-degree higher educ.	-.014	.037	.167	.098	.127	*.095*
University degree	.079	.126	.088	.065	.138	*.117*
Column means	*-.159*	*-.034*	*.024*	*-.001*	*.121*	N=9,173

Notes: Entries are mean scale scores. Higher scores indicate higher frequency of engagement in activities with the child. All statistics weighted to adjust for sample design.

Source: MCS, Wave 3.

Table 3.6.B. Father scores: Stimulation-oriented activities with children at age 5 (scale)

	Father's education					
Mother's education	Below O-level	O-level or equivalent	A-level or equivalent	Non-degree higher educ.	University degree	*Row means*
Below O-level	-.437	-.165	-.039	-.020	-.142	*-.250*
O-level or equivalent	-.190	.002	.006	.056	.016	*-.030*
A-level or equivalent	-.070	.130	.061	.057	-.036	*.042*
Non-degree higher educ.	-.192	-.040	.122	.079	.133	*.046*
University degree	.121	.090	.178	.166	.101	*.121*
Column means	*-.262*	*-.012*	*.056*	*.077*	*.076*	N=9,173

Notes: Entries are mean scale scores. Higher scores indicate higher frequency of engagement in activities with the child. All statistics weighted to adjust for sample design.

Source: MCS, Wave 3.

Stimulation-oriented activities with children at age 5. Tables 3.6.A and 3.6.B present scores for the second indicator of parenting behaviours. Higher values on this scale denote higher involvement in activities with the child by year 5. Generally speaking, *the association between the stimulation-oriented activities scale and parental education follows the patterns described for other outcomes*. The positive gradient exhibits a significant non-linearity at the bottom of the attainment distribution, confirming the distinctively poor home learning environments of children whose parents have less than secondary education. The very low values for partners in homogamous unions at this level of education further suggests some negative interaction, as both mothers' and fathers' scores are clearly below their corresponding marginal means (-.325 vs. -258 in the case of mothers, and -.437 vs. -.262 in the case of fathers).

3.5.2. Diagonal Reference Models

I use the same sequence of DRMs to analyse the association between parental levels of education, heterogamy and my four parenting outcomes. All models are run separately for mothers and fathers, and all predict average scores for partners in homogamous couples at each of level of attainment. Moreover, by controlling for the socio-demographic variables listed in Section 3.3, they provide a more stringent test of the general hypothesis about the educational gradient in parenting than the descriptive tables presented above.

In addition, the models generate weight parameters assessing the salience of mothers' and fathers' schooling in shaping parenting practices in educationally heterogamous couples. These weights (p and q) are a general measure of the influence of each partner without further specification about the pattern of heterogamy. These features are exemplified by Model 1, a baseline DRM as specified in Equation (2.2) with the addition of controls.

Model 2 extends the baseline setting by introducing two dummy variables for hypogamous and hypergamous couples. The coefficients of these variables indicate whether the attitudes and behaviours of partners in heterogamous couples resemble more the typical outcomes of individuals with the level of education of the more educated partner, or outcomes typical of individuals with the level of education of the less educated partner. If coefficients for the hypogamy and heterogamy dummies reach statistical significance, then some degree of adjustment to either pole of reference occurs. Hence, Model 2 tests the hypotheses of gender dominance and educational superiority. Which of these receives support depends then on the sign of the coefficients and whether the effects are found for both partners or one of them only.

Model 3 introduces another extension by breaking down hypogamy and hypergamy into short- and long-range matches. This specification aims to test whether the effects of heterogamy, if any, become stronger as dissimilarity increases.

Beliefs about the importance of parental stimulation for child development at 9 months. Tables 3.7.A and 3.7.B present the results of DRMs predicting, respectively, mothers' and fathers' scores on the scale of beliefs about the importance of parental stimulation. Predicted means for partners in homogamous unions confirm the educational gradient and non-linearities anticipated by the descriptive results.

Weight parameters in Model 1 suggest that in heterogamous couples the relative effect of one's own education is about three times more important than the effect of one's partner's education. This holds for both mothers (p=.775, q=.225) and fathers (p=.290, q=.710), and for the latter the introduction of the heterogamy variables further increases this salience.

In the case of mothers, the coefficients of the heterogamy variables in Models 2 and 3 do not reach statistical significance (Table 3.7.A). Not surprisingly, both specifications fail to produce improvements in model fit relative to the baseline model. For fathers, however, the hypogamy dummies prove significant and exhibit a positive sign (Table 3.7.B). This indicates that when men are less educated than their partners, their beliefs correspond more closely to the higher level of education of their female partners than to their own. What is more, the estimate for long-range hypogamy (b=.146, p <.01) proves larger in magnitude than that of short-range hypogamy (b=.082, p <.05). Improvements in model fit are observed according to the BIC statistic, albeit not in log-likelihood.

Table 3.7.A. Mother scores: Association between education and beliefs about the importance of stimulation for child development at 9 months (scale). DRMs

	Mother scores					
	Model 1		**Model 2**		**Model 3**	
Parental education weights						
Mother's education (*p*)	.775		.616		.671	
Father's education (*q*)	.225		.384		.329	
Means for homogamous couples						
Below O-level	-.251	***	-.255	***	-.255	***
	.037		*.037*		*.038*	
O-level or equivalent	-.065	**	-.056	*	-.059	+
	.022		*.028*		*.034*	
A-level or equivalent	.032		.029		.031	
	.027		*.030*		*.030*	
Non-degree HE	.098	***	.095	***	.096	**
	.026		*.028*		*.029*	
University degree	.187	***	.188	***	.187	***
	.023		*.026*		*.026*	
Educational heterogamy						
Hypogamy (mother>father)			.035			
			.038			
Hypergamy (father>mother)			-.033			
			.036			
Hypogamy long-range					.019	
					.074	
Hypogamy short-range					.030	
					.045	
Hypergamy short-range					-.031	
					.041	
Hypergamy long-range					-.016	
					.069	
Controls	Yes		Yes		Yes	
Log-likelihood	13,362		13,364		13,365	
BIC	-26,546		-26,532		-26,515	
Degrees of freedom	19		21		23	
N	11,361		11,361		11,361	

Notes: Standard errors in italics. ***: p <.001; **: p <.01; *: p <.05; +: p <.10. Homogamy as reference category for heterogamy variables. Controls: mother's age at child's birth, father's age at child's birth, number of siblings in the household, equivalised family income (log), parental ethnicity, step-father, and cohabiting couple; see Appendix for full results. Control variables from same wave as outcome. All statistics weighted to adjust for sample design.

Source: MCS, Wave 1.

Table 3.7.B. Father scores: Association between education and beliefs about the importance of stimulation for child development at 9 months (scale). DRMs

	Father scores					
	Model 1		Model 2		Model 3	
Parental education weights						
Mother's education (*p*)	.290		.047		.013	
Father's education (*q*)	.710		.953		.987	
Means for homogamous couples						
Below O-level	-.288	***	-.288	***	-.287	***
	.030		*.029*		*.029*	
O-level or equivalent	-.039		-.032		-.034	+
	.028		*.021*		*.021*	
A-level or equivalent	-.002		-.007		-.004	
	.026		*.021*		*.021*	
Non-degree HE	.136	***	.120	***	.120	***
	.029		*.025*		*.024*	
University degree	.193	***	.207	***	.206	***
	.024		*.024*		*.023*	
Educational heterogamy						
Hypogamy (mother>father)			.104	**		
			.033			
Hypergamy (father>mother)			-.017			
			.031			
Hypogamy long-range					.146	**
					.051	
Hypogamy short-range					.082	*
					.036	
Hypergamy short-range					-.037	
					.034	
Hypergamy long-range					-.009	
					.047	
Controls	Yes		Yes		Yes	
Log-likelihood	11,297		11,303		11,304	
BIC	-22,393		-22,409		-22,415	
Degrees of freedom	19		21		23	
N	11,361		11,361		11,361	

Notes: Standard errors in italics. ***: p <.001; **: p <.01; *: p <.05; +: p <.10. Homogamy as reference category for heterogamy variables. Controls: mother's age at child's birth, father's age at child's birth, number of siblings in the household, equivalised family income (log), parental ethnicity, step-father, and cohabiting couple; see Appendix for full results. Control variables from same wave as outcome. All statistics weighted to adjust for sample design.

Source: MCS, Wave 1.

Beliefs about the impact of maternal employment at 9 months. Tables 3.8.A and 3.8.B present the results of DRMs predicting, respectively, mothers' and fathers' scores on the scale of beliefs about the potentially negative impact of maternal employment on child development. After the inclusion of controls, significant differences in mean levels of support for mothers' participation in the labour market are found for the extreme categories of attainment only.

Weight parameters for both partners indicate that the salience of mothers' education largely outweighs that of fathers'. According to Model 1, the impact of paternal education is virtually nil, although in Models 2 and 3 it experiences a modest increase.

Significant effects of educational differences are observed in the same direction and magnitude on both mothers' and fathers' scores. The positive sign of hypogamy and the negative sign of hypergamy for both partners suggest that, in all instances of heterogamy, parenting beliefs tend to align with the education of the mother rather than with the education of the father. Put differently, scores move up when the female partner is more educated, and down when she is less educated. This pattern of results is remarkably robust as it holds for both partners and attains statistical significance in all specifications. Additionally, long-range distance in education tends to induce greater adjustments than short-range distance. For instance, amongst mothers one level of hypergamy is associated with a -.072 decrease in the belief scale ($p <.05$), whereas two or more levels of hypergamy bring it down by -.122 ($p <.01$). Furthermore, in both tables Models 2 and 3 improve goodness-of-fit according to BIC.

Table 3.8.A. Mother scores: Association between education and beliefs about the effects of maternal employment on child development at 9 months (scale). DRMs

	Mother scores					
	Model 1		**Model 2**		**Model 3**	
Parental education weights						
Mother's education (*p*)	.999		.829		.783	
Father's education (*q*)	.001		.171		.217	
Means for homogamous couples						
Below O-level	-.047		-.098	***	-.095	***
	.031		*.032*		*.032*	
O-level or equivalent	-.012	+	.037		.046	
	.007		*.054*		*.033*	
A-level or equivalent	.003		.012		.012	
	.006		*.030*		*.031*	
Non-degree HE	.016		.008		.001	
	.011		*.034*		*.030*	
University degree	.040	+	.040		.036	
	.024		*.034*		*.030*	
Educational heterogamy						
Hypogamy (mother>father)			.109	**		
			.038			
Hypergamy (father>mother)			-.091	*		
			.040			
Hypogamy long-range					.134	**
					.039	
Hypogamy short-range					.096	**
					.035	
Hypergamy short-range					-.072	*
					.035	
Hypergamy long-range					-.121	**
					.037	
Controls	Yes		Yes		Yes	
Log-likelihood	1,034		1,038		1,040	
BIC	-1,865		-1,879		-1,891	
Degrees of freedom	19		21		23	
N	10,607		10,607		10,607	

Notes: Standard errors in italics. ***: p <.001; **: p <.01; *: p <.05; +: p <.10. Homogamy as reference category for heterogamy variables. Controls: mother's age at child's birth, father's age at child's birth, number of siblings in the household, equivalised family income (log), parental ethnicity, step-father, and cohabiting couple; see Appendix for full results. Control variables from same wave as outcome. All statistics weighted to adjust for sample design.

Source: MCS, Wave 1.

Table 3.8.B. Father scores: Association between education and beliefs about the effects of maternal employment on child development at 9 months (scale). DRMs

	Father scores					
	Model 1		**Model 2**		**Model 3**	
Parental education weights						
Mother's education (*p*)	.999		.622		.626	
Father's education (*q*)	.001		.378		.374	
Means for homogamous couples						
Below O-level	-.085	**	-.083	*	-.078	*
	.025		*.036*		*.036*	
O-level or equivalent	-.037	**	.001		-.003	
	.012		*.033*		*.034*	
A-level or equivalent	-.008		-.034		-.039	
	.014		*.034*		*.033*	
Non-degree HE	.029	*	-.007		-.006	
	.013		*.035*		*.033*	
University degree	.101	**	.123	***	.126	***
	.029		*.030*		*.030*	
Educational heterogamy						
Hypogamy (mother>father)			.101	**		
			.033			
Hypergamy (father>mother)			-.095	**		
			.032			
Hypogamy long-range					.079	+
					.043	
Hypogamy short-range					.121	**
					.035	
Hypergamy short-range					-.070	*
					.035	
Hypergamy long-range					-.122	**
					.033	
Controls	Yes		Yes		Yes	
Log-likelihood	535		544		545	
BIC	-876		-892		-893	
Degrees of freedom	19		21		23	
N	10,607		10,607		10,607	

Notes: Standard errors in italics. ***: p <.001; **: p <.01; *: p <.05; +: p <.10. Homogamy as reference category for heterogamy variables. Controls: mother's age at child's birth, father's age at child's birth, number of siblings in the household, equivalised family income (log), parental ethnicity, step-father, and cohabiting couple; see Appendix for full results. Control variables from same wave as outcome. All statistics weighted to adjust for sample design.

Source: MCS, Wave 1.

Results for the two indicators of parenting attitudes can be summarised as follows: *in heterogamous couples, mothers' beliefs align with the expectation based on their own level of education rather than with that of their male partners, regardless of who is more educated in the couple*. Remarkably, *fathers too express beliefs that are more in line with the level of education of the mothers than with their own, even when they partner up with a less educated woman.* This pattern of influence is especially pronounced regarding beliefs about the impact of maternal employment on child development but holds as well for beliefs about the importance of parental stimulation. *The results therefore suggest that some bridging of the distance between the expected beliefs of partners with different levels of schooling does indeed occur, and that it takes the form of an adjustment to the beliefs predicted by the mother's level of education*. Hence, *the results for parenting attitudes provide consistent support for the hypothesis of female dominance*.

Stimulation-oriented activities with children at age 3. Tables 3.9.A and 3.9.B present estimates from DRMs predicting, respectively, mothers' and fathers' scores on the frequency of reading to the child at age 3. Once again, predicted means for partners in educationally homogamous couples come to confirm the positive association between education and parenting practices and the distinctiveness of the home learning environments of families where both parents hold university degrees or lack basic qualifications. Between these two extremes, the relationship between education and parental involvement with children remains fairly linear.

Salience parameters appear more balanced with respect to reading than to attitudinal outcomes. The influence of mothers' education is greater on mothers' frequency of reading to the child (e.g. p=.672, q=.328, Model 1); for fathers the education of both partners seems equally relevant (e.g. p=.471, q=.529, Model 1).

Heterogamy variables in Models 2 and 3 yield the inverse pattern of results to that observed for attitudinal outcomes. For example, in Model 2 hypergamy is associated with an increase in the frequency of reading to the child for both mothers (b=.080, p<.05) and fathers (b=.106, p<.05), which implies that adjustments occur with the level of education of the father. The signs of the coefficients for hypogamy, on the other hand, present an inconsistent pattern and fail to reach statistical significance for either partner. Results must nonetheless be interpreted with caution given the unsatisfactory overall fit of these models according to the BIC statistic.

Stimulation-oriented activities with children at age 5. Tables 3.10.A and 3.10.B report results for DRMs predicting, respectively, mothers' and fathers' direct involvement in stimulation-related activities with the child at age 5. Results for these models are broadly in line with those obtained for the equivalent outcome at age 3, although in this case the educational difference variables fail to attain statistical significance and to bring about any improvements in model fit. Overall, there is no evidence of effects of educational heterogamy on either mothers' or fathers' parenting activities at age 5.

Table 3.9.A. Mother scores: Association between education and stimulation-oriented activities with children at age 3 (reading). DRMs

	Mother scores					
	Model 1		**Model 2**		**Model 3**	
Parental education weights						
Mother's education (p)	.672		.750		.834	
Father's education (q)	.328		.250		.166	
Means for homogamous couples						
Below O-level	4.522	***	4.533	***	4.545	***
	.040		*.040*		*.041*	
O-level or equivalent	5.068	**	5.085	**	5.092	***
	.027		*.026*		*.026*	
A-level or equivalent	5.285	***	5.284	***	5.301	***
	.029		*.028*		*.027*	
Non-degree HE	5.414	***	5.410	***	5.433	***
	.027		*.026*		*.025*	
University degree	5.532	***	5.552	***	5.574	***
	.022		*.023*		*.023*	
Educational heterogamy						
Hypogamy (mother>father)			-.008			
			.034			
Hypergamy (father>mother)			.080	*		
			.034			
Hypogamy long-range					-.064	
					.053	
Hypogamy short-range					-.026	
					.037	
Hypergamy short-range					.065	+
					.039	
Hypergamy long-range					.176	**
					.055	
Controls	Yes		Yes		Yes	
Log-likelihood	-14,158		-14,162		-14,166	
BIC	28,537		28,527		28,515	
Degrees of freedom	20		22		24	
N	9,844		9,844		9,844	

Notes: Standard errors in italics. ***: p <.001; **: p <.01; *: p <.05; +: p <.10. Homogamy as reference category for heterogamy variables. Controls: mother's age at child's birth, father's age at child's birth, number of siblings in the household, equivalised family income (log), parental ethnicity, step-father, cohabiting couple and weekly hours of market work; see Appendix for full results. Control variables from same wave as outcome. All statistics weighted to adjust for sample design.

Source: MCS, Wave 2.

Table 3.9.B. Father scores: Association between education and stimulation-oriented activities with children at age 3 (reading). DRMs

	Father scores					
	Model 1		**Model 2**		**Model 3**	
Parental education weights						
Mother's education (p)	.471		.527		.516	
Father's education (q)	.529		.473		.484	
Means for homogamous couples						
Below O-level	3.701	***	3.660	***	3.659	***
	.046		*.047*		*.047*	
O-level or equivalent	4.205	***	4.153	***	4.152	***
	.038		*.038*		*.038*	
A-level or equivalent	4.439	+	4.371		4.370	
	.041		*.043*		*.043*	
Non-degree HE	4.599	***	4.531	***	4.531	***
	.039		*.040*		*.042*	
University degree	4.916	***	4.894	***	4.893	***
	.032		*.034*		*.036*	
Educational heterogamy						
Hypogamy (mother>father)			.042			
			.050			
Hypergamy (father>mother)			.106	*		
			.052			
Hypogamy long-range					.050	
					.084	
Hypogamy short-range					.046	
					.053	
Hypergamy short-range					.106	+
					.057	
Hypergamy long-range					.094	
					.087	
Controls	Yes		Yes		Yes	
Log-likelihood	-16,469		-16,470		-16,474	
BIC	33,160		33,141		33,131	
Degrees of freedom	20		22		24	
N	9,844		9,844		9,844	

Notes: Standard errors in italics. ***: p <.001; **: p <.01; *: p <.05; +: p <.10. Homogamy as reference category for heterogamy variables. Controls: mother's age at child's birth, father's age at child's birth, number of siblings in the household, equivalised family income (log), parental ethnicity, step-father, cohabiting couple and weekly hours of market work; see Appendix for full results. Control variables from same wave as outcome. All statistics weighted to adjust for sample design.

Source: MCS, Wave 2.

Table 3.10.A. Mother scores: Association between education and stimulation-oriented activities with children at age 5 (scale). DRMs

	Mother scores					
	Model 1		**Model 2**		**Model 3**	
Parental education weights						
Mother's education (*p*)	*.696*		*.305*		.230	
Father's education (*q*)	.304		.695		.770	
Means for homogamous couples						
Below O-level	-.232	***	-.214	***	-.209	**
	.034		*.058*		*.067*	
O-level or equivalent	-.078	**	-.065	*	-.065	*
	.026		*.030*		*.027*	
A-level or equivalent	.026		.014		.011	
	.030		*.034*		*.038*	
Non-degree HE	.106	**	.052		.046	
	.031		*.073*		*.059*	
University degree	.178	***	.214	***	.216	***
	.029		*.039*		*.035*	
Educational heterogamy						
Hypogamy (mother>father)			.087			
			.087			
Hypergamy (father>mother)			-.045			
			.056			
Hypogamy long-range					.114	
					.130	
Hypogamy short-range					.089	
					.081	
Hypergamy short-range					-.054	
					.050	
Hypergamy long-range					-.055	
					.104	
Controls	Yes		Yes		Yes	
Log-likelihood	5,665		5,666		5,669	
BIC	-11,148		-11,131		-11,118	
Degrees of freedom	20		22		24	
N	9,173		9,173		9,173	

Notes: Standard errors in italics. ***: p <.001; **: p <.01; *: p <.05; +: p <.10. Homogamy as reference category for heterogamy variables. Controls: mother's age at child's birth, father's age at child's birth, number of siblings in the household, equivalised family income (log), parental ethnicity, step-father, cohabiting couple and weekly hours of market work; see Appendix for full results. Control variables from same wave as outcome. All statistics weighted to adjust for sample design.

Source: MCS, Wave 3.

Table 3.10.B. Father scores: Association between education and stimulation-oriented activities with children at age 5 (scale). DRMs

	Father scores					
	Model 1		**Model 2**		**Model 3**	
Parental education weights						
Mother's education (p)	.443		.326		.321	
Father's education (q)	.557		.674		.679	
Means for homogamous couples						
Below O-level	-.281	***	-.279	***	-.279	***
	.037		*.037*		*.038*	
O-level or equivalent	-.020		-.021		-.021	
	.029		*.029*		*.030*	
A-level or equivalent	.068	*	.062	*	.062	*
	.031		*.029*		*.030*	
Non-degree HE	.103	**	.104	**	.104	**
	.032		*.032*		*.034*	
University degree	.130	***	.134	***	.134	***
	.028		*.030*		*.031*	
Educational heterogamy						
Hypogamy (mother>father)			.060	+		
			.033			
Hypergamy (father>mother)			.001			
			.036			
Hypogamy long-range					.065	
					.049	
Hypogamy short-range					.056	
					.036	
Hypergamy short-range					-.001	
					.038	
Hypergamy long-range					.002	
					.052	
Controls	Yes		Yes		Yes	
Log-likelihood	5,031		5,033		5,033	
BIC	-9,879		-9,865		-9,847	
Degrees of freedom	20		22		24	
N	9,173		9,173		9,173	

Notes: Standard errors in italics. ***: p <.001; **: p <.01; *: p <.05; +: p <.10. Homogamy as reference category for heterogamy variables. Controls: mother's age at child's birth, father's age at child's birth, number of siblings in the household, equivalised family income (log), parental ethnicity, step-father, cohabiting couple and weekly hours of market work; see Appendix for full results. Control variables from same wave as outcome. All statistics weighted to adjust for sample design.

Source: MCS, Wave 3.

In summary, *results for the indicators of parenting behaviours are less consistent than those observed for parenting attitudes. The only significant adjustment in partners' behaviour occurs with regard to the frequency of reading to the child in couples where the father is more educated than the mother. In these couples both partners appear to increase their involvement with children, therefore exhibiting behaviours more in line with that expected from the level of paternal education.* In this respect, *the results would point in the direction of a pattern of influence characterised by male dominance.* Nonetheless, the marginal levels of statistical significance and the puzzling performance of the measures of goodness-of-fit advise *caution when drawing conclusions from these results.* What remains certain, though, is that *the strong pattern of female dominance observed for parenting attitudes when the child is 9 months old is not replicated for parenting behaviours at later ages.*

Socio-demographic controls. Results for the socio-demographic control variables are presented in Tables A.3.7.A to A.3.10.B in the Appendix, following the numbering of the main tables to which results correspond. A detailed discussion of the effects of these variables falls beyond the scope of this chapter, but suffice to note that all socio-demographic controls behave as expected. The most consistent effects are observed for the ethnicity variables, with both mothers and fathers in Indian, Pakistani-Bangladeshi and Black families, as well in the residual category 'Other', attaining lower scores on all indicators of parenting relative to the reference category of White parents. The fact that these large negative effects persist in multivariate models including parental education and income strongly suggests that differences in ethno-cultural norms about parenting roles and standards pervade the family environments experienced by children in contemporary Britain.

Another consistent effect is found for step-fathers, who tend to place less importance on their role in the upbringing of the cohort child and engage less in stimulation-oriented activities with the child. The number of dependent children in the household also seems to depress parental levels of involvement, a finding that may be due to parents either delegating some care or play activities to older children or having to spread their time and attention between many children. It is also worth noting the opposite effect that the gender of the cohort child appears to have on parents' engagement in developmental activities at age 5, as fathers engage more actively with sons, and mothers with daughters. The issue of differential treatment of children by gender is addressed in more detail in the following chapter.

A final comment relates to the possibility that sample size constraints derived from response rates have affected my results. As noted above, my criteria for inclusion in the analytic samples may have introduced, on the one hand, an upward bias in the individual scales of parenting attitudes and behaviours (associated with higher item non-response among partners with lower levels of education) and, on the other, a downwards bias in the extent of disagreement within couples (associated with higher item non-response in less harmonious couples). Three considerations can be brought forward to discuss the incidence of these biases. First, response rates are high across all my outcomes variables –equal or superior to 85% for both partners in all cases. Second, all my statistical analyses adjust for sampling design, attrition across waves and item non-response by using special procedures for complex survey design and longitudinal weights (the product of sampling and non-response weights). Third, and more importantly, the focus of the chapter remains on the patterns of adjustment between partners with regards to attitudes and behaviours.

The first potential bias is therefore unlikely to have an impact on this aspect, as long as male and female respondents are equally affected by it. A more serious concern, however, is the possibility that non-respondents experience higher levels of partner inconsistency in parenting, and that disagreement is underestimated because of missing information. While worrying for the accuracy of my results, this type of selection bias would reduce the scope for observing adjustment between partners, thus working not for, but against my hypothesis that educational heterogamy can be linked to partners approaching their positions. The concluding section of the chapter revises the issue of selection.

3.5.3. Consistency of parenting approaches over time: partners' attitudinal agreement at year 1 and parenting behaviour by year 5

The preceding sections provide new evidence of differences in parenting attitudes and behaviours across parental levels of education and of attitudinal adjustment in situations of educational heterogamy, most notably towards the mother's position. In order to assess the potential implications of such adjustment, I next address a subsidiary research question regarding the inter-temporal consistency of parenting attitudes and behaviours: *Is parental engagement with children, measured at the individual level, affected by the degree of attitudinal agreement at the couple level?* In other words, *do mothers and fathers modify the behaviour expected of them on the basis of their own personal attitudes when these views are at odds with those held by their partners?*

The response to this question can be framed within two extreme, hypothetical scenarios. In the first, parental attitudes about their roles in child development are fully consistent at the time of birth. Arguably, then, when both parents place great importance on this issue their level of involvement with the child can be expected to be high. Inversely, when both parents give little priority to their actions in this regard, their level of involvement is likely to be low throughout the child's upbringing. In the second scenario, partners hold opposite views about the importance of parental stimulation for child development. Predictions about their engagement in active parenting at a later time are then more complex. Solutions may involve each partner pursuing his or her preferred approach, both partners converging towards middle ground, or one of them modifying his or her parenting practices in a direction that is more consistent with his or her partner's attitudes.

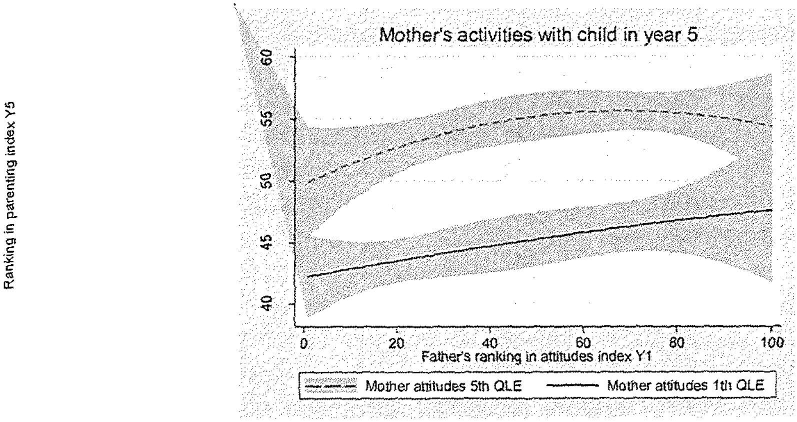
The design of the MCS and the new parenting scales I constructed for my previous analyses allow me to address these questions empirically. This involves ranking parents on both the attitudinal and behavioural scales and comparing their positions on the latter across varying degrees of attitudinal agreement. In Figure 3.1 I provide such a comparison for mothers (graph A) and fathers (graph B) in the top (5^{th}) and bottom (1^{st}) quintiles of the attitudes scale when the child is 9 months old by graphing their corresponding percentiles in the behavioural scale when the child is 5 years old. That is, I compare individuals at both ends of the attitudinal distribution enjoying varying levels of consistency with their partners. The aim of this exercise is to examine whether having a partner who holds rather different attitudes about parental responsibility in fostering children's development in year 1 leads to a change in behaviour by year 5 compared to having a partner with similar attitudes.

Figures 3.1.A and 3.1.B suggest that the same pattern of influence with regards to early attitudinal consistency applies to the parenting behaviours of mothers and fathers. Three features are worth noting. Firstly, the modest level of differentiation that exists in terms of parenting activities between parents with the most and least favourable opinions about the importance of parental stimulation. This result provides only partial support for the general expectation of inter-temporal and cross-domain consistency in parenting (Holden and Miller 1999). Such differentiation is reflected in the vertical distance of about 10 percentile points between the two groups around the median of the distribution (i.e. the distance between the dashed and solid lines). In other words, while a positive correlation exists between individual ranking on both scales, the predictive power of the attitudes held in year 1 with respect to parenting behaviours in year 5 appears rather small given the fact that the activities scale is normally distributed and most parents display levels of involvement close to its mean value.

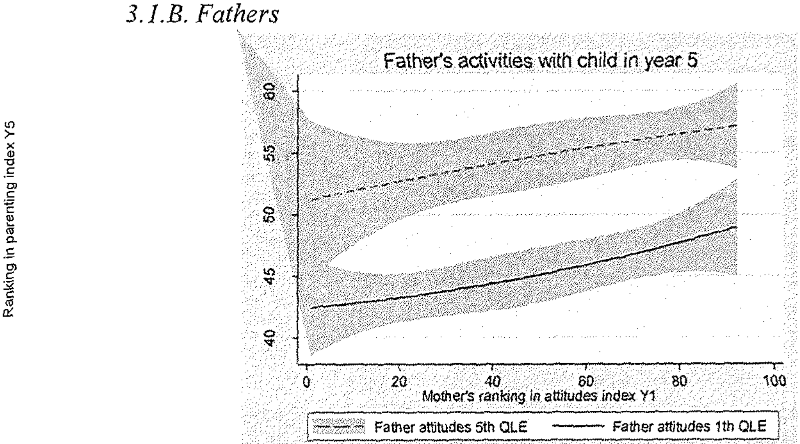
Secondly, the data suggests that, regardless of their own position on the attitudinal scale, mothers and fathers modify their involvement in parenting activities at year 5 as a function of the attitudes held by their partners, albeit to a modest degree. This is reflected in the positive slope of both the solid and dashed lines displayed in both graphs. However, the confidence intervals around these predictions suggest that differences for each attitudinal quintile are only statistically significant when partners hold extreme views in either direction. Fathers in the bottom quintile of the attitudinal scale in year 1 (i.e. solid line in Graph B) are the group most susceptible to changing their engagement with children according to maternal views on parenting, with differences in their rankings on the behavioural distribution amounting to 6 percentile points when their partners are in the top and bottom deciles of the attitudinal scale.

Figure 3.1. Adjustment of parenting behaviours over time as a function of early attitudinal consistency at the couple level

3.1.A. Mothers



3.1.B. Fathers



Notes: Ranking is the percentile distribution of scores on the multi-item scales of beliefs about the importance of parental stimulation for child development at 9 months and stimulation-oriented activities with children at age 5 (cf. Section 3.3). 5th QLE is the top quintile (i.e. most favourable attitudes); 1st QLE is the bottom quintile (i.e. least favourable). Shaded areas represent 95% confidence intervals.

Source: MCS, Waves 1 and 3.

And thirdly, the overlap of the confidence intervals for both mothers and fathers at both ends of the horizontal axis suggests that differences in engagement with children based on one's own attitudinal position blur when one's partner holds either very positive or negative attitudes. On the other hand, differences between both mothers and fathers with opposite views remain significant when partners hold views around the middle of the distribution. That is, *having a partner with extreme views on parenting, in either direction, seems to mitigate the differentiation that would otherwise occur between both mothers and fathers with opposite views themselves.*

Therefore, Figures 3.1.A and 3.1.B lead me to conclude *that attitudinal inconsistencies between partners are consequential for the modification of parenting behaviours over time. However, these adjustments appear exclusive to couples where both partners are in the top or bottom quintiles of the attitudinal distribution.* When combined with the results of the DRMs, which examined parenting attitudes and behaviours separately and from a cross-sectional perspective, the findings presented in Figures 3.1.A and 3.1.B suggest *a general tendency towards convergence in parenting at the couple level, either in the form of early attitudinal agreement or of later behavioural adjustment when attitudinal inconsistencies remain substantial.*

3.6. Discussion

This chapter has used data from the MCS to explore the educational gradient in parenting attitudes and behaviours and the patterns of mutual influence between mothers and fathers in educationally dissimilar couples. To my knowledge, this is the first empirical test of theoretically informed hypotheses about the effects of educational heterogamy on parenting practices using a nationally representative sample of the UK population and the best available methods for the identification of heterogamy effects.

The quality of parenting has long been considered a critical determinant of children's cognitive and social development and thus a major pathway for the intergenerational transmission of educational success (e.g. Bradley and Corwyn 2004; Duncan et al. 2007). While a vast literature has identified education as a key factor in shaping parental perceptions of their childrearing responsibilities and their actual involvement with children (for reviews, Sammons et al. 2007; Feinstein et al. 2008), a consistent body of empirical evidence about the dynamics of childrearing amongst partners with different levels of education has yet to emerge. I argued that this constitutes an important limitation to our understanding of the functioning of contemporary families given changes in parents' cultural and economic roles over recent decades, most visible in women's increased investments in education prior to childbearing and more continuous participation in the labour market thereafter (Goldin 2006; Esping-Andersen 2009). In the UK, women's increased levels of educational attainment and changing sorting patterns in the 1990s and early 2000s translated into two thirds of all parental couples being educationally heterogamous and similar proportions of those being led by a more educated male or female partner (cf. Chapter 2). In light of these trends, and given the strong association that education bears with parenting at the individual level, I posited that the direction and degree of educational dissimilarity between partners could exert an influence on their parenting values and behaviours.

Overall, my findings confirmed that the same positive relationship between education and parenting practices holds for mothers and fathers, and that as a corollary of the general tendency towards educational resemblance, most couples can be assumed to provide consistent parenting inputs. More importantly, my analyses of the dynamics of parenting in educationally heterogamous couples revealed that, in the attitudinal domain, both mothers and fathers adjust to the views that can be expected on the basis of the mother's level of education rather than on the father's. Hence, in these families parenting attitudes resemble more closely the values of families where both parents have the level of education of the mother than the values of families where both parents complete the qualifications of the father. With respect to parenting behaviours, however, I found no compelling evidence that dissimilarity in education leads to changes in parental interactions with children. When I examined the relationship of both dimensions of parenting over time, I observed a modest convergence in behaviour in cases where substantial inconsistencies in early beliefs existed.

My findings can be interpreted within the broader analytical frameworks of gender relations and the family-based transmission of inequalities. As for the implications at the parental level, the results suggest female dominance in parenting attitudes and beliefs. This may follow from the continued assignment of the major parenting responsibilities to mothers and from implicit agreement with the assumption that, by and large, "mothers know better" about childrearing. This is consistent with traditional expectations about differentiated gender roles (Davis and Greenstein 2009) and with evidence that, despite a narrowing of the gap over the last decades, mothers' average dedication to childcare in the UK remains substantially above fathers' (Bianchi et al. 2006: Appendix C). The fact that the adjustment to mothers' views occurs even in cases of female hypergamy further supports this interpretation. Such a statement does not deny the importance of paternal inputs and values in the upbringing of children but posits that, whenever mothers and fathers may be inclined to diverging childrearing approaches, the solution reached at the couple level tends to give greater weight to the values that can be considered typical of the level of education of the mother. Moreover, the magnitude of the adjustment towards the maternal position appears to increase as the educational distance between partners augments.

From this perspective, and with respect to beliefs about the importance of parental stimulation, the good news for children is that the pattern of adjustment is not symmetrical and occurs more clearly in cases of "attitudinal upgrading". Whereas I found no indication that heterogamy leads to changes in mothers' attitudes, my results suggest that fathers endorse active parenting more strongly when their female partners are more educated than them but that they do not decrease their commitment in the opposite case (tables 3.7.A and 3.7.B). Hence, it appears that female hypogamy succeeds in "enlightening" fathers' attitudes about their role in child development while hypogamy does not seem to have the inverse effect.

The pattern of influence with respect to views on maternal employment was also asymmetrical but here both maternal and paternal scores showed clear signs of adjustment, always in the direction of the mother's reference position (tables 3.8.A and 3.8.B). That is, in cases of female hypergamy both partners showed less support for combining maternal employment with childrearing, and in cases of female hypogamy both partners expressed more favourable views in doing so. Therefore, I conclude that it is the mother's level of attainment that has the greatest importance in shaping the decision about the work-childrearing arrangement ultimately adopted by the couple (net, of course, of other major determinants not discussed here). This is consistent with descriptive evidence of a far greater degree of variation in these attitudes with respect to maternal rather than paternal qualifications (tables 3.4.A and 3.4.B). These results can be connected to research on the recent evolution of family attitudes in the UK. This literature has documented a trend towards more permissive and egalitarian positions over the last three decades, as well as substantial gender differences in the level of concern over the implications for family life of mothers' participation in the labour market, with men being far more critical of it (Scott, Alwin and Braun 1996). However, there is little evidence of decreasing support for the traditional division of labour since the mid-1990s and, instead, signs of "mounting concern about work-family balance on items which taps the conflicts that employment and family care raise for women" (Scott 2008: 173-4). Hence, empirical evidence suggests that commitment to the traditional family model in British society was far from disappearing when data for the first wave of the MCS were collected in 2000-01, especially in connection with the notion that maternal employment may compromise family and child wellbeing. In turn, my findings suggest that, concerning their association with education, such views are much more polarised amongst women, and that in heterogamous couples attitudinal adjustment occurs towards women's positions, whether supportive of maternal employment or not.

It must also be noted that my results in the attitudinal domain contradict the pattern of male dominance found by De Graaf and Heath (1992) with respect to voting behaviour in the UK and, more importantly, by Van der Slik et al. (2002) in child-rearing values in the Netherlands. The latter see male dominance as resulting from within-couple resource imbalances, but fail to provide empirical support for it. Ultimately, while neither study can claim unequivocal support for its interpretation of the role of gender expectations, both provide evidence against the hypothesis of educational superiority or status maximisation. Hence, both point against explanations based on resource theory in the domain of parenting values.

The implications of my analyses for the process of family-based transmission of human capital are less clear-cut. The poor results in terms of overall fit and statistical significance of the heterogamy variables in the parenting behaviour models raise doubts on the validity of my framework to shed light on parents' effective engagement with children. On the one hand, my results provide confirmation of the well-documented positive relationship of education and parenting behaviours at the individual level. On the other, they fail to support the claim that the direction and degree of educational heterogamy are consequential for the quality and amount of stimulation-oriented activities that children received from their parents. Nonetheless, it is possible that the time gaps between dependent variables lie behind the different pattern of results obtained for the attitudinal and behavioural dimensions of parenting. Whereas information on attitudes was collected when the cohort child was 9 months old, information on behaviours comes from the surveys conducted when the child was 3 and 5 years old. Two possible confounding forces may be at work here. Firstly, a diminution of the importance of the home learning environment as children become increasingly exposed to inputs from non-familial contexts such as day-care centres and schools. Secondly, a gradual reduction in the opportunity for adjustment as parents settle on their parenting arrangements in the years following the child's birth, so that by years 3 and 5 little room for additional adjustment remains. This issue relates to potential selection bias, which I discuss in further detail below.

Finally, the possibility exists that educational heterogamy has an indirect effect on parenting behaviours through its impact on attitudes. For instance, the ecological model of the influence of parental education on children's schooling success proposed by Feinstein et al. (2008: 73-89) places cognitions at a stage prior to direct interactions between parents and children. In such a framework, it can be argued that fathers' attitudinal "enlightenment" in cases of female hypogamy should benefit children through increased paternal involvement in parenting activities. Similarly, assuming that the effects on children's schooling outcomes of family income in general and of transitions out of poverty in particular are consistently positive (e.g. Blanden and Gregg 2004; Brooks-Gunn and Duncan 1997), and assuming further that the detrimental effects of maternal employment are small and restricted to specific population groups (e.g. Goldberg et al. 2008; Verropoulou and Joshi 2009), it would be reasonable to expect most children to benefit from parents subscribing to the idea that mothers can safely combine childrearing and non-domestic work.

Overall, the positive gradient of education on parenting observed for both mothers and fathers together with pattern of female dominance in attitudes, regardless of the root cause of the latter, imply that children are likely to be better-off when raised by couples where the mother is more educated, as the overall quality of parental inputs can be assumed to improve by virtue of the attitudinal adjustment of fathers. Of course, the opposite may be true for children whose parents are in hypergamous unions, although my findings did not point so clearly in this direction.

Lastly, I must address the issue of self-selection and its potential implications for the interpretation of my results. Selection may be operating at multiple levels and affecting the patterns of influence that I claim to have identified in educationally dissimilar couples. On the one hand, partner selection arguably involves a fair degree of testing of attitudinal compatibility prior to union formation. In other words, it is unlikely that couples in my MCS sample would have formed in the first place had there existed irreconcilable differences in family and parenting values between their members. Therefore, partners who are dissimilar in terms of qualifications should be assumed to enjoy a certain level of attitudinal consonance, irrespective of whether this existed prior to partnership formation or was reached in the stages of the relationship that preceded parenthood. Unfortunately, given the nature of my data I cannot explore this possibility. At a different level, the restriction of the sample to families containing two parents at the time of outcome measurement is likely to be excluding cases of severe attitudinal disagreement, that is, couples who dissolve between survey waves due to extreme differences in values. However, it must be noted that both these selection process would work to enhance the levels of attitudinal agreement observed in my analytical sample and hence not favour the hypotheses that adjustment will occur and be linked to educational heterogamy. A third channel for selection is the birth order of the MCS cohort children included in my analyses. It is reasonable to assume that parenting dynamics in couples with more than one child change between the firstborn and later children (Steelman et al. 2002). In this respect, the scope for negotiation and adjustment between parents may be greater when dealing with their first child and less needed when rearing later children, provided that a learning or adjustment process has already occurred (alternatively, disagreements may have led to union dissolution before the birth of a second child). In order to test the hypothesis that the impact of heterogamy on parenting would differ by parity, I re-ran my DRM analyses on a restricted sample of parents of firstborn children. However, the analyses revealed no differences by the birth order of the cohort child. I therefore conclude that, while the issue of birth order deserves further investigation, it did not affect my results significantly.

CHAPTER 4. EDUCATIONAL HETEROGAMY, GENDER AND CHILDREN'S EARLY DEVELOPMENT

4.1. Introduction

In this chapter I explore gender differences in the effects of parental education and educational heterogamy on children's early development. I use recent data from a UK birth cohort study to test a set of hypotheses about the role of gender [48] in the intergenerational transmission of educational success, namely a) *whether it is the mother's or father's education that exerts a greater influence on children's outcomes*; b) *whether the effect of parental education is more pronounced along same-gender lines*; c) *whether children's outcomes improve when their mothers are more educated than their fathers*; and d) *whether sons' and daughters' outcomes improve when the same-gender parent is more educated*. The latter two hypotheses are posited *relative to situations of parental educational homogamy*. To answer the first two questions, I compare the relative salience of mothers' and fathers' education in determining children's scores in cognitive and behavioural assessments. With regard to the third and fourth questions, I examine the effects of various forms of educational

[48] For convenience, I use the term 'gender' throughout the chapter in a non-technical manner to refer to both biological and social aspects of identity and avoid the dichotomy 'sex' vs. 'gender'.

heterogamy on the same set of child outcomes while controlling for parental levels of education.

My analyses address a series of issues in the literature about social reproduction in the family for which the existing evidence remains inconclusive. The general theme underlying these issues is the *differential parental treatment of sons and daughters and the impact it may have on their cognitive and behavioural-emotional outcomes*. I use the term 'parental treatment' to refer broadly to family socialisation and resource allocation decisions. It can be argued that if sons and daughters were differentially exposed to these family dynamics, their developmental and educational trajectories would likely differ. Gender gaps in education have in fact been documented in a large number of industrialised societies and across a variety of indicators and stages of schooling (e.g. Penner 2008; Marks 2008b; 2008c; Bedard and Cho 2010; Vincent-Lancrin 2008). Evidence for the UK suggests large gender differentials in reading and language-based subjects in favour of females and a gradual reversal of the traditional male advantage in math at both primary and secondary levels of education (Machin and McNally 2005; DfES 2007). Sociologists have explored a wide range of biological and environmental factors as potential determinants of differences in the outcomes of boys and girls (for reviews, see Francis and Skelton 2005; Buchmann et al. 2008)[49]. However, my focus here is restricted to parental education as a proxy for family inputs and to arguments related to the differential treatment of sons and daughters.

The motivation for this chapter emanates from several research streams in family sociology and family economics. The

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[49] Examples of factors considered include differences between boys and girls in the timing of maturation, learning styles, the range of variation in ability, motivations and interests, or whether school settings favour one gender or the other. However, all these topics fall beyond the scope of this chapter.

first of these lines of research documents the association between parental levels of education and sorting patterns, on the one hand, and children's achievements, on the other, through a variety of demographic processes and parent-child interactions (e.g. Mare and Schwartz 2006; Feinstein et al. 2008; Blossfeld 2009). The second stream records changes in the educational makeup of British families since the 1990s which resulted in about two thirds of all parental couples being educationally mixed and in similar proportions of hypogamy and heterogamy by the beginning of this century (cf. Chapter 2). The third body of evidence suggests the persistence of differential treatment of children by gender, and particularly that fathers tend to show higher levels of investment when a son is present in the household (for reviews, see Lundberg 2005; Raley and Bianchi 2006). The most widely accepted justifications for such gender-biased parental behaviour range from traditional gender-role socialisation to differential abilities in childrearing and differential preferences for investment in children between mothers and fathers (cf. section 4.2). At the same time, and despite their different foci, all these explanations share a common null hypothesis, namely that *gender egalitarianism in interactions with and preferences over children should result in no differences in the impact of fathers' and mothers' education for sons and daughters*. This counterargument would be supported by trends of increasingly similar levels of attainment between men and women (e.g. Smith 2000) and diminishing market incentives for different human capital investments by gender (e.g. Goldin 2006). Overall, it remains unclear whether mothers and fathers are better equipped to foster the development of daughters and sons, respectively, and whether they exhibit a preference for children of a particular gender when it comes to allocating their resources. Alternatively, it may be that neither differential maternal and paternal abilities nor gender discrimination in the treatment of children play a significant role in the intergenerational transmission of human capital in contemporary families.

I seek to make a contribution to these strands of research by testing hypotheses a) to d) above using a novel methodological approach to recent UK data and exploring a richer set of model specifications than most previous studies. A common limitation in the literature is to analyse the interaction between parental education and gender of children by looking at one parent only, typically the mother (e.g. Mensah and Kiernan 2010). In addition, there is a surprising scarcity of attempts to explore in a systematic fashion the effects of educational heterogamy, a task considered "an avenue for future work" in state-of-the-art comparisons of the impact of mothers' and fathers' education on children's outcomes (e.g. Jerrim and Micklewright 2011: 281). In this chapter I attempt to address both limitations.

My empirical analyses use data from the four available surveys of the Millennium Cohort Study (MCS), a longitudinal dataset that follows the lives of over 19,000 children born in the UK in 2000-01. The MCS is particularly well-suited for my objectives in this chapter as it provides a wealth of indicators of children's cognitive and behavioural development at various ages as well as separate maternal and paternal questionnaires with detailed information about their educational attainments.

Methodologically, I rely on the Diagonal Reference Model (DRM) framework introduced in Chapter 3. DRMs were originally designed by Sobel (1981, 1985) to analyse the effects of status inconsistency and are widely recognised as the best available method to examine the impact of educational differences between partners (e.g. Hendrickx et al. 1993; Eeckhaut et al. 2013). DRMs measure the relative salience of each partner's level of education in determining the dependent variable of interest and can further test for an effect of heterogamy independent of those of the mother's and father's schooling. Moreover, in this chapter I use an extension of Sobel's original specification introduced by Sorenson (1989) which allows the estimation of group differences in weight parameters and which I apply to differences in the effects of parental education according to the gender of the child.

The chapter is organised as follows: in Section 4.2, I review theoretical arguments and empirical evidence on the interaction between parental education and gender as a determinant of children's development and specify my empirical hypotheses. In Sections 4.3 and 4.4, I describe my data and analytic sample and highlight the advantages of using DRMs to shed light on my research questions. In Section 4.5, I present and discuss my empirical results and lastly, in Section 4.6, I elaborate on their implications for debates on the role of gender in shaping parental treatment of children and children's schooling outcomes.

4.2. Theory and hypotheses

This section is structured around the four research questions that I address in my empirical analyses. The first two questions relate to the relative importance of mothers' and fathers' education as determinants of children's development and to whether such influence is conditional on the gender of children. The last two questions have to do with variation in the intensity of parental preferences for investments in children, again in connection with gender. I frame these questions within the overarching theme of differential parental treatment of sons and daughters, which I take to encompass both the reproduction of gender roles and resource allocation within the family. I next review arguments and empirical evidence on each of these issues before spelling out the hypotheses that guide my own empirical analyses.

4.2.1. Differential treatment of children, and the general counterargument

At a theoretical level, the differential treatment of children can be understood as a parental reaction to heterogeneity in children's endowments. This has received a good deal of attention in the literature on social reproduction via parental investments, which most often adopts the analytical framework of family economics (for reviews, see Behrman 1997; Pasqua 2005). Theoretical models in this tradition consider a variety of scenarios as to whether parents are equally concerned about all their offspring, and as to whether parents opt for endowment reinforcement or compensation. Endowments have a strong genetic component and can be defined as determinants of individuals' social and economic outcomes that are set prior to the human capital investment process, including "genetically inherited characteristics that are rewarded directly or indirectly (through their interaction with human capital investments) in labour and marriage markets" (Behrman 1997: 130). Some endowments are related to physical conditions (e.g. health), and others to personality traits or ability (e.g. intelligence). Unequal parental concern might be based on any of these characteristics as well as on other considerations such as birth order. These traits can therefore translate into differential treatment in terms of parental investments including time, stimulation-oriented inputs and financial resources. In some cases, parents may choose to put more effort into fostering the development of children with more unfavourable endowments; in others, they may opt to concentrate resources on children who enjoy more favourable conditions in order to develop their potential. Alternatively, parents may not take heterogeneity in endowments into account and treat all offspring largely equally.

Gender is a relevant endowment in social stratification because neither schools nor labour or marriage markets are gender-neutral in their rewards to individuals. Gender is therefore one of the factors that may predispose parents to rear children differently. For instance, market factors determine both direct and indirect costs of schooling through returns to education and these have historically been higher for men than for women. Teachman (1987) suggests that the reason why the process of educational attainment has in the past been more responsive to the performance of men than of women is that it reflected the lower effectiveness of education for women as a route to adult roles and the greater negative effects of marriage and parenthood on their careers. Hence, given such a social context, families used to devote more resources to sons than to daughters because the former would derive greater rewards from their schooling. However, as argued by DiPrete and Buchmann (2006), in recent decades the value of education on a variety of dimensions seems to have risen faster for women than for men and contributed to the narrowing, and in some cases reversal, of the traditional male advantage in educational attainment. Consistent with this argument, Korninch and Furstenberg (forthcoming) find that the composition of parental spending on sons and daughters shifted in recent decades in the US from being favourable to boys in the 1970s to equalisation in the 1990s and to a female advantage in the 2000s.

Changes in the perceived desirability of education for women go hand in hand with the decline (yet not disappearance) in sex-role stereotyping and gender discrimination in the labour market and other social settings (Goldin 2006; Buchmann and DiPrete 2006). In parallel, the trend towards increasing levels of educational attainment has arguably helped the spread of more egalitarian values in gender relations (Davis and Greenstein 2009). Overall, changes in incentive and preference structures may have stimulated families to ensure that sons and daughters receive the same amount of resources and opportunities in education. These arguments highlight the relevance of investigating the developmental trajectories of children of contemporary families in connection with parental education and potential gender biases.

4.2.2. Parents' relative influences and the same-gender hypothesis

The tension between the practice of taking the family as a unit of analysis and the principle of methodological individualism has implications for the question of which parent exerts a stronger influence on children's outcomes. Put differently, the question pertains to the debate on how to conceptualise family background given the use of individual-level indicators of parental attributes (for an extended discussion, see Sorenson and Brownfield 1991;

Sørensen 1994; Beller 2009; Marks 2010). As noted by Kalmijn (1994), the commonly held view amongst stratification researchers is that the greatest influence on a child's own socio-economic attainment is that of the father's class or occupation, whereas with regard to the child's developmental or schooling outcomes the greatest prominence is most often attributed to the mother's education. This is typically argued on the basis that fathers tend to have a greater attachment to the labour market than mothers and hence play the key role in defining a family's socio-economic position, while mothers tend to be more directly involved than fathers in childrearing, especially at early ages. Along these lines, Haveman and Wolfe's (1995: 1855) widely-cited survey of US evidence concludes that "the human capital of the mother is usually more closely related to the attainment of the child than is that of the father".

A natural extension of the question about the relative salience of each parent's level of schooling is to explore whether the effects of parental education are more pronounced along same-gender lines. This involves adding a second dimension to the analysis, namely that of the gender of children. Put simply, this line of reasoning inquires whether the intergenerational transmission of educational advantage is more successful between same-gender parents and children. If that were the case, mothers would play a greater role than fathers in the development of daughters and the opposite would hold for fathers.

This second research question emerges from a variety of theoretical perspectives about family socialisation. Some scholars argue that role modelling is gender-specific and, as a consequence, the influence of each parent differs for sons and daughters. Much of the literature on gender role differentiation shows that, both in the family and other social settings, the roles to which males and females are typically assigned and come to enact are highly differentiated (for a review, see Walker and Fennel 1986). Summarising evidence from the fields of social psychology and child development, Raley and Bianchi (2006: 402) argue that "a gendered self-concept emerges through a mix of social learning, biological predispositions, and gender role modeling processes that take place within the family and that result in schemas for appropriate male and female behavior and choices". Given the role of the family as a fundamental socialisation agency, gender-modelling theories posit that, when developing educational and occupational aspirations, girls will look to their mothers and boys to their fathers (Rosen and Aneshensel 1978).

Gender-role socialisation theories therefore predict that compositional shifts in maternal education or employment rates will produce female-favourable trends in educational and occupational attainment (Buchmann and DiPrete 2006). This is because such compositional changes should have a greater impact on daughters than sons. However, these theories must resort to external factors to explain initial changes in the education or labour market participation rates of adult women.

A related perspective that has attracted the attention of both sociologists and economists is that mothers and fathers may possess differential abilities for parenting along gender lines (Lundberg 2005; Raley and Bianchi 2006). According to this approach, parents would gender-type their investments in children if they believe, for instance, that there is special knowledge to be passed on between mothers and daughters and fathers and sons, respectively, or that they will derive more enjoyment from spending time with same-gender children. This may be based on assumptions such as that the same-gender parent is more important to the development of a child's social skills and emotional stability, or on a greater similarity of interests within, rather than between, the genders[50]. In fact, whether the inputs of mothers and fathers are actually more effective along gender lines may prove irrelevant if such a belief is held and suffices to sustain gender-typed parenting practices. Time-use data provide ample evidence

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[50] In the jargon of family economics, the argument relates to gender differences in the 'technology of parenting', as described by Thomas (1994), Lundberg (2005) or Dahl and Moretti (2008), amongst others.

that the gender of children affects the amount of time and activities that parents engage in with children, and that such effects are much more pronounced for fathers than for mothers (for a review, see Lundberg 2005). For instance, in a recent investigation with US data for the early 2000s, Mammen (2011) finds that in two-parent families, fathers with sons invest more time in children overall and take on more childcare responsibilities without the mother being present relative to fathers with daughters only. Further, the fathers' increased time, especially in developmental activities, is allocated mainly to sons. This evidence suggests that gender-typed parenting practices are still widespread in contemporary families and that fathers in particular exhibit a gender-bias in their involvement with children.

These arguments inform a large number of empirical studies that have compared the impact of mothers' and fathers' education on children's outcomes and tested the hypothesis that the effects will be greater along same-gender lines. This literature has offered mixed findings in both comparative and single-country studies. Korupp et al. (2002) used US, German and Dutch survey data for respondents born between 1923 and 1962 to analyse the determinants of their educational attainment and compare the magnitude of the effects of maternal and parental variables. Their conclusion was that accounting for both parents' background is superior to using status traits of one parent only, and that a model that classifies parents hierarchically according to their status within the family fits the data best. Further, the historical trend of parental influence on children's education appeared similar for mothers and fathers, and the effects of a mother's education and occupation were as important for sons as for daughters. The latter was suggested by the poor fit of models that posited that the influence of the same-gender parent ought to be stronger than that of the different-gender parent.

Guided by similar concerns, three recent comparative studies with some methodological variations have been carried out for 30 OECD countries (Marks 2008a, 2008b; Jerrim and Micklewright

2011). Marks (2008a) and Jerrim and Micklewright (2011) present analyses of pooled samples of males and females to test whether mothers have a greater effect than fathers on children's literacy and numeracy skills. The results of the former suggest that the mother's education (and the father's occupation) tend to exert the strongest effects, although the pattern is inconsistent across countries and does not reveal any meaningful clustering alongside cultural or economic similarities. Further, no differences are found in the magnitude of parental effects across outcomes. In turn, the second study finds significant differences between the effects of mothers' and fathers' education on children's ability on 10 out of 30 countries only. However, stronger maternal and paternal influences account for half of these cases each, making it difficult to draw conclusions about the relative salience of their attainments for the development of children in general.

An extended set of hypotheses derived from same-gender socialisation theories are further tested in Marks (2008b) and in Jerrim and Micklewright's (2011) second stage analyses. In the former study this is done through an interaction between the gender of children and parental background variables and in the latter study by running separate models for boys and girls. The results obtained by Marks (2008b) provide partial support for the same-gender socialisation model in 5 countries only, leading the author to conclude that there is "little or no gender difference in the effects of father's and mother's socioeconomic characteristics on their sons' and daughters' educational performance" (Marks 2008b: 862). In turn, Jerrim and Micklewright (2011) find some indication that mothers' education has a greater impact on their daughters' ability than on their sons', albeit differences are small and many counterexamples can be observed. Overall, the inconsistency of the results precludes any generalisations about the pattern of influence across countries and intergenerational dyads. The fact that two different operationalisations of parental educational attainments are employed in these studies further suggests that the lack of a clear pattern of results holds regardless of the choice of indicators. In all these studies the UK is one of the countries where no differences are observed, with the exception of Northern Ireland where Jerrim and Micklewright (2011) find a significant deviation towards a stronger effect for mothers than for fathers.

Studies with a UK-focus, using various datasets and methods, similarly yield mixed conclusions regarding the role of gender in conditioning the effects of parental education. Fluori and Buchanan (2004) used NCDS data to investigate the association between parental involvement at age 7 and children's educational attainment by age 20. While both maternal and paternal levels of involvement were found to be independent predictors of children's outcomes in a set of regression models, interaction terms with the gender of the child yielded no significant results. This again suggested that neither fathers' nor mothers' involvement was more important for sons' educational outcomes than for daughters'. However, a different conclusion is reached by Chevalier (2004) who used pooled data for 1994 to 2002 from the UK Family Resource Survey to examine the effects of an educational reform affecting parental attainments on their children's probability of staying on after post compulsory schooling. This study found no significant differences in the influence of father's or mother's schooling on children's continuation in school; however, when accounting for the sex of children, the observed effects remained significant for the same-gender parent only. Chevalier (2004: 21) interprets this result as "consistent with models where the same-sex parent plays a role model for the teenager or where parents exhibit preferences for same sex children".

In another relevant piece of research, Connolly (2006) used data from the Youth Cohort Study of England and Wales to compare the effects of class and ethnicity on gender differences in GCSE attainments for 3 cohorts of school leavers in 1997-2001. Employing log-linear models, he found no significant variation in the magnitude of gender gaps in attainment across occupational and ethnic groups, which suggests that the effects of gender are best understood as operating additively rather than interacting with family background variables. The study employs an occupational definition of social class, and the interaction of gender with parental education is not explored. Connolly (2006: 15) has nonetheless grounds to contend that effect of gender is stable across social strata and to dismiss "simplistic and universal constructions of 'failing boys' versus 'achieving girls'".

A more recent study by Mensah and Kiernan (2010) using MCS data specifically addresses variation in the effects of parental education for sons and daughters. This is done in the context of a debate about whether boys' and girls' educational outcomes are similarly related to disadvantage in the family environment (see also Entwisle et al. 2007). Mensah and Kiernan (2010) find that the factors negatively affecting children's early literacy and mathematical skills, as measured by teacher assessments in the first year of school, are more pronounced for boys than for girls. This finding emerges from regression models where interactions between the gender of children and mothers' educational qualifications, age at first birth and the quality of the area for bringing up children, as well as a combined test for the three measures, all prove significant. These findings indicate that the gender gap in ability assessments in favour of girls, for both literacy and maths, is larger amongst children experiencing disadvantage. Specifically with regards to education, sons appear to be more strongly affected by the lack of maternal qualifications than daughters. On the other hand, the gender gap amongst children of highly educated mothers remains small and non-significant. Whether the similar pattern of interaction holds for paternal education remains unclear since Mensah and Kiernan (2010) focus solely on mothers.

In sum, the reviewed empirical evidence does not reveal a clear pattern of results –neither regarding the relative salience of parental educational attainments on children's outcomes nor variation in the strength of such associations between boys and girls. If anything, however, this lack of consistency would call into question, on the one hand, the argument that mothers' remains more consequential for children's development, and, on the other, the claim that the differential parental treatment of sons and daughters plays a role in determining children's educational outcomes as predicted by gender-role socialisation theories.

4.2.3. Parental preferences and same-gender bias

Recent research on the intergenerational transmission of advantage has problematised the role of individual parental preferences. Both social exchange theories in sociology (for a review, see McDonald 1981) and bargaining approaches in economics (for a review, see Behrman 1997) challenge the premise held by 'common preference' models that families can be treated as single decision-making units. Such assumption is normally predicated on the basis that spouses hold consensual preferences regarding family life. Instead, social exchange and bargaining perspectives treat each partner as an independent decision-maker. A straightforward application of these non-unitary models of the family is to explore variation in preferences regarding investments in children and to take gender as one of the dimensions on which such parental priorities might differ[51]. This invites the analysis of how different hypotheses about parental preferences interact with costs and returns to education to potentially induce a gender bias in the treatment of children. On the one hand, it is possible that such variation exists between mothers and fathers, irrespective of the gender of children. For instance, mothers may be more willing than fathers to allocate a larger share of family resources to children than to adult consumption. On the other hand, it is possible that parents exhibit

[51] There is also extensive evidence on how the gender of children affects family demographic outcomes in industrialised societies. These outcomes include completed family size, marital status and family structure (Andersson et al. 2007; Dahl and Moretti 2008; Mills and Begall 2012), amongst others.

a preference for either sons or daughters, which may or may not overlap with same-gender lines. In either case, the ability to favour children of a particular gender is likely to depend on the balance of power between parents.

The rejection of common preference models and the existence of gender biases in parental decision-making are supported by a large number of empirical studies. Broadly speaking, the findings suggest that children's well-being often increases with enhanced maternal control of resources in the household, and that families tend to exhibit a preference for sons. Evidence supporting these claims has long been available for developing countries (e.g. Blumberg 1991; Croll 2001; Das Gupta et al. 2003; Duflo 2003) but relevant findings have also been obtained for industrialised societies.

Using survey data from the US, Brazil and Ghana, Thomas (1994) examined the differential impacts of mother's and father's education on the height of sons and daughters and whether such differences reflected gender biases in parental preferences. In all three countries, he found the effects of parental education to be stronger along gender lines. More importantly, Thomas contends that comparisons of mean outcomes for boys and girls or, in a multivariate regression framework, the significance of a gender dummy, do not represent valid tests for whether unequal parental concern contributes to such differential effects. He then examines two additional model specifications. With the Ghanaian sample, Thomas finds that the education of a woman who is better educated than her husband has a large and significant effect on her daughter's height but no effect on her son's height. In the Brazilian sample, he obtains similar effects for non-labour income contributions by mothers. Thomas (1994: 980) thus argues that relative educational status and non-labour income are indicative of power in household allocation decisions and his findings support the interpretation that "mothers prefer to allocate resources towards daughters and fathers treat their sons preferentially". As such, the differential effects of parental education should not be attributed solely to "technological differences in child rearing" but also to gender biases in parental preferences.

Additional evidence that mothers and fathers may differ in their preferences with regard to children comes from the study of Lundberg et al. (1997) with data from the UK Family Expenditure Survey. The authors investigated the effects of a change in the child benefit policy that shifted resources to mothers on families' consumption choices. The emerging finding was that this resulted in increases in expenditures in children's goods relative to parental private consumption. This policy change worked as a natural experiment as it modified partners' contributions to household income exogenously and allowed the identification of preferences behind changes in expenditures. Another relevant analytical strategy is that adopted by Ziol-Guest (2009) who compares the consumption behaviour of two-parent families and of father- and mother-headed single-parent families using US household expenditure data for the period 1980-2003. His analyses suggest that single-fathers tend to spend less on items that are arguably beneficial to children's development compared to both married parents and single mothers. Such items include school fees, books and toys. In addition, single mothers are found to spend a smaller share of their budget than single fathers on private-consumption items such as alcohol and tobacco, business products, or recreation and sports. Ziol-Guest (2009: 618) interprets these differences between mothers and fathers as "measuring their preferences for their children's educational attainment" and thus as a sign of "divergent levels of importance placed on different investments in children". Lastly, an insightful analysis of competing explanations based on preferences and productivities in parenting is carried out by Bonke and Esping-Andersen (2011) with recent couple-based time use data for Denmark. Their study finds that the presence of a son produces large increases in fathers' overall and separate child care time but that these effects are concentrated on low-educated fathers. By means of comparing parents at different education levels, the authors are able to disentangle gendered preferences from parenting skills. If the latter were the main determinant of parental child care decisions, a positive 'boy effect' should be observed for fathers across all education levels and particularly amongst the highly educated who prioritise children's development more. Since the opposite occurs, Bonke and Esping-Andersen (2011: 49) conclude that "the boy-effect is therefore far more likely a manifestation of gendered preferences".

These studies are examples of recent and methodologically sound research that challenges the premises of common preference models. Overall, the evidence points to the conclusion that children fare better when their mothers have greater bargaining power and control a larger fraction of family resources. Further, there is some indication that parental biases tend to favour same-gender children, especially amongst fathers.

One way of exploring the potential effects of diverging parental preferences is through the effects of educational heterogamy on the development of sons and daughters. Following insights from the literature above, I take parents' relative levels of education as a measure of their bargaining power[52] in family life. This is based on the argument that education is a valuable proxy not just for individuals' potential economic contributions but also for their leverage in decisions regarding investments in children and, as such, a more meaningful indication of the notion of bargaining power that I am interested in. My intention to explore the impact of heterogamy variables is further justified because of the dearth of studies providing such an empirical test. Often this approach is not pursued due to identification problems; however, as explained in section 4.4, the statistical techniques employed in

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[52] The conventional approach to operationalise determinants of power differentials in the family is to compare partners' contributions to household income (e.g. Vogler 1998). A problem with this approach is that earnings are often endogenous to the negotiation of the household division of labour, especially when young children are present. Looking at both indicators, Evertsson and Nermo (2007) find that increases in educational attainment also affect partners' ability to negotiate shares of housework in Sweden.

this chapter allow a more rigorous test of the inclusion of heterogamy variables alongside parental educational attainments.

4.2.4. Hypotheses

I next formulate a set of hypotheses about the effects of parental educational attainments and their interactions with gender on children's developmental outcomes. These are derived from the arguments above and will be tested on my sample of UK families with children.

As a starting point, and in order to set the stage for the main questions I engage with, *I expect a positive gradient for the association between parental education and indicators of children's early development*. That is, I expect this gradient to hold for both mothers' and fathers' education, and for children's cognitive and behavioural outcomes. This general prediction is based on the well-documented positive impact of parental schooling and the quality of the inputs provided for children in the family context. These range from financial resources to the amount of time spent in stimulation-oriented interactions with children (for reviews, see Sammons et al. 2007; Feinstein et al. 2008).

More closely connected to the focus of the chapter are the following hypotheses: firstly, *I expect maternal education to exert a larger influence on children's outcomes than paternal education*. This is guided by the conventional view that mothers tend to spend more time with children during their early years (Marks 2008a). Secondly, *I expect the association of parental education with children's outcomes to be more marked along same-gender lines*. This latter prediction is based on gender-role socialisation theories that argue that parents tend to adopt gendered parenting practices either because human capital transmission and role modeling are more effective along same-gender lines, or simply because parents believe so (Raley and Bianchi 2006; Jerrim and

Micklewright 2011). Therefore, maternal inputs should be more consequential for the development of daughters and paternal inputs more important for the development of sons.

Further, and based on evidence suggesting that parents need not have equally strong preferences for investments in children, I examine two additional hypotheses, both posited relative to situations of parental educational homogamy: on the one hand, *whether having a mother who is more educated than her male partner (i.e. female hypogamy) boosts both sons' and daughters' outcomes*; on the other, *I explore whether sons' and daughters' outcomes improve when the same-gender parent is more educated* (i.e. female hypergamy in the case of sons, and female hypogamy in the case of daughters). The first of these hypotheses is derived from existing evidence that children of both genders tend to benefit from enhanced maternal control of the family resources (Lundberg et al. 1997; Ziol-Guest 2009). The latter hypothesis is linked to research suggesting that adult members of the household, and especially fathers, prefer to allocate resources to children of the same gender as themselves (Duflo 2003; Mammen 2011; Bonke and Esping-Andersen 2011). In these two instances, I assume that situations of educational heterogamy are reflective of the ability of parents to enact their preferences whenever these may differ with respect to children.

All these predictions are spelled out against the null hypothesis that the gender of children does not condition parental efforts to foster children's development in any meaningful way and, hence, that *the effects of parental education and parental heterogamy shall not exhibit any significant variation by gender*.

4.3. Data, analytic sample and variables

4.3.1. Data

I analyse gender differences in the effects of parental education and educational heterogamy on children's early development using data from the MCS, an on-going birth cohort study that provides a nationally representative sample of UK households with young children. The MCS gathers information on around 19,000 families, where a live birth was recorded between September 2000 and November 2001. The first wave of the study was carried out when the cohort children were 9 months old and follow-up waves took place at two-year intervals from 2004 onwards. The sample is clustered geographically and stratified to over-represent disadvantaged social groups and the smaller UK countries (for an overview, Hansen 2012). My statistical analyses take both clustering and attrition into account by reapplying the adjustments described in the preceding chapter where a fuller description of the dataset can also be found (cf. section 3.3).

Variables used in this chapter come from the first four waves of the MCS. In line with earlier surveys, the response rate of Wave 4 (2008) was 81%, which resulted in an achieved sample of 13,857 families. The number of families participating in all four MCS waves was 11,721, whereas 3,455 participated in three waves only and 1,760 participated in two waves only (Ketende 2010).

4.3.2. Analytic sample

I select the sample for this chapter following the same basic criteria as in my analyses of parenting practices and behaviours (cf. Chapter 3). The sample is composed of heterosexual two-parent families containing at least one MCS child and without restrictions regarding the nature of the bonds between parents and children. However, a control for step-parenthood is introduced in all my multivariate analyses to adjust for the potential impact of this type of family structure.

Most importantly, comparing the effects of mothers' and fathers' education and testing for the impact of educational heterogamy requires the exclusion of single-parent families where, by definition, the couple-level similarity variable cannot be measured. Therefore, my assessment of the association between parental education and children's developmental outcomes relates to two-parent households only. This limits the generalisability of my findings as almost a fourth of dependent children in the UK were living in lone-parent families in the mid-2000s (ONS 2007). However, this selection filter is inherent to the nature of my research questions. As a partial remedy, and due to the complex union dissolution and re-partnering dynamics observed amongst MCS parents (Calderwood 2008: 25-30), I maintain in the sample families that experience episodes of lone-parenthood between waves, but that have two parental figures at the time when the child outcomes are measured.

In addition, inclusion in the sample is conditional on the availability of information on the dependent variables, which are not subject to imputation procedures, and the control variables used in multivariate models. In this respect, variation in response rates across MCS families must be discussed because selection biases may affect the results of my analysis if missingness departed from random occurrence (Little and Rubin 2002). The general patterns of unit and item non-response in the MCS have been studied by Plewis (2007) and Ketende (2010). Plewis (2007) showed that low levels of education are among the measures of socio-economic disadvantage correlated with unit non-response across MCS waves, whereas item non-response in relation to education is minimal (cf. Section 3.3.2). For the purpose of this chapter, the main concern about missing data pertains to the measures of child development used as dependent variables (described in detail in subsection 4.3.3 below). Conditional on having information on the rest of the variables employed in the analyses, response rates for these child outcomes range between 83% and 98% across waves and domains and align with the pattern of socio-economic disadvantage highlighted by Plewis (2007: 39-47) and Ketende (2010: 18-25). The pattern is especially visible in the availability of information on the child's behavioural adjustment, as the variable is constructed from parental reports (as opposed to a test administered to the child). Most importantly, however, the pattern of missingness of the outcome variables is uncorrelated with the child's gender, which is reassuring given my focus on the varying effects of parental education for sons and daughters.

In order to minimize potential biases associated to missing data, my analyses apply the longitudinal weights produced by Centre for Longitudinal Studies (CLS) for work with MCS data. These weights correct for unequal selection probabilities of wards derived from sample design and for unit non-response across waves. The weights are estimated following a multiple imputation procedure to enable a prediction of the probability of responding using a regression model (Hansen 2012: 103-106). Variation in both unit and item non-response rates leads to variation in the sizes of my analytic samples across waves; these sample sizes are shown in Table 4.1 below.

4.3.3. Dependent variables

Children's early development remains my outcome of interest. The MCS provides multiple indicators of child development on the complementary domains of cognitive ability and behavioural adjustment. The collection of data on these two dimensions reflects a new understanding of stratification outcomes that moves beyond the conventional focus on reading and maths test scores to incorporate socio-emotional traits as determinants of positive development throughout childhood and adolescence (Farkas 2003). Indeed, both early cognitive and behavioural skills have been shown to exert a lasting influence on individuals' educational, occupational and health-related outcomes later in life (Duncan et al. 2007; Henderson 2012). The MCS offers high-quality assessments of children's early development through age-appropriate, standardised and tested survey instruments suitable for administration by non-technical interviewers. Furthermore, assessments are largely consistent across waves, hence allowing a comparison of results at different ages (for an overview, Hansen 2012: 56-79).

Children's cognitive ability is measured using the Bracken School Readiness Assessment (hereafter, BSRA; see Bracken 1998, 2002) and the British Ability Scales (hereafter, BAS; see Elliot et al. 1996; Hill 2005) assessments, both of which were administered directly to children. On the one hand, the BSRA was used at age 3 only. It is a non-verbal test, requiring children to point, but not speak. It comprises six subtests of the revised Bracken scale that assess the knowledge of concepts taught in preparation for formal education such as colours, letters, numbers and counting, or sizes and shapes. My analyses rely on a composite standard score that combines information from the six subtests into a single indicator available in the original MCS data files. On the other hand, BAS assessments were administered at ages 3, 5 and 7. At the earliest wave only the 'Naming vocabulary' subscale was used, and with children who could speak English exclusively. At later waves, however, the assessment included the 'Picture similarities' and 'Pattern construction' subscales as well. The three tests capture core aspects of children's verbal, pictorial reasoning and spatial abilities and each is robust and individually interpretable in itself. Additionally, they can be combined to obtain a composite measure of the child's cognitive ability. In order to obtain a single indicator for each later wave comparable to the BSRA composite, I replicated Jones and Schoon's (2008) procedure with the original BAS variables and carried out a principal component analysis (PCA) of the three BAS subscale scores for waves 3 and 4. The PCA confirmed the presence of a general underlying factor accounting for 56% and 62% of the total variance, respectively[53]. I then constructed a general ability

[53] At wave 3, factor loadings were .57 for 'Naming vocabulary', .57 for 'Picture similarities', and .59 for 'Pattern construction'. At wave 4, factor loadings were .57, .53, and .63, respectively. Composite scores were then predicted on rotated factors. At wave 3, this transformation

indicator and assigned scores to each child based on this underlying factor.

The MCS also measures children's socio-emotional adjustment at ages 3, 5 and 7. This is done in a consistent manner using the Strengths and Difficulties Questionnaire (hereafter, SDQ), a behavioural screening assessment based on parental reports (Goodman 1997, 2001). These reports were included in the self-completion module of the parental interview and were most often completed by the child's mother. The SDQ is divided into five subscales: 'Conduct problems', 'Hyperactivity', 'Emotional symptoms', 'Peer problems' and 'Pro-social behaviour', each of which comprises five items. Following the scoring syntax provided by the SDQ team[54], I computed a composite behavioural difficulties score by summing up scores on the twenty items included in the four subscales indicating problematic behaviour. I then applied reverse coding so that higher scores reflect better adjustment.

All my analyses rely on standardised scores derived with reference to norming samples based on age-specific bands, as provided in the original MCS data files. In order to provide a more comprehensive picture of children's development, I use the composite measures of both cognitive and behavioural skills as dependent variables and not the specific subscales. After the transformations described above, in all assessments and waves higher scores on the dependent variable indicate more positive development. For ease of presentation in graphical form, I standardise indicators of children's skills to a mean of 0 and a standard deviation of 1.

Descriptives of all outcome variables are reported in Table 4.1 below for boys and girls separately. The results provide a first-

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was carried out using normed t-scores. Since the latter are unavailable at sweep 4, I then used raw scores instead.

[54] See *http://www.sdqinfo.org > Scoring the SDQ* [last accessed: 9th April 2012].

order confirmation of the consistency on the gender gap in early development in favour of females. At all measurement points and for both cognitive and behavioural outcomes girls outperform boys with the magnitude of the gap remaining roughly constant at about two tenths of a standard deviation. The only significant exception appears to be children's cognitive ability at age 7 for which gender differences are much smaller. Interestingly, a comparison of boys' and girls' scores at the median and top and bottom deciles indicates that the direction of the gap is uniform across the performance distribution and larger at the extremes. Variation in child developmental outcomes across levels of parental education and educational heterogamy is presented in later sections.

4.3.4. Parental educational attainments

As shown in previous chapters, the MCS yields a large sample of parental couples with substantial variation in terms of educational attainment and educational sorting. The classification of attainments and the derived measures of educational similarity employed in this chapter reproduce those of Chapter 3. The attainment scheme is made up of the following five categories: 'University degree' is the highest level of attainment and corresponds to graduate academic qualifications and above; 'Non-degree higher education' comprises other tertiary-level certificates plus the highest vocational qualifications; 'A-level or equivalent' groups the upper levels of secondary schooling and Level 3 National Vocational Qualification (NVQ) certificates; 'O-level or equivalent' corresponds to lower secondary certificates and Level 2 NVQs; finally, the residual category 'Below O-level' is assigned to respondents with lower or no qualifications.

The couple-level variables for educational similarity are operationalised as dichotomous indicators for situations of *homogamy* and *heterogamy* with a further breakdown of the latter in either *hypogamy* or *hypergamy* (always defined from the perspective of the female partner). The set of dummies equally captures whether the educational distance between partners is short- or long-range. A more detailed description of these variables and the recoding procedures used for their construction, as well as arguments justifying my methodological choices, can be found in section 3.3 in the preceding chapter.

Table 4.2 shows the distribution of the educational attainments and heterogamy variables at wave 2 when the child assessments are available for the first time. With the exception of some imbalance in the proportions of mothers and fathers at upper and lower levels of secondary schooling, parents appear similarly and evenly distributed across attainment categories. As noted before, this feature of the MCS parental cohort represents a deviation from the traditional pattern of male advantage in attainment levels in older British cohorts (Smith 2000: 209; also Table 2.2 in Chapter 2). In terms of educational sorting, the pattern is largely similar to that observed at the baseline survey. Twice as many couples in my analytic sample are educationally heterogamous rather than homogamous, and short-range heterogamy dominates over more distant combinations[55]. Hypogamy and hypergamy account for half of the educationally dissimilar couples each, and hence by nearly a third of the total number of couples respectively.

[55] A disaggregation of long-range heterogamy by distance (not shown in the table) reveals that couples in which partners are 2 or >2 levels apart represent 17.87% and 9.14% of the total, respectively.

Table 4.1. Summary statistics of dependent variables: Developmental outcomes by gender.

Variable	N	Mean	s.d.	Percentile		
				10%	50%	90%
Cognitive ability at age 3						
Girls	4,618	.116	.962	-1.190	.154	1.316
Boys	4,831	-.115	1.023	-.1.495	-.089	1.194
Behavioural adjustment at age 3						
Girls	4,862	.101	.972	-1.196	.308	1.436
Boys	5,029	-.097	1.016	-1.384	.120	1.060
Cognitive ability at age 5						
Girls	4,635	.081	.963	-1.081	.096	1.251
Boys	4,815	-.078	1.027	-1.392	-.042	1.203
Behavioural adjustment at age 5						
Girls	4,603	.112	.945	-1.117	.274	1.070
Boys	4,801	-.108	1.038	-1.515	.076	1.070
Cognitive ability at age 7						
Girls	5,410	.038	.956	-1.254	.113	1.227
Boys	5,481	-.037	1.039	-1.421	.016	1.286
Behavioural adjustment at age 7						
Girls	5,393	.127	.927	-1.183	.277	1.190
Boys	5,576	-.123	1.050	-1.548	.095	1.007

Notes: All outcomes standardised to a mean of 0 and a standard deviation of 1. All statistics weighted to adjust for sample design.

Source: MCS, Waves 2 to 4.

4.3.5. Socio-demographic controls

Descriptive statistics for the socio-demographic variables used as controls in the multivariate analyses are also presented in Table 4.2. Child characteristics taken into account include gender, age in months and low birth weight. Family characteristics include the number of dependent children in the household, equivalised family income, and the parental ages, ethnicity and bond to the cohort child. Following Mensah and Kiernan (2010), I impute income based on socio-demographic characteristics for less than 10% of families with missing information. All income data is equivalised to adjust for the number and ages of the household members using OECD equivalence scales. Table 4.2 reports information measured in wave 2 but no meaningful changes occur in the variable means at later waves. All models are nonetheless run using variables from the same wave as the child development variables.

White couples formed by the natural parents of the cohort child largely dominate my analytic sample. Mothers tend to be 3 years younger than fathers and boys outnumber girls by a small margin. About 6% of the children were born weighting less than 2.5kg and non-negligible variation exists in terms of age in months at the time of the assessment. These two controls are expected to exert a significant impact on both cognitive and behavioural development but further exploratory analyses (not shown in the table) confirm that their means do not differ significantly between boys and girls.

Table 4.2. Summary statistics of independent variables: Parental educational attainments and family characteristics (at wave 2).

Variable		**Mean**	**s.d.**
Mother's education (%)	Below O-level	17.28	
	O-level or equivalent	29.19	
	A-level or equivalent	15.33	
	Non-degree higher education	17.11	
	University degree	21.10	
Father's education (%)	Below O-level	20.40	
	O-level or equivalent	21.60	
	A-level or equivalent	20.78	
	Non-degree higher education	16.02	
	University degree	21.20	
Similarity in education (%)	Homogamy	37.84	
	Heterogamy (any)	62.16	
	Short-range (1 level)	35.13	
	Long-range (2+ levels)	27.03	
	Hypogamy (mother>father)	30.95	
	Short-range (1 level)	17.68	
	Long-range (2+ levels)	13.27	
	Hypergamy (mother<father)	31.18	
	Short-range (1 level)	17.44	
	Long-range (2+ levels)	13.74	
Control variables (%)	Male child	51.20	
	Low birth weight	6.21	
	Child's age at assessment (months)	38.03	2.33
	Mother's age at child's birth (years)	29.49	5.48
	Father's age at child's birth (years)	32.13	6.13
	Number of dependent children (number)	2.15	.91
	Equivalised family income (£/week)	407.70	267.09
	Ethnicity: White	87.20	
	Ethnicity: Mixed	2.53	

Ethnicity: Indian	1.70
Ethnicity: Pakistani-Bangladeshi	2.93
Ethnicity: Black	1.46
Ethnicity: Other	1.10
Two natural parents	97.77
Step-father	2.23

Notes: All statistics weighted to adjust for sample design.
Source: MCS, Wave 2. *N*=10,387.

4.4. Methods

I use Diagonal Reference Models (DRMs) to assess the association between parental educational attainments and educational heterogamy, on the right-hand side of the equation, and children's developmental outcomes, as outcomes of interest. Section 3.4 in the preceding chapter discusses the motivation behind DRMs as originally developed by Sobel (1981, 1985). DRMs are typically applied to square tables where two status variables structure rows and columns and the means of a dependent variable fill the resulting matrix. DRMs belong to the family of 'status inconsistency' models whose aim is to assess the impact of mismatch of the status variables on a wide range of outcomes of interest to social scientists (Hendrickx et al. 1993; cf. section 3.4). As such, they can be applied to discrepancy on any given status dimension and hence to heterogamy in education (Sobel 1985: 710)[56]. A revived interest in DRMs is exemplified by the methodological comparison carried out by Eeckhaut et al. (2013) who favour DRMs over a number of alternative techniques for the analysis of the effects of educational differences between partners.

[56] For ease of exposition, I again use the terms 'consistency' and 'inconsistency' as functionally equivalent to educational 'homogamy' and 'heterogamy'.

DRMs model the effects of heterogamy as independent of the effects of partners' levels of education. The solution proposed by Sobel (1981; 1985) to the identification problem inherent in the linear dependency of these variables rests on the assumption that the values of the outcome variable associated with situations of consistency "typify the appropriate referents" (1981: 896) for comparisons with the outcomes corresponding to situations of inconsistency. Therefore, in the context of this chapter the developmental outcomes of children living with educationally homogamous parents are taken to represent the level of cognitive or socio-emotional development characteristic of children receiving the inputs associated with the corresponding levels of parental education. In other words, children of parents who share a given level of attainment are assumed to receive more consistent influences as compared to children of parents whose levels of education differ and who are more likely to provide potentially divergent inputs by virtue of the mismatch of their levels of schooling. The effect of heterogamy is thus assessed by the *deviation* of the average outcomes of children of educationally dissimilar parents from the average outcomes of children of educationally homogamous parents.

The adoption of DRMs as my modelling approach in this chapter requires further justification given the hierarchical data structure introduced by having outcome variables at the child level. This structure as well as the focus on differences by gender may invite alternative modelling approaches within the families of Structural Equation Models (SEM) or Generalised Linear Models (GLM). For instance, and restricting the examples to analyses of MCS data, Kiernan and Huerta (2008) used SEM to assess the impact of economic deprivation and maternal well-being on children's early development and the mediating role of maternal attitudes and interactions with children, and Mensah and Kiernan (2010) applied Tobit regression models to study the differential impact of socio-economic disadvantage on boys and girls early educational attainment. While useful in clarifying structural associations between parental and child variables, neither of these approaches is well-suited to solve the identification problem derived from the linear dependency of the parental educational heterogamy variables, as argued by Hope (1975) and Hendrickx et al. (1993). In other words, SEM or GLM techniques may provide a richer characterisation than DRMs of some of the relationships between intermediate and final outcomes and of interaction effects as long as the related variables are measured at the individual level. However, my interest remains on the impact of a couple-level attribute –i.e. educational heterogamy – and on addressing the concern of how to identify such impact while taking into account each parent's level of schooling. Ultimately, it is the nature of my research questions around the implications of educational heterogamy which calls for a technique that can accommodate the modelling of these two relationships. By relying on DRMs, I am able to shade light on an aspect of the parental influences on children that has hardly been explored. I nonetheless acknowledge this may come at a cost in terms of the modelling of other relevant associations.

The functional form of the baseline DRMs in this chapter is:

$$Y_i = p\mu_j + q\mu_k + \delta' C' + \varepsilon_{ijk} \qquad (4.1),$$

where Y_i is the outcome variable for the ith child; μ_j and μ_k are the estimated means for children of educationally homogamous parents in attainment categories j and k of variables X_1 and X_2, respectively; p and q are weight parameters; C' is a set of control variables with corresponding coefficients δ'; and ε_{ijk} is a stochastic error term with expected value 0. The weights p and q measure the relative salience of X_1 (education of the mother) and X_2 (education of the father) in determining Y_i and are assumed to add up to 1. The parameters estimate the proximity of the outcomes of children in heterogamous families to the outcomes of children of homogamous parents with the attainment levels that define the situation of heterogamy of the former. Hence, if $p > .5$, then the outcomes of children of heterogamous parents resemble more the outcomes of children of homogamous parents with the level of education of the mother than the outcomes of children of homogamous parents with the level of education of the father. If $p < .5$ the opposite holds. A comparison of the weight parameters p and q for each model and outcome allows me to test the first research question addressed in this chapter, namely whether it is the mother's or father's education that exerts a greater influence on children's outcomes in general –i.e. without distinguishing between sons and daughters.

The focus on gender differences in the effects of parental education and educational heterogamy requires an extension to the baseline DRM framework. To test for such variation I rely on the development introduced by Sorenson (1989: 128, equations 7-9) to capture group differences in estimates of the p and q parameters. This was originally applied to ethnic variation in the importance of men's and women's education in fertility decisions (Sorenson 1989) and in the strength of parent-child bonds for delinquent behaviour (Sorenson and Brownfield 1991). The extension adopts the following form:

$$Y_i = (p + p_m M)\mu_j + (q + q_m M)\mu_k + \pi M + \delta' C' + \varepsilon_{ijk} \qquad (4.2),$$

where all recurring terms are as above; M is a dummy variable that denotes the gender of the child (female being the omitted category in my analyses) with coefficient π; and parameters p_m and q_m describe gender differences in the relative influence of mothers' and fathers' education between boys and girls subject to the constraint $p_m + q_m = 0$. This effectively operates as an interaction and allows potential variation by gender of the child in the salience of the parental education variables to emerge. For instance, if the weight parameter for the mother's education (p) is to be adjusted downwards for sons because the interaction (p_m) yields a negative coefficient, this would suggest that mothers are less influential in the development of sons than that of daughters, and vice versa. On the other hand, the lack of significant interactions would suggest that the salience of the mothers' and fathers' education does not vary with the gender of children[57].

In addition, the group variable on which differences in p and q are explored (M) is included in the model separately and its coefficient is to be interpreted as the direct effect of gender on children's development. It is of course possible that gender remains highly significant for the outcomes variables without conditioning the effect of the parental education variables through p_m and q_m. In summary, the extension to the baseline DRM introduced by Sorenson allows me to test the second hypothesis explored in this chapter, namely whether the effect of parental education is more pronounced along same-gender lines. This will be revealed by the sign and significance levels of the p_m and q_m parameters.

Lastly, in order to assess the potential effects of parental educational heterogamy on children's cognitive and behavioural development, I apply a series of models that incorporate inconsistency effects as in the preceding chapter:

$$Y_i = p\mu_j + q\mu_k + \beta' Z' + (\delta' C') + \varepsilon_{ijk} \qquad (4.3),$$

where all recurring terms are as above and Z' represents a set of four dummy variables identifying specific instances of parental dissimilarity in education and β' a vector with their respective coefficients. These four forms of heterogamy are *short-* and *long-range* combinations of both *hypergamy* and *hypogamy*. In line with the theoretical foundations of DRMs, *homogamy* is kept as the omitted category relative to which the effects of inconsistency are assessed. The models specified in Equation 4.3 allow me to address research questions regarding variation in parental preferences for investment in children. More precisely, the coefficients and significance levels of the heterogamy dummies

[57] Note, however, that the salience parameters need not be equal to each other but only to add up to 1.

will be indicative of whether sons do better in families where the father is more educated, and whether girls do better in families where the opposite holds. In this respect the null hypothesis remains that the intensity of parental preferences does not vary according to the gender of the child and hence that no form of heterogamy shall have an effect over and above the impact of parental levels of schooling.

The overall goodness-of-fit of my DRMs will be measured using the standard R-squared statistic that indicates the proportion of variation in the data that is accounted for by the models. This will be reported alongside the degrees of freedom consumed and the number of observations for each model. Further, the comparison between the fit of models with and without interactions between the weight parameters and gender of the child will be assessed through a Likelihood-ratio test for the assumption that the fit of the nested model is as satisfactory as the full model with interactions. As in the previous chapter, I estimate all my DRMs using the 'diagref' package in STATA. This incorporates Sorensen's extension allowing users to specify that the weight parameters p and q be a function of an exogenous variable through the 'wcovars' option[58].

4.5. Results

I present the results of my empirical analyses in three stages. I first provide descriptive evidence of the educational gradient in children's development and the average differences between boys and girls at each level of parental schooling and degree of educational heterogamy (Figures 4.1 to 4.6 and Tables 4.3 and 4.4). I next discuss a set of DRMs that explore hypotheses about the relative salience of parental attainments (Tables 4.5 to 4.7). Lastly, I present a second set of DRMs that aim to test the role of

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[58] *http://www.nd.edu/~olizardo/Stataprogs/diagref* [last accessed: 2nd May 2011].

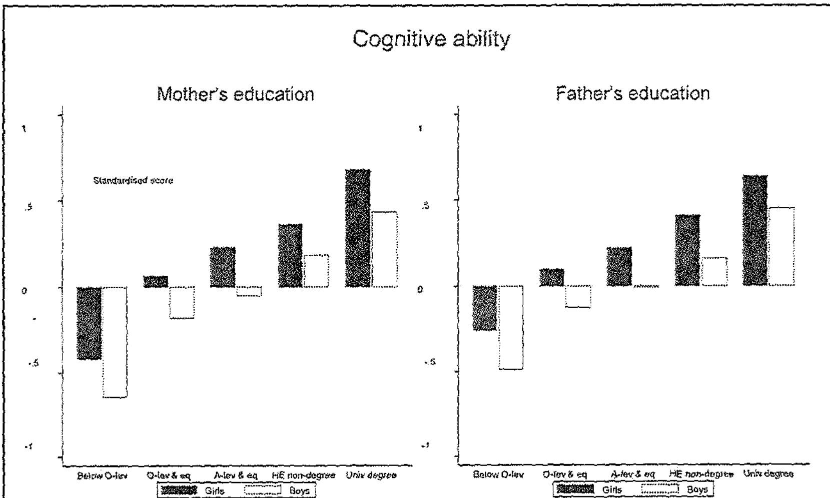
parental preferences by discussing the performance of educational heterogamy variables (Tables 4.8 to 4.10). For all analyses I use the standardised composite scores described in section 4.3.

4.5.1. Descriptive evidence

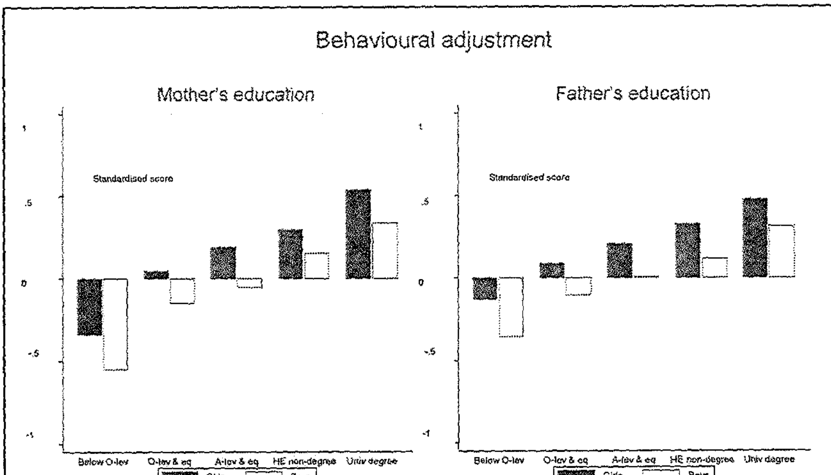
Figures 4.1 to 4.3 provide evidence that the well-known positive gradient of parental education with regards to children's development is also observed in my analytical sample. This association holds for both maternal and paternal education and at all 3 stages of childhood under consideration although its slope becomes less pronounced at the latest measurement point (age 7). For girls the positive relationship is roughly linear, whereas for boys the pattern appears slightly less uniform. Nonetheless, for both genders the largest non-linearity is observed between the lowest level of parental education and the rest of the attainment categories. This suggests that children of parents with qualifications below O-level experience a particularly large disadvantage with respect to peers growing up in families with more educated parents.

Gaps between children with parents in the top and bottom attainment categories (calculations not shown) range in all cases between over half and a full standard deviation. More interestingly, in all waves the gaps are larger for cognitive skills than for behavioural adjustment (by about .10 standard deviations), and also larger across levels of maternal education than of paternal education (by about a .15 standard deviations). These bi-variate associations therefore suggest, on the one hand, that the inputs provided by parents by virtue of their education exert a stronger impact on the cognitive rather than the socio-emotional development of children, and, on the other, that maternal interactions tend to be more consequential than paternal interactions. By and large, however, the emerging picture with regards to the association between parental education and

Figure 4.1. Child developmental outcomes at age 3, by gender and parental education.



Source: MCS, Wave 2. N=9,449.



Source: MCS, Wave 2. N=9,891.

Figure 4.2. Child developmental outcomes at age 5, by gender and parental education.

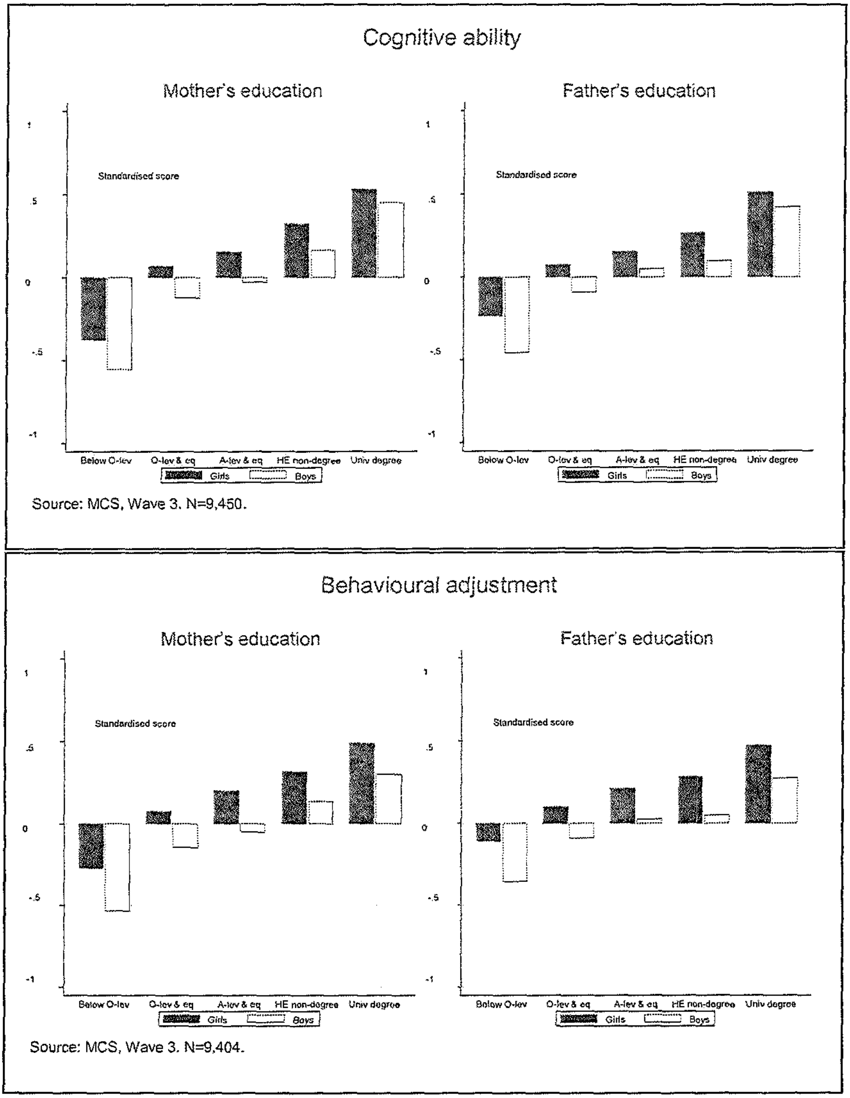
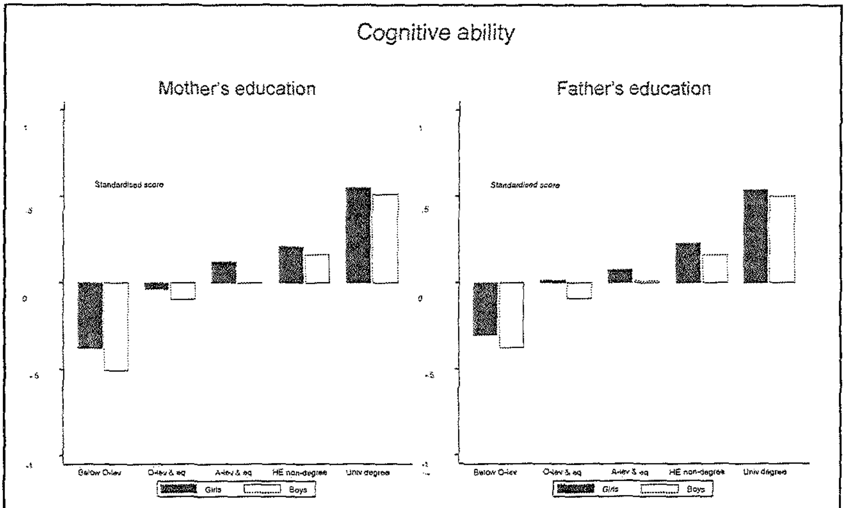
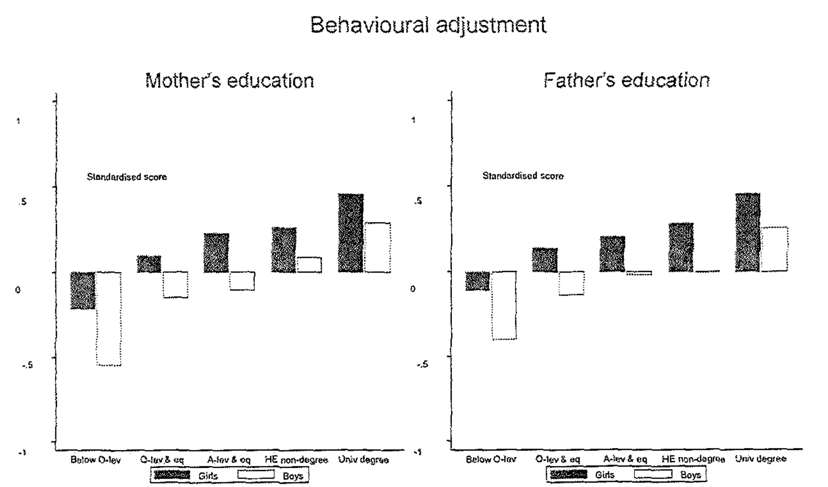


Figure 4.3. Child developmental outcomes at age 7, by gender and parental education.



Source: MCS, Wave 4. N=10,891.



Source: MCS, Wave 4. N=10,696.

children's early development is characterised by its positive gradient and its consistency across parental figures, outcomes and ages.

Table 4.3 gets closer to my core interests in this chapter by reporting the magnitude of the gender gap across parental levels of education and children's developmental outcomes and ages. The entries in the table correspond to the differences in the height of the bars shown in Figures 4.1 to 4.3, and the positive sign of every difference provides evidence of the consistency of the female advantage in developmental gaps. Focusing first on the average gaps presented in the leftmost column, it becomes clear that the magnitude of the gaps is remarkably similar across maternal and paternal levels of education. In other words, average differences between sons and daughters do not vary significantly depending on which parental variable is used to stratify them. Moreover, average gender gaps in cognitive skills decrease from more than a fifth of a standard deviation at age 3 to less than a tenth at age 7, whereas gaps in behavioural adjustment remain fairly constant at about a fifth of a standard deviation at early ages to experience a slight increase at age 7. That is, the cognitive development trajectories of boys and girls seem to converge over time, but gaps in behaviour appear to increase.

Table 4.3 also reveals some interesting variation in the magnitude of gender gaps across parental educational categories. One key feature of this pattern is that developmental gaps between boys and girls tend to be larger at lower levels of parental schooling and smaller when parents have some form of higher education. The largest gaps are observed for behavioural skills and parents with minimal qualifications, whereas the smallest gaps are found for cognitive skills at ages 5 and 7 and parents with university degrees. This in line with research suggesting that variation in ability is larger amongst boys and that the male disadvantage is particularly pronounced at the bottom of the distribution (Entwisle et al. 2007; Penner and Paret 2008).

Table 4.3. Gender gaps in developmental outcomes, by parental level of education.

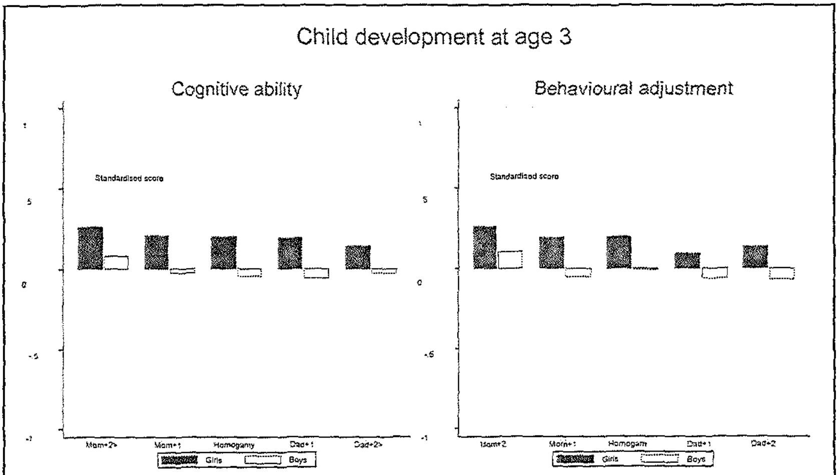
	Parental level of education					
Child outcome	**Below O-lev.**	**O-lev. & eq.**	**A-lev. & eq.**	**HE non-degree**	**Univ. degree**	***Average***
Cognitive ability at age 3						
By mother's education	.199	.230	.234	.210	.259	.226
By father's education	.243	.199	.233	.231	.209	.223
Behavioural problems at age 3						
By mother's education	.263	.171	.237	.140	.197	.202
By father's education	.241	.158	.204	.251	.155	.202
Cognitive ability at age 5						
By mother's education	.162	.178	.184	.168	.067	.152
By father's education	.230	.166	.092	.187	.095	.154
Behavioural problems at age 5						
By mother's education	.224	.212	.230	.168	.168	.200
By father's education	.232	.188	.189	.206	.192	.201
Cognitive ability at age 7						
By mother's education	.126	.082	.113	.036	.010	.074
By father's education	.096	.129	.064	.053	.028	.074
Behavioural problems at age 7						
By mother's education	.379	.248	.305	.174	.176	.256
By father's education	.287	.275	.208	.319	.227	.263

Notes: Entries indicate differences between MCS girls' and boys' average scores. A positive score signals a gender gap in favour or girls, and vice versa. All outcomes standardised to a mean of 0 and a standard deviation of 1. All statistics weighted to adjust for sample design. *N*s for each outcome as indicated in the graphs.

Source: MCS, Waves 2 to 4.

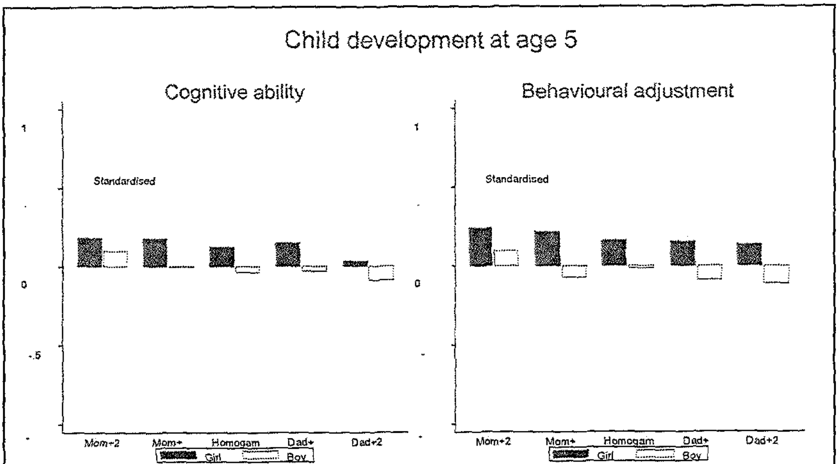
The same descriptive exercise is repeated in Figures 4.4 to 4.6 and Table 4.4, which focus on variation across levels of parental similarity in education. Figures 4.4 to 4.6 clearly suggest that variation in developmental outcomes is smaller across categories of parental heterogamy than across categories of parental schooling. The fact that none of the bars in the second set of figures reaches the .50 line indicates that the independent explanatory power of the combinations of parental attainments is rather modest. This is hardly surprising given that categories of similarity in education are defined regardless of the level of attainment at which combinations occur. As such, these figures are not indicative of the importance of education for children's development, but rather of whether specific sorting patterns affect such outcomes. While modest in magnitude, some patterns emerge from a visual inspection of Figures 4.4 to 4.6. On the one hand, as suggested by the relative height of the bars on the left-hand side of each of the graphs, it seems that children tend to do better when their mothers are more educated than their fathers. This relationship appears more pronounced for girls and for outcomes at ages 3 and 5. On the other hand, and as a mirror image of the latter, children's outcomes tend to be below average when their fathers are more educated that their mothers. This appears particularly true for boys and for behavioural adjustment. Indeed, it tends to be the case that, for both boys and girls, and for all outcomes and ages, children whose mothers are two or more attainment categories above their fathers perform best compared to children of the same gender whose parents are in other combinations of educational levels. Inversely, children whose fathers are two or more attainment categories above their mothers tend to perform the worst compared again to children of the same gender in couples with different combinations of attainments. This first-order association is suggestive of a differential emphasis put on investments in children between heterogamous couples depending on the gender of the more educated parent.

Figure 4.4. Child developmental outcomes at age 3, by gender and parental similarity in education.



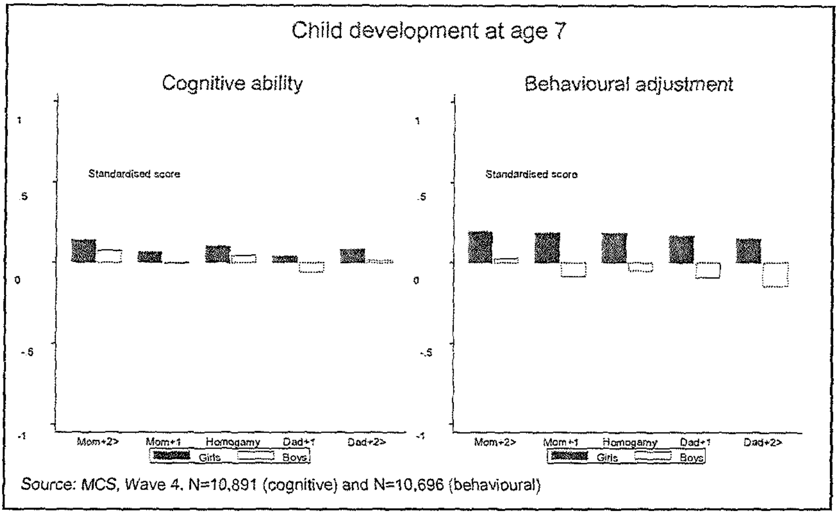
Source: MCS, Wave 2. N=9,449 (cognitive) and N=9,891 (behavioural)

Figure 4.5. Child developmental outcomes at age 5, by gender and parental similarity in education.



Source: MCS, Wave 3. N=9,450 (cognitive) and N=9,404 (behavioural)

Figure 4.6. Child developmental outcomes at age 7, by gender and parental similarity in education.



Lastly, Table 4.4 reports gender gaps across categories of dissimilarity in education. These gaps are again calculated as the difference between the heights of each corresponding pair of bars in the preceding figures. Here no clear pattern emerges as to how different combinations of parental attainments affect differences between boys and girls, but this is logical given that heterogamy appears to affects children of both genders equally.

Table 4.4. Gender gaps in developmental outcomes, by parental dissimilarity in education.

	Dissimilarity in education					
Child outcome	Mother +2>	Mother +1	=	Father +1	Father +2>	***Average***
Cognitive ability age 3	.227	.236	.240	.259	.145	.221
Behaviour age 3	.190	.198	.190	.189	.253	.204
Cognitive ability age 5	.093	.188	.163	.168	.106	.144
Behaviour age 5	.161	.256	.153	.269	.204	.208
Cognitive ability age 7	.066	.084	.044	.142	.056	.078
Behaviour age 7	.180	.214	.244	.323	.324	.257

Notes: Entries indicate differences between MCS girls' and boys' average scores. A positive score signals a gender gap in favour or girls, and vice versa. All outcomes standardised to a mean of 0 and a standard deviation of 1. All statistics weighted to adjust for sample design. *N*s for each outcome as indicated in the graphs.

Source: MCS, Waves 2 to 4.

4.5.2. DRMs for the salience of parental attainments and gender interactions

Tables 4.5 to 4.7 present results from DRMs that examine the relative salience of parental education variables in determining children's cognitive and behavioural skills at ages 3, 5 and 7, respectively. For each outcome, Model 1 (M1) corresponds to the baseline specification as in Equation 4.1 and Model 2 (M2) to an extension that tests the interaction of the weight parameters with the gender of the child, as in Equation 4.2.

Starting with the weight parameters for the mother's education (p) and father's education (q), in all cases p turns out to be larger than q. This indicates that the outcomes of children of educationally heterogamous parents resemble more the average outcomes of children whose parents have both the level of education of the mother than the average outcomes of children whose parents both hold the qualifications of the father. For cognitive ability, however, these differences are not large and p ranges between .50 and .60; for behavioural adjustment, p tends to be larger than q by a factor of 1.5 to 2.0. I interpret these results as providing weak support for the hypothesis that maternal education is a stronger determinant of children's early development than paternal education.

The male child dummy introduced in all models yields, with no exception, a negative coefficient and high levels of statistical significance. This comes as no surprise given the descriptive evidence presented above. However, it must be noted that all DRMs incorporate an extensive set of socio-demographic controls that do not succeed in cancelling out the significance of the gender dummy. Critical amongst those is the child's age in months that is likely to account for differences in maturation stages. Thus, the coefficient for the gender dummy reflects differences in development between boys and girls, net of the timing of the assessment (and all other predictors in the model). Despite the inclusion of controls, this difference represents between a tenth and a fifth of a standard deviation depending on the outcome and age. That these differences are at their smallest for cognitive ability at age 7 is again indicative of the gender convergence in this domain in middle childhood, while differences in behaviour appear to magnify.

Most importantly, a comparison of M1 and M2 across Tables 4.5 to 4.7 provides a test for the conditional effects of parental education by gender. In all cases this interaction (p*male child) fails to reach statistical significance, as indicated by its coefficient and standard error and by the rejection of the hypothesis that M2 provides a better fit to the data than M1. This latter point is illustrated by the Likelihood-ratio tests that do not provide grounds to reject the assumption of nested models. It is also worth noting that at ages 3 and 5, and for both outcomes, the interaction yields a negative coefficient that would point in the direction of the mother's education being more important for daughters than for sons. At age 7, however, the sign of the coefficient is the opposite. Further, none of these interactions reaches conventional levels of significance. I therefore conclude that my analyses yield no support for the hypothesis that the effects of parental education are more pronounced along gender lines.

Tables 4.5 to 4.7 further report mean outcomes for children of educationally homogamous couples at all five levels of schooling. These means come to confirm the positive association of parental education with children's development and suggest that gaps between the top and bottom attainment categories are larger for cognitive than for behavioural skills. My results are thus in line with prior studies using data from the MCS and other cohort studies showing that education plays a major role in the intergenerational transmission of advantage across generations (Blanden et al. 2005; Hansen and Hawkes 2009; Hansen and Jones 2010). Results for control variables in the models presented in Tables 4.5 to 4.7 are discussed at the end of the section.

Table 4.5. Child developmental outcomes at age 3: Salience of parental education variables and interaction with gender. DRMs.

	Cognitive ability at age 3				**Behavioural adjustment at age 3**			
	M1		**M2**		**M1**		**M2**	
Parental education weights								
Mother's education (p)	.559		.582		.695		.731	
Father's education (q)	.441		.418		.305		.269	
Gender and interactions								
Male child	-.224	***	-.223	***	-.187	***	-.186	***
	.020		*.020*		*.020*		*.020*	
Interaction (p*male child)			-.044				-.069	
			.071				*.106*	
Means for homogamous couples								
Below O-level	-.454	***	-.455	***	-.360	***	-.361	***
	.029		*.029*		*.032*		*.032*	
O-level or equivalent	-.129	***	-.128	***	-.055	*	-.053	*
	.026		*.026*		*.024*		*.024*	
A-level or equivalent	.010		.011		.060	*	.061	*
	.029		*.029*		*.027*		*.027*	
Non-degree HE	.170	***	.169	***	.113	***	.110	***
	.029		*.029*		*.027*		*.027*	
University degree	.403	***	.403	***	.241	***	.243	***
	.025		*.025*		*.022*		*.023*	
Controls	Yes		Yes		Yes		Yes	
R-squared	.11		.11		.08		.08	
Degrees of freedom	20		21		20		21	
Likelihood-ratio test	.458				.408			
N	9,449		9,449		9,891		9,891	

Notes: Standard errors in italics. ***: p <.001; **: p <.01; *: p <.05; +: p <.10. Likelihood-ratio test for the assumption that M1 is nested into M2. Controls: child's age in months, low birth weight, mother's age at child's birth, father's age at child's birth, number of siblings, equivalised family income (log), parental ethnicity and step-father; see Appendix for full results. Control variables from same wave as outcome. All statistics weighted to adjust for sample design.

Source: MCS, Wave 2.

Table 4.6. Child developmental outcomes at age 5: Salience of parental education variables and interaction with gender. DRMs.

	Cognitive ability at age 5				**Behavioural adjustment at age 5**			
	M1		**M2**		**M1**		**M2**	
Parental education weights								
Mother's education (*p*)	.581		.584		.608		.649	
Father's education (*q*)	.419		.416		.392		.351	
Gender and interactions								
Male child	-.133	***	-.133	***	-.192	***	-.191	***
	.020		*.020*		*.020*		*.020*	
Interaction (*p**male child)			-.004				-.079	
			.077				*.111*	
Means for homogamous couples								
Below O-level	-.444	***	-.444	***	-.345	***	-.345	***
	.031		*.032*		*.032*		*.032*	
O-level or equivalent	-.086	***	-.086	***	-.030		-.030	
	.026		*.026*		*.025*		*.025*	
A-level or equivalent	-.008		-.008		.066	*	.068	*
	.029		*.029*		*.029*		*.029*	
Non-degree HE	.122	***	.122	***	.071	*	.072	*
	.030		*.030*		*.028*		*.028*	
University degree	.416	***	.417	***	.237	***	.236	***
	.024		*.025*		*.023*		*.023*	
Controls	Yes		Yes		Yes		Yes	
R-squared	.09		.09		.05		.05	
Degrees of freedom	20		21		20		21	
Likelihood-ratio test	.937				.360			
N	9,450		9,450		9,404		9,404	

Notes: Standard errors in italics. ***: $p<.001$; **: $p<.01$; *: $p<.05$; $^{+}$: $p<.10$. Likelihood-ratio test for the assumption that M1 is nested into M2. Controls: child's age in months, low birth weight, mother's age at child's birth, father's age at child's birth, number of siblings, equivalised family income (log), parental ethnicity and step-father; see Appendix for full results. Control variables from same wave as outcome. All statistics weighted to adjust for sample design.

Source: MCS, Wave 3.

Table 4.7. Child developmental outcomes at age 7: Salience of parental education variables and interaction with gender. DRMs.

	Cognitive ability at age 7				Behavioural adjustment at age 7			
	M1		M2		M1		M2	
Parental education weights								
Mother's education (p)	.522		.499		.662		.591	
Father's education (q)	.478		.501		.338		.409	
Gender and interactions								
Male child	-.085	***	-.085	***	-.260	***	-.260	***
	.019		*.019*		*.020*		*.020*	
Interaction (p*male child)			.043				.134	
			.062				*.121*	
Means for homogamous couples								
Below O-level	-.488	***	-.488	***	-.330	***	-.330	***
	.029		*.029*		*.030*		*.031*	
O-level or equivalent	-.083	***	-.083	***	.008		.007	
	.025		*.025*		*.025*		*.025*	
A-level or equivalent	-.008		-.009		.053		.046	
	.028		*.028*		*.029*		*.031*	
Non-degree HE	.102	***	.102	***	.052	*	.059	*
	.029		*.029*		*.024*		*.028*	
University degree	.478	***	.479	***	.216	***	.216	***
	.024		*.024*		*.023*		*.023*	
Controls	Yes		Yes		Yes		Yes	
R-squared	.10		.10		.05		.05	
Degrees of freedom	20		21		20		21	
Likelihood-ratio test	.424				.143			
N	10,891		10,891		10,969		10,969	

Notes: Standard errors in italics. ***: p <.001; **: p <.01; *: p <.05; +: p <.10. Likelihood-ratio test for the assumption that M1 is nested into M2. Controls: child's age in months, low birth weight, mother's age at child's birth, father's age at child's birth, number of siblings, equivalised family income (log), parental ethnicity and step-father; see Appendix for full results. Control variables from same wave as outcome. All statistics weighted to adjust for sample design.

Source: MCS, Wave 4.

4.5.3. DRMs for the role of parental preferences and gender interactions

Tables 4.8 to 4.10 present results for a set of DRMs that incorporate educational heterogamy variables to test the role of parental preferences on children's developmental outcomes at ages 3, 5 and 7, respectively. For each outcome, Model 1 (M1) corresponds to Equation 4.3 and Model 2 (M2) adds interactions between the heterogamy variables and the gender of children. In M2 the first set of coefficients for these variables must be interpreted as pertaining to daughters and the coefficients for the interactions themselves as relative to sons.

In all three tables, the weight parameters exhibit the same pattern as in previous models with the salience of maternal education (p) being larger than that of paternal education (q). Hence, the inclusion of the heterogamy variables does not alter the conclusion that the outcomes of children of educationally heterogamous parents align with the outcomes that can be expected on the basis of the mother's level of education rather than on the father's. The salience of the maternal education appears particularly high for children's cognitive ability at age 3 (M1: p=.855, q=.145).

Also in line with the baseline models are the results for the male child dummy, which are always negative and highly significant. This is proof of the importance of gender as an independent predictor of children's early development. Likewise, the means for children of educationally homogamous couples come close to replicating the results in the models without heterogamy variables with a clear positive gradient and top-bottom gaps of nearly a full standard deviation in cognitive ability and about a sixth of a standard deviation in behavioural adjustment, at all three ages.

However, the key results of Tables 4.8 to 4.10 are those for the heterogamy variables and their interactions with gender. In all models, homogamy is used as the reference category for the interpretation of any potential effects of the various combinations of parental attainments. By and large, these variables tend to perform poorly and add no explanatory power to the baseline models. Only in two cases out of six does parental heterogamy in education have an impact on children's outcomes.

Firstly, long-range hypogamy and both short- and long-range hypergamy reach statistical significance when predicting children's cognitive ability at age 3 (Table 4.8), the coefficient for hypogamy being positive and those for hypergamy being negative. Results for M1 suggest that, on average, and relative to having parents with the same level of education, children experience gains in cognitive development when their mother is (substantially) more educated than their father and difficulties when it is the father who is more educated than the mother. Nonetheless, results for M2 qualify the interpretation above by providing two sets of coefficients for the heterogamy variables, one for girls and another for boys. The fact that the interactions for male children do not reach statistical significance and that the coefficients for females remain similar to those in M1 suggests that the positive and negative impact of hypogamy and hypergamy, respectively, apply to daughters only. This conclusion is consistent with the descriptive evidence presented in the left-hand graph of Figure 4.4 where the mean outcomes of girls decrease as the pattern of heterogamy moves away from a maternal advantage to a paternal superiority. For boys no such pattern is detected.

Secondly, some forms of heterogamy appear to have an impact on behavioural adjustment at age 5 (Table 4.9). In this case M1 would suggest that, on average, there are no significant effects. M2, however, reveals a positive impact for girls of having a mother more educated than her partner (albeit no more than one level above), and a negative impact for boys of situations of short-range heterogamy, in either direction. This result is puzzling as it must be interpreted to mean that sons would do better when their parents have the same type of qualifications than when either partner is more educated than the other. This seems partly consistent with the right-hand graph of Figure 4.5 but an incomplete explanation for the height of the bars on the extremes.

Overall, it is not possible to detect any clear pattern from the signs and levels of significance of the heterogamy variables throughout Tables 4.8 to 4.10. For instance, there is no consistency in the sign of the hypogamy variables that, according to the hypothesis that children benefit from a greater maternal control of the family resources, was expected to be positive for all outcomes. Further, the interactions with gender of children reveal no consistent variation in the effects for boys and girls. Therefore, I conclude that my DRMs offer little or no support for the hypotheses that parental preferences for *investment in children*, as measured by their relative education, play a role in determining children's early cognitive and behavioural skills.

This conclusion was not altered by additional analyses (results not shown in the tables) that extended the models to control for the weekly number of hours of non-domestic work supplied by each partner. The rationale for this was to explore the possibility that the finding that hypergamy produces negative effects could be due to selection effects related to parental work schedules. In situations of female hypergamy the male partner is likely to be the chief breadwinner and may be working long hours while the mother is likely to be a part-timer or housewife. The parents' relative labour supply may thus be used as a proxy for time with the children. However, the inclusion of these additional controls resulted in minimal changes in the direction and significance of the heterogamy variables, as well as in a loss of observations and no increases in the explanatory power of the models.

4.5.4. Results for other child and family characteristics

Results for the control variables included in the DRMs in this chapter are reported in Tables A.4.1 to A.4.6 in the Appendix. Positive effects of family income and child's age in months are found for all outcomes, while the opposite holds for low birth weight. The number of siblings affects cognitive development only, and the presence of a step-father is significant for behavioural adjustment only. Mean outcomes for children of ethnic minorities tend to be lower than those of White children but the direction of significance of these effects varies greatly. By and large, all results for control variables are in line with prior research with MCS data (e.g. Hansen and Hawkes 2009; Hansen and Jones 2010; Mensah and Kiernan 2010).

Further, I found no evidence that the gender of the focal MCS child was associated with the pattern of missing data. This is reassuring for my conclusions regarding the comparison between the developmental outcomes of sons and daughters and the extent to which gender conditions the impact of parental education on such outcomes. However, my results may be subject to selection biases associated with a higher incidence of non-response amongst socially disadvantaged families; if the latter were under-represented because of the lack of information on child outcomes, it is likely that the reported levels of child development would upwardly biased. The weighting applied to all statistical models is expected to counteract this bias, though.

Table 4.8. Child developmental outcomes at age 3: Impact of parental heterogamy and interaction with gender. DRMs.

	Cognitive ability at age 3				Behavioural adjustment at age 3			
	M1		M2		M1		M2	
Parental education weights								
Mother's education (p)	.855		.853		.729		.730	
Father's education (q)	.145		.147		.271		.270	
Educational heterogamy								
Hypogamy long-range	.157	*	.149	*	.030		.002	
	.065		*.072*		*.050*		*.059*	
Hypogamy short-range	.018		.006		.002		.027	
	.040		*.047*		*.036*		*.044*	
Hypergamy short-range	-.080	*	-.098	*	-.034		-.037	
	.039		*.047*		*.038*		*.048*	
Hypergamy long-range	-.177	**	-.154	*	-.028		-.067	
	.061		*.068*		*.053*		*.061*	
Gender and interactions								
Male child	-.224	***	-.213	***	-.187	***	-.159	***
	.019		*.032*		*.020*		*.032*	
Hypogamy long-range*male child			.013				.056	
			.062				*.062*	
Hypogamy short-range*male child			-.047				-.059	
			.056				*.057*	
Hypergamy short-range*male child			-.037				.005	
			.059				*.059*	
Hypergamy long-range*male child			.042				-.076	
			.063				*.065*	

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	Cognitive ability at age 3				Behavioural adjustment at age 3			
	M1		M2		M1		M2	
Means for homogamous couples								
Below O-level	-.455	***	-.454	***	-.363	***	-.364	***
	.027		*.027*		*.032*		*.032*	
O-level or equivalent	-.135	***	-.135	***	-.055	*	-.055	*
	.021		*.021*		*.023*		*.023*	
A-level or equivalent	.013		.013		.061	+	.061	+
	.025		*.025*		*.032*		*.030*	
Non-degree HE	.162	***	.162	***	.118	***	.118	***
	.024		*.024*		*.026*		*.026*	
University degree	.414	***	.413	***	.238	***	.239	***
	.025		*.025*		*.025*		*.025*	
Controls	Yes		Yes		Yes		Yes	
R-squared	.11		.11		.08		.08	
Degrees of freedom	24		28		24		28	
N	9,449		9,449		9,891		9,891	

Notes: Standard errors in italics. ***: $p < .001$; **: $p < .01$; *: $p < .05$; $^{+}$: $p < .10$. Homogamy as reference category for heterogamy variables. Controls: child's age in months, low birth weight, mother's age at child's birth, father's age at child's birth, number of siblings, equivalised family income (log), parental ethnicity and step-father; see Appendix for full results. Controls from same wave as outcome. All statistics weighted to adjust for sample design.

Source: MCS, Wave 2.

Table 4.9. Child developmental outcomes at age 5: Impact of parental heterogamy and interaction with gender. DRMs.

	Cognitive ability at age 5				Behavioural adjustment at age 5			
	M1		M2		M1		M2	
Parental education weights								
Mother's education (*p*)	.606		.606		.546		.543	
Father's education (*q*)	.394		.394		.454		.457	
Educational heterogamy								
Hypogamy long-range	-.041		-.089		.020		.056	
	.063		*.071*		*.043*		*.053*	
Hypogamy short-range	-.005		.021		-.002		.097	*
	.042		*.051*		*.036*		*.043*	
Hypergamy short-range	.012		.016		-.050		.013	
	.036		*.045*		*.035*		*.043*	
Hypergamy long-range	-.020		-.041		-.010		.003	
	.056		*.067*		*.042*		*.053*	
Gender and interactions								
Male child	-.133	***	-.141	***	-.192	***	-.121	***
	.020		*.033*		*.020*		*.031*	
Hypogamy long-range*male child			.091				-.071	
			.063				*.061*	
Hypogamy short-range*male child			-.051				-.192	**
			.056				*.059*	
Hypergamy short-range*male child			-.007				-.127	*
			.060				*.060*	
Hypergamy long-range*male child			.041				-.032	
			.068				*.066*	

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	Cognitive ability at age 5				Behavioural adjustment at age 5			
	M1		**M2**		**M1**		**M2**	
Means for homogamous couples								
Below O-level	-.442	***	-.441	***	-.349	***	-.347	***
	.032		*.032*		*.033*		*.033*	
O-level or equivalent	-.089	***	-.089	***	-.027		-.026	
	.025		*.025*		*.026*		*.026*	
A-level or equivalent	-.010		-.010		.077	*	.075	*
	.030		*.030*		*.030*		*.030*	
Non-degree HE	.128	***	.128	***	.068	*	.068	*
	.036		*.036*		*.031*		*.031*	
University degree	.414	***	.413	***	.230	***	.230	***
	.270		*.027*		*.024*		*.024*	
Controls	Yes		Yes		Yes		Yes	
R-squared	.09		.09		.05		.05	
Degrees of freedom	24		28		24		28	
N	9,450		9,450		9,404		9,404	

Notes: Standard errors in italics. ***: p <.001; **: p <.01; *: p <.05; $^+$: p <.10. Homogamy as reference category for heterogamy variables. Controls: child's age in months, low birth weight, mother's age at child's birth, father's age at child's birth, number of siblings, equivalised family income (log), parental ethnicity and step-father; see Appendix for full results. Controls from same wave as outcome. All statistics weighted to adjust for sample design.

Source: MCS, Wave 3.

Table 4.10. Child developmental outcomes at age 7: Impact of parental heterogamy and interaction with gender. DRMs.

	Cognitive ability at age 7				Behavioural adjustment at age 7			
	M1		M2		M1		M2	
Parental education weights								
Mother's education (p)	.574		.572		.660		.659	
Father's education (q)	.426		.428		.340		.341	
Educational heterogamy								
Hypogamy long-range	-.049		-.050		-.007		-.021	
	.049		*.057*		*.039*		*.050*	
Hypogamy short-range	-.008		.008		.001		.016	
	.037		*.045*		*.035*		*.042*	
Hypergamy short-range	-.031		.001		.014		.051	
	.034		*.043*		*.033*		*.043*	
Hypergamy long-range	.048		.044		-.020		.026	
	.046		*.054*		*.038*		*.046*	
Gender and interactions								
Male child	-.084	***	-.068	*	-.259	***	-.231	***
	.019		*.032*		*.020*		*.033*	
Hypogamy long-range*male child			.003				.025	
			.060				*.062*	
Hypogamy short-range*male child			-.031				-.028	
			.056				*.058*	
Hypergamy short-range*male child			-.063				-.072	
			.058				*.059*	
Hypergamy long-range*male child			.004				-.090	
			.062				*.066*	

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	Cognitive ability at age 7				Behavioural adjustment at age 7			
	M1		M2		M1		M2	
Means for homogamous couples								
Below O-level	-.493	***	-.492	***	-.328	***	-.327	***
	.029		*.029*		*.031*		*.030*	
O-level or equivalent	-.084	***	-.084	***	.006		.005	
	.025		*.025*		*.025*		*.025*	
A-level or equivalent	-.001		-.001		.052	+	.051	+
	.029		*.029*		*.029*		*.029*	
Non-degree HE	.104	***	.105	***	.052	+	.052	+
	.030		*.030*		*.029*		*.029*	
University degree	.472	***	.472	***	.217	***	.217	***
	.025		*.025*		*.024*		*.024*	
Controls	Yes		Yes		Yes		Yes	
R-squared	.10		.10		.05		.05	
Degrees of freedom	24		28		24		28	
N	10,891		10,891		10,969		10,969	

Notes: Standard errors in italics. ***: $p<.001$; **: $p<.01$; *: $p<.05$; $^{+}$: $p<.10$. Homogamy as reference category for heterogamy variables. Controls: child's age in months, low birth weight, mother's age at child's birth, father's age at child's birth, number of siblings, equivalised family income (log), parental ethnicity and step-father; see Appendix for full results. Controls from same wave as outcome. All statistics weighted to adjust for sample design.

Source: MCS, Wave 4.

4.6. Discussion

This chapter has explored the role of gender in the intergenerational transmission of educational advantage in contemporary UK families with young children. I tested a set of hypotheses regarding the relative salience of mothers' and fathers' educational attainments and the impact of parental dissimilarity in education as determinants of children's early cognitive and behavioural skills. Of specific interest was the hypothesis that these associations were more pronounced along same-gender lines. My empirical analyses were carried out on a sample of two-parent families drawn from the MCS. By looking at parental attainments at the couple level, I was able to extend the scope of prior research on familial influences on children's outcomes, particularly with regards to the potential implications of parental heterogamy in education. Further, my application of DRMs represents a contribution to the literature since this statistical technique, arguably the best available method for the identification of heterogamy effects, had not yet been used on UK data with this purpose. This combines with the fact that the parents of the MCS children present a unique pattern of educational assortative mating that differentiates them from previous parental cohorts in Britain.

The chapter was informed by a general interest in the emergence of social inequalities in children's early development. Differentials in early skills in both cognitive and behavioural domains are a source of concern for social researchers given their lasting influence on a variety of outcomes later in life and the tendency of gaps to magnify over time (Duncan et al. 2007; Henderson 2012). My focus was on developmental gaps between boys and girls and the role that parents may play in producing them. Substantial gender gaps in school readiness and performance at various levels of education have been documented in the UK and family resources remain critical (albeit not the sole) influences on the educational trajectories of boys and girls (Francis and Skelton 2005; DfES 2007; Buchmann et al. 2008).

More specifically, my main motivation was the lack of consensus in the sociological and economic literatures that investigate the persistence of differential parental treatment of children by gender and its potential implications for children's outcomes. This literature distils two general and competing perspectives. On the one hand, diminishing market incentives for different educational investments by men and women and increasing gender egalitarianism in the family context point in the direction of equal parental concern for the development of sons and daughters and thus of no differential treatment (Buchmann and DiPrete 2006). On the other, a large number of studies document the persistence of gendered parenting practices and uncover variation in the intensity in mothers' and fathers' preferences for investment in children generally or in boys or girls specifically (Raley and Bianchi 2006). Taking these conflicting accounts of the importance of gender in the family transmission of human capital as my point of departure, I sought to examine the extent to which parental educational attainments and educational heterogamy affected the outcomes of sons and daughters differently under the premise that variation in such effects is indicative of differential treatment of children by gender.

My substantive findings provide little or no support for the theoretical perspectives that posit either differential effects of parental education for sons and daughters or the presence of gendered preferences for investment in children. Instead, the emerging picture for my sample of UK two-parent families with children born in 2000-01 does not suggest any significant interactions between the gender of children and the parental inputs provided by virtue of their absolute and relative levels of education. This is nonetheless compatible with the existence of substantial gender gaps in both cognitive and behavioural outcomes at ages 3, 5 and 7, always in favour of females. I documented the magnitude of these gaps across levels of parental education and heterogamy in my descriptive analyses and confirmed the significance of gender in all DRMs across outcomes and ages. However, in almost all instances gender remained an independent predictor of children's developmental outcomes. That equates to saying that, firstly, gender did not condition the association between parental education and children's skills neither in its gradient nor intensity, and, secondly, that children's development was neither significantly boosted nor harmed when the same-gender parent was more educated than the opposite-gender parent.

Two minor exceptions to these general conclusions are nonetheless worth mentioning. On the one hand, my results consistently suggested that maternal education is more salient in determining children's early development than paternal education. However, this holds for both boys and girls and it is likely to result from the fact that mothers tend to play a more active role than fathers in children's early socialisation rather than from differences in the parenting skills or preferences of mothers and fathers. The finding therefore provides partial support for the conventional view of a stronger maternal influence. On the other hand, when looking at children's cognitive development at age 3, I obtained evidence to support the hypothesis that girls (but not boys) do better when their mothers are more educated than their fathers and vice versa. However, this pattern of results was neither replicated for cognitive ability at later ages nor in behaviour.

Therefore, for the most part my analyses yielded a set of negative findings. These results, I contend, are still relevant for our knowledge about the transmission of educational success in the family context. My analyses suggest that in contemporary UK families, sons and daughters derive the same advantages and disadvantages from their parents' levels of education. This is a meaningful conclusion as it attenuates concerns about increasing divergence in the educational trajectories of boys and girls. One of these concerns emanates from the prediction of gender-role socialisation perspectives that compositional shifts in maternal education should translate into a male disadvantage in schooling outcomes because these changes ought to have a greater impact on daughters than sons (Buchmann and DiPrete 2006). My findings, on the contrary, do not reveal any gender-specific pattern in the influence of parental education. Another common concern for stratification researches is that the persistence of gender biases in parenting, particularly by fathers, may lead to different outcomes for boys and girls. Insofar as my assumption –that relative levels of education reflect the ability of parents to enact their preferences when their preferences over children differ– is valid, my findings suggests that either gendered parenting is inconsequential for children's early cognitive and behavioural skills, or that mothers and fathers have largely similar preferences for investments in sons and daughters. These negative findings are far from being provocative and will likely fail to attract the attention of commentators with an interest in stirring up debates about the role of gender in educational inequalities, but they may align with research that tends to receive less exposure. As argued by Raley and Bianchi (2006: 417), "there may be a bias in the social science literature toward the publication of articles that find statistically significant gender differences. Null findings are typically thought to be harder to publish, so the ways in which boys and girls are treated similarly may be less publicized".

I further believe that this chapter has made some specific contributions to the literature on the determinants of children's development in the UK. One such contribution is to provide evidence that no significant differences exist in the impact of maternal and paternal education on children's early skills. This is in line with the conclusion reached by previous studies looking at literacy and numerical skills at age 15 (Marks 2008a, 2008b; Jerrim and Micklewright 2011). Hence, this lack of interactions appears to hold at different stages of childhood as well as in adolescence. Moreover, I believe my analyses provide a richer picture of the effects of parental education for MCS children than prior pieces of research that have focused solely on mothers and neglected the potential influence of fathers (e.g. Mensah and Kiernan 2010) or that have combined their qualifications into a single indicator (e.g. Hansen and Jones 2010). Lastly, I argue that this is the first systematic examination of the effects of parental dissimilarity in education with UK data and a novel application of DRMs, the best-suited technique for this purpose (Eeckhaut et al. 2013). The fact that my results with MCS data were largely negative should not discourage more detailed investigations into the potential implications for children of the relative balance of partners' attainments with other datasets or in other time periods.

Further research on the topics discussed in this chapter should aim to address some limitations in its analytical approach. In particular, future studies should incorporate considerations about differences in sibship gender composition (Steelman et al. 2002). For instance, my analyses could be replicated by distinguishing between single children and children with siblings of the same, and of different, genders. While I controlled for the number of children in the household in all my models, only the gender of the focal MCS cohort child was taken into account. However, there are good reasons to suspect that sibship gender composition may be a relevant factors in influencing, for example, the degree to which parenting practices are sex-typed, or the extent to which parents with children of both genders hold more gender egalitarian views than parents with boys or girls only. Similarly, the potential interaction of birth order and gender effects was not explored in my analyses. Another relevant limitation of the research presented in this chapter is the lack of a longitudinal perspective on children's developmental trajectories. This would require a detailed examination of changes over time in the relative performance of children at each assessment point. For instance, it may be that children of parents with a particular level or education are more or less able in catching up from slow development in a given domain at an early age, or inversely to maintain a high level or development over time (Feinstein 2003). This could also vary between boys and girls depending on whether their mothers or fathers are in a position of educational superiority vis-à-vis their partners.

CHAPTER 5. CONCLUSIONS

5.1. *Introduction*

This chapter summarises my findings about the pattern of parental educational homogamy and its impact on parenting practices and children's early development in contemporary Britain, and interprets them within the process of intergenerational transmission of inequalities in education. In doing so, the chapter highlights the main contributions and limitations of this thesis and suggests avenues for future research.

This thesis began by arguing that the acquisition of the skills that facilitate educational attainment is closely linked to parental investments in children, especially at early ages (Waldfogel 2006; Feinstein et al. 2008). It further argued that, due to the critical role that education subsequently plays for individuals' socio-economic attainment, the study of the family-based reproduction of educational success sheds light on a key component of the stratification system in industrialised societies.

The ordering of my empirical chapters reflected the causal sequence in this general model of intergenerational transmission of human capital. Chapter 2 examined the educational composition of parental couples, Chapter 3 looked at partners' childrearing attitudes and behaviours, and Chapter 4 finally explored children's early developmental outcomes. In other words, I began by characterising the pattern of parental educational homogamy in contemporary Britain and then moved on to explore its implications for children's home learning environments and, ultimately, for their cognitive and behavioural skills.

The thesis paid special attention to educational assortative mating –i.e. the partnering of individuals with similar levels of education at a higher rate than predicted by probability alone– for two reasons. Firstly, because the narrowing of gender gaps in educational attainment across cohorts leads to the prediction that new patterns of spousal resemblance in education have emerged (Kalmijn 1998; Blossfeld 2009). Secondly, because changes in the pattern of homogamy may affect the distribution across families of the resources, behaviours and values that foster children's development, given the strong relationship that parental education has with these mediating factors (e.g. Ultee and Luijkx 1990; Mare 1991; Fernandez and Rogerson 2001; Mare and Schwartz 2006; Esping-Andersen 2007).

In addition, the thesis was motivated by the concern that the conventional approach to characterising family background in stratification research falls short of capturing the current heterogeneity of family compositions and arrangements. To a large extent, the bulk of our knowledge about social mobility and social stratification is based on the experience of the mid-20th century cohorts who, by and large, experienced stable family structures and a sharp division of labour between the sexes (i.e. a stable male-breadwinner and female-carer model). The diminishing prevalence of these features of family life has led to extensive revisions of the process of intergenerational transmission of human capital. In this respect, the two most important strands of research have focused on the impact on children's outcomes of lone-parenthood (e.g. McLanahan and Sandefur 1994; Rodgers and Pryor 1998; Sigle-Rushton et al. 2005) and maternal employment during early childhood (e.g. Bianchi 2000; Goldberg et al. 2008; Verropoulou and Joshi 2009).

This thesis sought to contribute to this research agenda by investigating, instead, the implications of growing heterogeneity in the combinations of parental educational attainments in contemporary families. The key question I posed was whether the association between parental education and the factors that promote children's development operates differently depending on the degree of parental similarity in education. Specific instances of this question relate, for instance, to the pattern of mutual influence in parenting practices between partners with different levels of education, or to the role of gender in mediating this association both at the parental (i.e. hypergamy vs. hypogamy) and child levels (i.e. sons vs. daughters). The thesis is therefore an attempt to analyse the intergenerational transmission of educational success through the lens of parental similarity in education.

5.2. Summary of findings

5.2.1. Trends in parental educational attainment and educational assortative mating in Britain, 1958-2001

In Chapter 2, I analysed trends in educational attainment and educational assortative mating amongst four parental 'cohorts', namely those of the parents of children born in Britain in 1958, 1970, 1990 and 2000-01. I used data from the NCDS, the BCS, the LSYPE and the MCS to construct two analytic samples. The first sample included all parental couples with a child who is included in these datasets. The second was restricted to couples where the cohort child was the firstborn. The latter sample enhanced the comparability of my findings to those of prior research on educational assortative mating which most commonly analyses samples of newlyweds. I first examined trends in average levels of parental education and gaps between mothers and fathers since the aggregate distributions of educational attainments of men and women establish the context in which marital sorting takes place. My analyses then sought to reveal the pattern of association between parents' qualifications and its evolution over time. This was done by means of an inter-cohort comparison of absolute and relative rates of homogamy. Relative rates were obtained through log-linear analyses.

With regard to average levels of parental education, my analyses documented a consistent trend towards increasing stocks of human capital in the adult population. That is, most children in recent cohorts are being raised by parents with upper secondary and tertiary levels of schooling, in contrast to children born in the 1950s and 1970s whose parents had lower average levels of attainment. Moreover, my analyses confirmed that mothers' and fathers' average levels of education have become increasingly symmetrical from 1970 onwards, to the point that minimal gender differences existed in the MCS parental cohort.

The trend in absolute rates of homogamy revealed a large decline in the proportion of couples sharing the same qualifications. Amongst the parents of children born in 1958, about 61% of couples were educationally homogamous. Amongst the parents of children born in 1990 and 2000-01, the percentage was down to about 38%. This trend in absolute rates is largely due to the diminishing proportion of adults with minimal qualifications who composed the bulk of the marriage pool in the 1950s. More interestingly, my analyses indicated that the proportion of couples where partners are two or more attainment categories apart doubled between the parents of the NCDS and BCS children and the parents of the LSYPE and MCS children.

Relative rates of homogamy confirmed the direction of this trend after discounting the impact of structural changes in the male and female distributions of educational attainment. My log-linear analyses showed that the strength of homogamy increased between the 1958 and 1970 parental cohorts, then decreased to its lowest level with the 1990 cohort, and finally bounced back slightly with the 2000-01 cohort (cf. Figure 2.2). These findings applied to both the overall and firstborn samples of parental couples and are consistent with the results obtained using different data by Ultee and Luijkx (1990) for the earlier part of my observation window and by Halpin and Chan (2003) for the mid-1970s and mid-1990s.

I interpreted the trend in educational assortative mating in Britain as consistent with Mare's (1991) hypothesis about the relationship between the strength of homogamy and changes in the timing of school completion and marriage transitions. Mare argued that as the gap between these two events narrows, individuals' exposure to educationally heterogamous contexts tends to decrease, and that this results in increasing levels of homogamy. I compared trends in homogamy (as revealed by relative rates) and trends in the mean age at first marriage for men and women between 1950 and 2000 and observed that the 1970 peak in homogamy coincides with the lowest average ages at first marriage. Further, the data showed a sustained increase in average ages at first marriage since 1970 that fits well with the expected and observed downwards trend in the strength of homogamy. Given that the U-shaped pattern in ages at first marriage between the 1950s and the 1990s occurred in an era of sustained educational expansion, it is logical to conclude that the average time gap between school departure and marriage must have been shortest around 1970, precisely when the tendency to enter a homogamous partnership was strongest. My finding of a modest rebound of homogamy in the 1990s (but, it must be noted, remaining at lower levels than in 1970) is not at odds with the steady increase in mean ages at first marriage. The explanation for this lies in the unprecedented expansion of tertiary education in Britain during that decade, which is documented in my own descriptive analyses and elsewhere (OECD 2000). This evidence suggests that the lengthening of schooling experiences outpaced the increase in ages at first marriage during the 1990s. Therefore, the evolution of parental education homogamy in Britain between the 1950s and 1990s revealed by my analyses appears closely aligned with changes in the timing of life-course transitions in early adulthood.

5.2.2. Educational heterogamy and parenting attitudes and behaviours

In Chapter 3, I used data from the MCS to explore the educational gradient in parenting attitudes and behaviours and the patterns of mutual influence between mothers and fathers in educationally dissimilar couples. To address these questions, I applied Diagonal Reference Models (DRMs).

My findings confirmed the well-documented positive relationship between education and parenting practices. Further, they showed that this holds for both mothers and fathers in a similar manner and that, given a tendency towards spousal resemblance in education, most couples can be assumed to provide consistent parenting inputs. The novelty of my analyses, however, lies in the focus on the dynamics of parenting in educationally heterogamous couples. I found that in these couples, mothers and fathers tend to hold views that are more consistent with the mother's level of education than with the father's level of education. That is, in heterogamous couples parenting attitudes resemble more closely the values of couples where both parents have the same qualifications as the mother than the values of couples where both parents have the same qualifications as the father. Moreover, the magnitude of the adjustment towards the maternal position appears to increase with the educational distance between partners. On the other hand, I found no firm evidence that dissimilarity in parents' education leads to changes in individual parenting behaviours. Further, when I examined the relationship of both dimensions of parenting over time, I observed some convergence in partners' behaviours in cases where substantial inconsistencies in early beliefs existed.

Therefore, in the attitudinal domain my results revealed a pattern of female dominance. This is likely to follow from the continued assignment of the major parenting responsibilities to mothers and from the implicit assumption that "mothers know best" about childrearing. A noteworthy result in support of this interpretation is that the adjustment to mothers' views occurs even in cases of female hypergamy. This is not to deny the importance of paternal beliefs on the upbringing of children but simply to state that, whenever mothers and fathers tend to have diverging childrearing approaches by virtue of their different levels of education, both the mother's and the father's attitudes tend to give greater weight to the approach that can be considered characteristic of the level of education of the mother.

Moreover, my findings confirmed the positive correlation between partners' levels of education and support for the view that maternal employment during a child's early years need not be detrimental for family life and child development. In addition, the pattern of influence in heterogamous couples with respect to views on maternal employment clearly suggested that both partners adjusted towards the position associated with the mother's level of education. This adjustment occurred regardless of which partner is more supportive of early maternal employment. For instance, in cases of female hypergamy both partners showed less support for the mother combining her participation in the labour market with childrearing, and in cases of female hypogamy both partners expressed more favourable views about doing so. Therefore, I concluded that the mother's education has greater importance than the father's education in shaping the work-childrearing arrangement ultimately adopted by the couple (net of other determinants). This result is consistent with evidence of greater variation in beliefs about the impact of maternal employment across women's levels of education than across men's. My results in the attitudinal domain contradict the pattern of male dominance found by De Graaf and Heath (1992) with respect to voting behaviour in the UK and by Van der Slik et al. (2002) in child-rearing values in the Netherlands. Nonetheless, my results in Chapter 3 coincide with these studies in not lending support to the hypothesis of educational superiority or status maximisation. Hence, the evidence appears to dismiss explanations based on resource theory in the domain of parenting values.

On the other hand, the poor fit of the models predicting parenting behaviours and the lack of statistical significance of the heterogamy variables raised doubts on the validity of my framework to shed light on parents' developmental activities with children. My descriptive analyses provided confirmation of the positive relationship of education and parenting behaviours at the individual level. However, the results of the DRMs did not support the claim that the direction and degree of educational heterogamy are consequential for the quality and amount of stimulation-oriented activities that children received from their parents.

5.2.3. Educational heterogamy, gender and children's early development

In Chapter 4, I explored the relative salience of mothers' and fathers' educational attainments and the impact of parental educational heterogamy as determinants of children's early cognitive and behavioural skills. In particular, I tested the hypothesis that these intergenerational associations would be more pronounced along same-gender lines. My analytical sample of two-parent UK families with young children was drawn from the MCS, and the method employed for my analyses were Diagonal Reference Models (DRMs).

My hypotheses in Chapter 4 were derived from two competing perspectives on the importance of gender in the intergenerational transmission of educational success. On the one hand, equal parental concern for the development of sons and daughters should follow from the weakening of market incentives for different educational investments for men and women and increasing gender egalitarianism in the family context. On the other, differential treatment of children on the basis of gender is suggested by a number of studies that document the persistence of gendered parenting practices and variation in the intensity in mothers' and fathers' preferences for investment in children generally, or in boys or girls specifically.

My findings provided little or no support for the theoretical perspectives that posit either differential effects of parental education for sons and daughters or the presence of gendered parental preferences. On the contrary, my analyses did not reveal any significant interactions between the gender of children and the impact of parental levels of education (neither absolute nor relative) on children's early development. These negative results were obtained in the context of substantial gender gaps in both cognitive and behavioural outcomes at ages 3, 5 and 7; always in favour of females. I documented the magnitude of these gaps across levels of parental education and heterogamy in my descriptive analyses and confirmed the significance of the gender variable in all DRMs across outcomes and ages. However, in most models gender remained an independent predictor of children's outcomes. In other words, gender did not generally condition the association between parental education and children's skills. Moreover, the pattern of parental heterogamy in education (e.g. whether it was female hypergamy or hypogamy) had no significant impact on the development of neither sons nor daughters.

Nonetheless, there were two minor exceptions to this general pattern of results. Firstly, my analyses consistently suggested that maternal education is more salient in determining children's early development than paternal education, and that this likely reflects the fact that mothers tend to play a more active role in children's early socialisation (rather than mothers and fathers having different preferences). The finding therefore provided support for the conventional view of a stronger maternal influence. Secondly, girls' cognitive development at age 3 appeared to get a boost in families where mothers are more educated than fathers. However, this result was not observed for cognitive ability at later ages or in the behavioural domain.

Therefore, my analyses mainly yielded negative results regarding the hypotheses that parental educational attainments and educational heterogamy should affect the outcomes of sons and daughters differently under the premise that this variation would be indicative of differential treatment of children by gender. Taken together, thus, my findings in Chapter 4 suggested that in contemporary UK families, sons and daughters derive the same (dis)advantages from their parents' levels of education and that gender is largely inconsequential in mediating this intergenerational association. This appears to be in line with evidence for other industrialised societies (Jerrim and Micklewright 2011).

5.3. A general interpretation of the implications of parental educational heterogamy for the intergenerational reproduction of education

5.3.1. Main contributions

This thesis has made both theoretical and methodological contributions to the debates outlined above, which I address following the order of the empirical chapters.

My parallel analyses of trends in educational attainment and educational homogamy amongst parental cohorts in Britain in Chapter 2 provide for the first time, to my knowledge, a comprehensive picture of these two phenomena over the period that spans from the mid-1950s to the beginning of our century. For instance, relative to the most exhaustive prior study (Halpin and Chan 2003), I extended the time period under investigation to cover the 1990s. This allows critical insights into the educational makeup of contemporary UK families with young children. Furthermore, my analyses disaggregated the trend in assortative mating at different levels of the educational distribution and showed its consistency for pairings at various levels of dissimilarity. Such disaggregation of relative rates of homogamy, following the work of Schwartz and Mare (2005) in the US, had not been carried out with British data before. At the theoretical level, my findings contest claims that educational assortative mating is on the rise in industrialised societies due to the equalisation of average levels of attainment between men and women and the persistence of a strong preference to marry an equally educated partner. This prediction appears to be heavily influenced by evidence for the US case (Mare 1991; Schwartz and Mare 2005) but also by international comparisons (Blossfeld and Timm 2003). The reduction in the strength of homogamy in Britain after 1970 that my analyses revealed suggests that each country case needs to be examined in detail and, ideally, in conjunction with other demographic processes.

Research on the determinants and dynamics of parenting attitudes and behaviours in the UK is active and extensive (e.g. Feinstein et al. 2008; Kiernan and Mensah 2011). However, most empirical work looks at the practices of one parent only or relies on indices at the couple level. In this respect, my contribution in Chapter 3 was to study the implications of parental dissimilarity in education for parenting practices. This was the first empirical investigation of theoretically informed hypotheses about the effects of heterogamy using a nationally representative sample of the UK population and applying DRMs to this area of research. This had previously been done with Dutch data (Van der Slik et al. 2002) but not with UK data. Theoretically, my findings advocate analysing parenting attitudes and behaviours separately (as these two dimensions are influenced by heterogamy quite differently), but also studying their potential interactions over time.

In Chapter 4, I extended the scope of prior research on familial influences on children's outcomes, particularly with regards to the potential implications of parental heterogamy. Further, my application of DRMs represents a contribution to the literature since this statistical technique, arguably the best available method for the identification of heterogamy effects, had not yet been used on UK data with this purpose. From a substantive point of view, my findings add to a growing body of evidence on the relative unimportance of gender as a mediator in the impact of maternal and paternal education on children's skills (e.g. Marks 2008a, 2008b; Jerrim and Micklewright 2011). This suggests role-socialisation theories may be growing outdated in light of increasing gender egalitarianism in the family, especially concerning the parental treatment of sons and daughters.

In summary, the main contribution of the thesis was to provide for the first time an integrated perspective into the recent evolution of educational assortative mating in Britain and its implications for the transmission of educational success in the family.

5.3.2. General interpretation

The overarching premise that motivates this thesis is a link between the pattern of educational homogamy in one generation and educational mobility in the next generation. More specifically, the underlying concern is that assortative mating has the potential to enhance either social mobility or social reproduction depending on how it affects the distribution of the resources that promote children's success in school. Social fluidity would be enhanced when these resources become more evenly distributed across families, and social reproduction would be reinforced in the opposite scenario.

My analyses of the trend in educational homogamy presented in Chapter 2 indicate that education has lost leverage in marital selection in Britain over recent decades and that there is increasing variation in the educational makeup of parental couples. Following the argument above, the decrease in the strength of educational assortative mating has likely led to an equalisation of the families' relative capacity to invest in their children's education. Note, however, that this conclusion relies to a large extent on the assumption that the relationship between education and family resources has either remained stable or increased. To my knowledge, there is no sound evidence to suggest otherwise.

However the thesis did not remain at the level of making conjectures about the impact of changing patterns of educational homogamy. Instead, it explored the implications for children of an increasingly diverse landscape in terms of combinations of parental educational attainments. Chapter 3 was motivated by a large body of literature that contends that parenting quality is a major influence on the intergenerational transmission of human capital. I argued that education is usually identified as a key factor in shaping parenting practices, and that a body of empirical evidence about the dynamics of childrearing in educationally dissimilar couples has yet to emerge. Given the association that education has with parenting at the individual level, I posited that the direction and degree of educational dissimilarity between partners could exert an influence on their parenting values and behaviours. My results in the attitudinal domain of parenting confirmed this prediction, and the interpretation of the observed effects must be that educational heterogamy appears to have a positive impact on the quality of parenting in contemporary UK families. This is because the observed pattern of adjustment mainly takes the form of an "attitudinal upgrading", such as when fathers endorse active parenting more strongly if married to a more educated female partner. On the other hand, I found no evidence that fathers decrease their commitment to developmental parenting in the contrary case. Furthermore, I also found that it is the mother's level of attainment that has the greatest influence on decisions about work-childrearing arrangements. Given that evidence on the positive effect of maternal employment on children (via family income) outweighs evidence on its detrimental effects (via reduced time), the fact that mothers are gaining influence in parenting and labour supply decisions is arguably good news for children. Note that this conclusion is not based on the argument that preferences for investments in children differ between mothers and fathers. The evidence presented in Chapter 4 did not point in this direction. Instead, the conclusion derives from a) the main effects of the enhanced levels of education amongst mothers, and b) their pattern of influence over fathers.

The largely negative findings about the impact of educational heterogamy on children's early skills must be connected with the lack of evidence on its influence on parenting behaviours. Therefore, it appears that the framework has not proven useful for the analysis of these direct intergenerational interactions. It may be that considerations about partners' bargaining power and diverging preferences are more pertinent for the analysis of couple-level outcomes such as the division of labour in the household. Parenting behaviours and the intensity of preferences for investments in children, on the contrary, appear to be dimensions over which parents do not bargain dramatically.

Overall, my findings in this thesis qualify concerns about the increase of educational assortative mating in industrialised societies and its potential consequences for the intergenerational reproduction of inequalities in education. This is for two reasons. Firstly because educational assortative mating amongst parental couples weakened in the UK over the last decades. Secondly because I found no evidence that unequal matches in terms of parental education are consequential for children in ways that may compromise their early development.

5.3.3. Main limitations

Due to its research focus on parental homogamy, the findings reported in this thesis suffer from some limitations in their generalisability to population groups that do not fit with the model of a two-parent family with young children. These limitations are largely inherent to the nature of my research questions but must nonetheless be highlighted to qualify the interpretation of my results.

The choice of my data sources imposes the first restriction on the scope of my analyses. By drawing my analytic samples from a series of birth cohort studies, my examination of trends in educational assortative mating in Chapter 2 is limited to parental couples. This contrasts with the focus of most homogamy research on the overall population of adult couples, be they childless or not. The main reason why this limits the possibility of comparison with other studies is that differences in homogamy patterns are likely to exist between couples with and without children given the impact of education on the timing of childbearing and likelihood of divorce (Martin 2004; Harkonen and Dronkers 2006). As such, the education groups most prone to breakup in the early stages of marriage are likely to be underrepresented in a sample drawn from the population of parental couples. Nonetheless, I mitigated the impact of selective dissolution on my estimates of homogamy rates by replicating all analyses on a subsample of parents of firstborn children who closely resemble the population of newlyweds. Moreover, my focus on parental couples is consistent with my concern about intergenerational transmission of inequality.

The second limitation relates primarily to the exclusion of single-parent families from my analyses of parenting practices and children's developmental outcomes in Chapters 3 and 4. The reasons for this exclusion were a) the difficulty of measuring the couple-level variable of parental similarity in education when one of the parents is absent, and b) the argument that co-residence is a condition for the potential implications of parental educational similarity to emerge. While these reasons may be well grounded in theory and practicality, they restrict the applicability of my findings to two-parent families only. This was acknowledged at the outset in the introductory chapter of the thesis and discussed in further detail in Sections 3.3 and 4.3. The exclusion of single-parent families is problematic because family disruption weakens the process of intergenerational transmission of status (Biblarz et al. 1997). Therefore, it remains unclear whether children living with a single parent would experience any of the effects detected, for instance, with regards to the adjustment of parenting attitudes between mothers and fathers. More generally, it is possible that the absence of a parent from the child's residence alters the relative salience of both parents' level of education in shaping his or her developmental trajectory. These issues remain unexplored in this thesis. Nonetheless, growing up with two co-resident adults continues to be the normative experience for British children and I maintain that the exclusion of single-parent families limits but does not undermine the relevance of my analyses.

Connected to both limitations is the issue of the selectivity of my analytical samples. By focusing on parental couples who remain together at the time of measurement of the outcome variables, it is likely that my analyses excluded families whose levels of disagreement on a number of dimensions are higher than average (and who may have therefore divorced). Under the assumption that such lack of consonance may have been somewhat related to the partners' levels of education, it could be argued that selection forces are operating to make the detection of heterogamy effects more difficult, not less. Hence, I contend that the selectivity introduced by my criteria for sample inclusion has not contributed to my detection of educational heterogamy effects.

5.4. Avenues for further research

In this section, I outline a programme for future research which should help to provide a richer answer to some of the questions raised by this thesis. I suggest three particularly promising avenues for further work.

The first extension relates to exploiting the longitudinal nature of the birth cohort studies. In this thesis I did not take advantage of the availability of repeated observations for the cohort children and their families except in the analysis of the inter-temporal consistency of parenting attitudes and behaviours in Chapter 3. The rest of my analyses, however, were of a cross-sectional character. The introduction of a longitudinal perspective could provide, firstly, a better insight into the selectivity linked to parental educational heterogamy and marital disruption. Marital stability from baseline into later waves could be examined in order to assess the extent to which disagreement and marital conflict are associated with partners' dissimilarity in education. This may reveal another potential pathway for the association between parental heterogamy and children's outcomes, namely union disruption. In addition, the analysis of children's developmental trajectories lends itself naturally to a longitudinal research design. This would involve assessing the impact of early cognitive and behavioural skills (e.g. pre-school measurement at age 3) on later achievement (e.g. age 7 tests or teacher assessments). This type of analyses has in fact been carried out with UK cohort studies (e.g. Feinstein 2003).

The second proposed extension concerns a more detailed investigation of birth order and sibship gender composition effects (Steelman et al. 2002). As noted in Chapter 3, it is reasonable to assume that parenting dynamics in couples with more than one child change between the first and later births. For instance, adjustment in parental attitudes and behaviours may be greater after the arrival of the first child than after later births, provided that some learning has occurred or that partners have reached a different work-life balance in light of the demands of having multiple children in the household. That is, the impact of educational assortative mating on parenting practices may differ across families with varying numbers of children, or across children of different parity within the same family. The assessment of these dynamics would require separate analyses by parity. With regard to sibship gender composition, the presence of and relative balance between sons and daughters in multiple-children families is likely to influence the degree to which parenting practices are sex-typed or whether children of different genders receive the same type of encouragement. My analyses could therefore be replicated distinguishing between single children and children with siblings of the same and of different genders. While my analyses in Chapters 3 and 4 controlled for the number of children in the household, only the gender of the focal cohort child was taken into account.

Lastly, the third extension would involve analysing the impact of parental heterogamy in education on children's educational outcomes at later ages, for instance completed educational attainment in early adulthood. This would serve to test the mechanism of the intergenerational setting of attainment benchmarks proposed by some stratification researchers. That children's school continuation decisions are heavily influenced by whether their parents made these transitions themselves is a common observation in theories of status attainment. A prominent argument in this literature is that families are chiefly concerned about the avoidance of intergenerational downward mobility –i.e. the precept that children should attain at least the same level of education as their parents, if not more (Breen and Goldthrope 1997). The mechanism posited here is that parental attainments are used as a yardstick when individuals evaluate the potential costs and benefits of a given level of education. In other words, individual assessments of the value of education will differ provided that all families wish to avoid downwards mobility but not all take the same level of attainment as their reference point. As noted by Mare and Chang (2006), the argument leaves many interesting questions unresolved. For instance, attainment norms are not clearly defined in the case of educationally heterogamous couples. That is, when a child's parents have attained different levels of schooling, which parent sets the attainment benchmark - the most or the least educated? Additionally, it is unclear whether the mechanism is gender-neutral or operates along gender lines (i.e. mothers setting the benchmark for daughters, and fathers for sons). Future work may thus explore to what extent children's completed educational trajectories reflect in any systematic way the pattern of educational matching among their parents.

APPENDICES

Table A.2.1. Recoding procedures of original educational attainment variables, by level and dataset.

Level	Description	NCDS	BCS	LSYPE	MCS
1	**Below O-level**	Left school at minimum leaving age or less (14 or 15, *depending on year of birth*)	No qualifications, Left school at age 14 or less	No qualifications, GCSE grades D-E, Youth training, Skill seekers	No qualifications, GCSE grades D-G, NVQ / SVQ / GSVQ level 1
2	**O-level or equivalent**	+ 1 year of schooling after compulsory age	GCE 'O' level, SCE 'O' Grade, Certificate of Secondary Education (CSE), City and Guilds Intermediate Technical or Final *Craft Certificates, Lower* vocational training	GCSE grades A-C, Trade apprenticeship, NVQ2 or NVQ1, City and Guilds Part II or Part I	O level, GCSE grades A-C, NVQ / SVQ / GSVQ level 2
3	**A-level or equivalent**	+ 2 *years of schooling* after compulsory age	GCE 'A' level, High School Certificate (HSC), Higher Grade of Scottish Leaving Certificate (SLC) *and Certificate of* Education, Ordinary National Diploma / Certificate (OND, ONC), City and Guilds Final Technical Certificate	A levels, OND, ONC, Scottish Higher Grade, AS level, NVQ3, SYS City and Guilds Part III	A / AS / S levels, Trade apprenticeships, NVQ / SVQ / GSVQ level 3
4	**Non-degree higher education**	+ 3-4 years of schooling after compulsory age	State Registered Nurse, Certificate of Education (Teachers), Teaching Qualification (Primary/Secondary in Scotland); see note*	HE diploma, HNC, HND, NVQ4, Non-degree Teaching or Nursing qualifications	Diplomas in higher education, Professional qualifications *at degree level, Nursing* and other medical qualifications
5	**University degree**	Left full-time education after the age of 20	Left full-time education after the age of 20; see note	First degrees, Higher degrees	First degrees, Higher degrees
Survey year		1974 (Wave 3). Child aged 16	1975 (5-year follow-up). Child aged 5	2004 (Wave 1). Child aged 13/14	2000-1 (Wave 1). Child aged 9 months
Source		Parental questionnaires	Maternal self-completion questionnaire	Parental questionnaires	Parental questionnaires
Original variables		n537, n194, n195, n2396, n2397	*e189a, a0009, e198b, a0010*	w1hiqualmp, w1hiqualsp	amacqu00, apacqu00, amvcqu00, apvcqu00

*: The original BCS qualifications variable grouped degree and non-degree qualifications into a single 'University' category equating, for instance, 'High academic degrees' with 'City and Guilds Full Technical Certificates'. In order to preserve the distinction between these two levels, the cut-off is set by years of schooling instead.

Source: NCDS, BCS, LSYPE, MCS.

Table A.2.2. Percentage of homogamous, hypergamous and hypogamous partnerships, by sex, attainment and cohort. All parental couples.

		Level of attainment					
MOTHERS		[1]	[2]	[3]	[4]	[5]	**Total**
Upwards	1958	.23	.19	.22	.16	n/a	.21
	1970	.35	.39	.15	.19	n/a	.29
	1990/1	.53	.39	.30	.21	n/a	.35
	2000/1	.55	.46	.30	.21	n/a	.32
Homogamous	1958	.77	.38	.26	.32	.61	.61
	1970	.65	.39	.68	.30	.67	.56
	1990/1	.47	.35	.24	.19	.55	.37
	2000/1	.45	.30	.27	.24	.62	.38
Downwards	1958	n/a	.44	.52	.53	.39	.18
	1970	n/a	.22	.16	.51	.33	.14
	1990/1	n/a	.26	.46	.60	.45	.28
	2000/1	n/a	.23	.43	.55	.38	.30
FATHERS		[1]	[2]	[3]	[4]	[5]	**Total**
Upwards	1958	.22	.14	.13	.04	n/a	.18
	1970	.22	.19	.09	.04	n/a	.14
	1990/1	.50	.31	.25	.12	n/a	.28
	2000/1	.60	.38	.31	.19	n/a	.30
Homogamous	1958	.78	.44	.22	.29	.29	.61
	1970	.78	.47	.52	.26	.36	.56
	1990/1	.50	.40	.19	.23	.42	.37
	2000/1	.40	.41	.18	.26	.60	.38
Downwards	1958	n/a	.42	.65	.67	.71	.21
	1970	n/a	.34	.39	.70	.64	.29
	1990/1	n/a	.29	.57	.65	.58	.35
	2000/1	n/a	.21	.50	.54	.40	.32

Notes: [1]=Below O-level or equivalent, [2]=O-level or equivalent, [3]=A-level or equivalent, [4]=Non-degree higher education, [5] University degree. Entries are column percentages and add up to 100% when added by row (i.e. cohort). In all cases, the denominator for the calculation of these percentages in the total N for each analytic sample, which is shown in Tables 2.2 and 2.3.

Source: NCDS, BCS, LSYPE, MCS.

Table A.2.3. Percentage of homogamous, hypergamous and hypogamous partnerships, by sex, attainment and cohort. Parents of firstborns.

		Level of attainment					
MOTHERS		[1]	[2]	[3]	[4]	[5]	**Total**
Upwards	1958	.32	.20	.21	.15	n/a	.26
	1970	.41	.42	.19	.19	n/a	.32
	1990/1	.54	.39	.29	.21	n/a	.34
	2000/1	.60	.46	.27	.21	n/a	.30
Homogamous	1958	.68	.41	.28	.31	.65	.54
	1970	.59	.37	.68	.31	.68	.52
	1990/1	.46	.35	.25	.18	.57	.37
	2000/1	.40	.31	.27	.23	.59	.37
Downwards	1958	n/a	.39	.51	.54	.35	.20
	1970	n/a	.21	.13	.50	.32	.15
	1990/1	n/a	.26	.45	.61	.43	.29
	2000/1	n/a	.22	.46	.56	.41	.33
FATHERS		[1]	[2]	[3]	[4]	[5]	**Total**
Upwards	1958	.29	.11	.14	.02	n/a	.26
	1970	.28	.16	.11	.04	n/a	.32
	1990/1	.55	.34	.24	.13	n/a	.34
	2000/1	.67	.42	.34	.24	n/a	.30
Homogamous	1958	.71	.47	.22	.28	.27	.54
	1970	.72	.49	.47	.27	.39	.52
	1990/1	.45	.42	.20	.22	.44	.37
	2000/1	.33	.40	.20	.26	.62	.37
Downwards	1958	n/a	.42	.65	.69	.73	.20
	1970	n/a	.35	.42	.68	.61	.15
	1990/1	n/a	.25	.55	.65	.56	.29
	2000/1	n/a	.18	.46	.50	.38	.33

Notes: [1]=Below O-level or equivalent, [2]=O-level or equivalent, [3]=A-level or equivalent, [4]=Non-degree higher education, [5] University degree. Entries are column percentages and add up to 100% when added by row (i.e. cohort). In all cases, the denominator for the calculation of these percentages in the total N for each analytic sample, which is shown in Tables 2.2 and 2.3.

Source: NCDS, BCS, LYSPE, MCS.

Table A.2.4. Cross-tabulation of parental educational attainments, by cohort. Cell, row and column percentages. White parental couples only.

NCDS (N=8,425)[a]		Father					
		[1]	[2]	[3]	[4]	[5]	Total
Mother	[1]	41.06	8.02	4.06	1.82	0.42	55.37
	[2]	10.31	9.45	2.74	1.33	0.53	24.37
	[3]	3.39	2.09	2.77	1.89	0.55	10.68
	[4]	1.51	0.95	1.55	2.30	1.15	7.47
	[5]	0.20	0.12	0.14	0.37	1.28	2.11
	Total	56.47	20.63	11.26	7.70	3.93	100.00
BCS (N=14,826)		**Father**					
		[1]	[2]	[3]	[4]	[5]	Total
Mother	[1]	26.12	7.76	4.77	1.23	0.49	40.37
	[2]	5.92	10.55	6.67	2.30	1.36	26.79
	[3]	0.69	2.99	15.31	2.33	0.91	22.22
	[4]	0.59	1.01	2.23	1.98	1.25	7.06
	[5]	0.11	0.28	0.43	0.37	2.37	3.56
	Total	33.43	22.58	29.41	8.20	6.37	100.00
LSYPE (N=8,934)		**Father**					
		[1]	[2]	[3]	[4]	[5]	Total
Mother	[1]	11.09	7.98	3.71	1.86	0.87	25.51
	[2]	8.45	11.69	7.31	3.42	2.52	33.39
	[3]	2.62	4.33	3.67	2.27	2.13	15.01
	[4]	1.94	3.52	3.07	2.74	3.00	14.27
	[5]	0.76	1.22	1.90	1.44	6.50	11.82
	Total	24.85	28.73	19.67	11.73	15.02	100.00
MCS (N=10,986)		**Father**					
		[1]	[2]	[3]	[4]	[5]	Total
Mother	[1]	6.14	4.29	2.99	1.44	0.56	15.42
	[2]	6.65	9.47	7.68	4.81	2.25	30.86
	[3]	2.33	3.64	4.02	2.54	1.74	14.26
	[4]	2.15	3.59	4.15	4.38	3.61	17.88
	[5]	0.76	1.60	2.70	3.17	13.35	21.58
	Total	18.03	22.60	21.53	16.33	21.50	100.00

Notes: [1]=Below O-level or equivalent, [2]=O-level or equivalent, [3]=A-level or equivalent, [4]=Non-degree higher education, [5] University degree. [a] The large differences in the number of observations and distributions between the overall and white samples in the NCDS are linked to missing information on ethnicity for a large number of families.

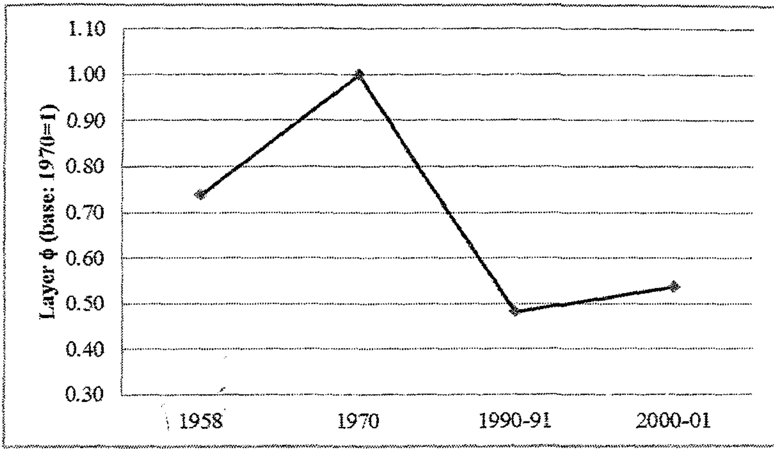
Source: NCDS, BCS, LSYPE, MCS.

Table A.2.5. Goodness-of-fit of log-linear models of association. White parental couples only (N=43,147).

A. Pattern of association	Terms	d.f.	G^2	rG^2	BIC	ID
M1: Conditional independence	[MY] [FY]	64	19,937.3	-	16,254.2	23.6
M2: M1 + Single-Diagonal	[MY] [FY] [H]	63	6,955.5	65.1	6,283.1	15.2
M3: M1 + Variable-diagonal	[MY] [FY] [V]	59	4,130.1	79.3	3,500.3	11.6
M4: M3 + Distance	[MY] [FY] [V] [D]	56	1,831.5	90.8	1,233.8	7.9
M5: M3 + Crossings	[MY] [FY] [V] [C]	57	1,859.4	90.7	1,251.1	7.9
M6: M5 + Hypergamy	[MY] [FY] [V] [C] [P]	56	1,835.5	90.8	1,237.8	7.9
M7: M1 + Quasi-symmetry	[MY] [FY] [Q]	54	1,817.4	90.9	1,241.1	7.8
B. Temporal trend	**Terms**	**d.f.**	G^2	rG^2	**BIC**	**ID**
M8: M4 * Time	[MY] [FY] [VY] [DY]	32	147.8	99.3	-193.8	1.4
M9: M5 * Time	[MY] [FY] [VY[[CY]	36	197.2	99.0	-187.0	1.7
M10: M6 * Time	[MY] [FY] [VY] [CY] [PY]	32	187.4	99.1	-154.2	1.6
M11: M7 * Time	[MY] [FY] [QY]	24	98.3	99.5	-157.8	1.0
C. Uniform difference models	**Terms**	**d.f.**	G^2	rG^2	**BIC**	**ID**
M12: Unidiff M4 pattern	[MY] [FY] [V, D, f]	59	1,321.7	93.4	692.0	6.1
M13: Unidiff M5 pattern	[MY] [FY] [V, C, f]	56	887.5	95.5	289.8	5.0
M14: Unidiff M6 pattern	[MY] [FY] [V, C, P, f]	55	884.1	95.6	297.0	4.9
M15: Unidiff M7 pattern	[MY] [FY] [Qf]	51	664.8	96.7	120.5	4.0

Notes: M=mother's education (5); F=father's education (5); Y=year/cohort (4); H=homogamy as single parameter for all diagonal cells (1); V=homogamy as different parameters for diagonal cells (5); D=absolute distance parameters (4); C=crossing parameters (4); P=hypergamy parameter (M<F); Q=quasi-symmetry parameters (11); f=layer parameter in Unidiff specifications.

Figure A.1.1. Trends in the strength of educational assortative mating amongst white couples, by parental cohort.



Notes: Layer parameters from Unidiff models positing a quasi-symmetric pattern of association between partners' education.

Source: NCDS, BCS, LSYPE, MCS.

Table A.3.1. Items included in the factor analysis for the construction of scales used as dependent variables.

Underlying concept	Items	Factor loadings		In scale
		Mother	Father	
Beliefs about the importance of parental stimulation Wave 1 (2000-01)	*"How much do you agree or disagree that… (1=Strongly disagree; 5=Strongly agree)*			
	talking, even to a young baby, is important"	.813	.728	Yes
	babies need to be stimulated if they are to develop well"	.690	.649	Yes
	cuddling a baby is very important"	.675	.596	Yes
	it is important to develop a regular pattern of feeding and sleeping with a baby"	.381	.388	No
	children need their father as closely involved in their upbringing as their mother"	.253	.357	No
	education helps you to be a better parent"	.219	.244	No
	babies should be picked up whenever they cry"	.132	.054	No
Beliefs about the impact of maternal employment Wave 1 (2000-01)	*"How much do you agree or disagree that… (1=Strongly disagree; 5=Strongly agree)*			
	a child is likely to suffer if his or her mother works before he/she starts school"	.723	.707	Yes
	a mother and her family would all be happier if she goes out to work"	.714	.784	Yes
	all in all, family life suffers when the woman has a full-time job"	.305	.338	No
Stimulation-related activities with the child Wave 3 (2006)	*"How often do you… (1=Not at all; 6=Every day)*			
	play games/toys indoors with the child"	.662	.681	Yes
	draw/paint with the child"	.617	.615	Yes
	play physically active games with the child"	.609	.599	Yes
	do musical activities with the child"	.490	.504	Yes
	tell stories to the child"	.453	.510	Yes
	read to the child"	.448	.515	Yes
	take the child to the park/playground"	.402	.459	Yes

Notes: Factor loadings from un-rotated iterated principal factors analysis. No rotation method was applied since only one factor with Eigenvalue >1.0 emerged for each set of items. Items are included in the scale if their factor loadings are >.4.

Source: MCS, Waves 1 and 3.

Table A.3.7.A. Mother scores: DRM coefficients for control variables.

Control variables	**M1**		**M2**		**M3**	
Male child	.012		.012		.012	
	.020		*.020*		*.020*	
Mother's age at child's birth	.008	**	.008	**	.008	**
	.003		*.003*		*.003*	
Father's age at child's birth	.001		.001		.001	
	.003		*.003*		*.003*	
Number of siblings	-.021	+	-.021	+	-.021	+
	.012		*.012*		*.012*	
Equivalised family income (log)	.003		.003		.003	
	.020		*.020*		*.020*	
Ethnicity: Mixed	.081		.080		.080	
	.053		*.053*		*.053*	
Ethnicity: Indian	-.269	***	-.270	***	-.271	***
	.079		*.079*		*.079*	
Ethnicity: Pakistani-Bangladeshi	-.247	***	-.247	***	-.248	***
	.064		*.064*		*.064*	
Ethnicity: Black	-.077		-.075		-.076	
	.078		*.078*		*.078*	
Ethnicity: Other	-.241	*	-.241	*	-.241	*
	.102		*.102*		*.102*	
Step-father	-.018		-.014		-.014	
	.185		*.185*		*.185*	
Cohabiting couple	-.014		-.014		-.014	
	.025		*.025*		*.025*	
N	11,361		11,361		11,361	

Notes: Standard errors in italics. ***: p <.001; **: p <.01; *: p <.05; +: p <.10.
Reference categories: Female child, White ethnicity, and Married couple.
Source: MCS, Wave 1

Table A.3.7.B. Father scores: DRM coefficients for control variables.

Control variables	**M1**		**M2**		**M3**	
Male child	.016		.015		.015	
	.020		*.020*		*.020*	
Mother's age at child's birth	.006	*	.006	*	.006	*
	.003		*.003*		*.003*	
Father's age at child's birth	.006	*	.006	*	.005	*
	.003		*.003*		*.003*	
Number of siblings	-.064	***	-.063	***	-.062	***
	.013		*.013*		*.013*	
Equivalised family income (log)	.039	*	.040	*	.039	*
	.020		*.020*		*.020*	
Ethnicity: Mixed	.035		.035		.031	
	.062		*.063*		*.063*	
Ethnicity: Indian	-.326	***	-.333	***	-.338	***
	.087		*.088*		*.088*	
Ethnicity: Pakistani-Bangladeshi	-.265	***	-.268	***	-.271	***
	.061		*.061*		*.061*	
Ethnicity: Black	-.061		-.058		-.059	
	.072		*.072*		*.072*	
Ethnicity: Other	-.355	**	-.357	**	-.359	**
	.107		*.106*		*.107*	
Step-father	-.417	+	-.407	+	-.410	+
	.247		*.244*		*.243*	
Cohabiting couple	.010		.010		.010	
	.025		*.025*		*.025*	
N	11,361		11,361		11,361	

Notes: Standard errors in italics. ***: p <.001; **: p <.01; *: p <.05; +: p <.10.
Reference categories: Female child, White ethnicity, and Married couple.
Source: MCS, Wave 1.

Table A.3.8.A. Mother scores: DRM coefficients for control variables.

Control variables	**M1**		**M2**		**M3**	
Male child	.020		.020		.020	
	.022		*.022*		*.022*	
Mother's age at child's birth	.003		.003		.003	
	.003		*.003*		*.003*	
Father's age at child's birth	-.006	*	-.006	*	-.006	*
	.003		*.003*		*.003*	
Number of siblings	-.066	***	-.066	***	-.066	***
	.013		*.014*		*.013*	
Equivalised family income (log)	.173	***	.171	***	.173	***
	.022		*.022*		*.022*	
Ethnicity: Mixed	-.032		-.032		-.029	
	.072		*.072*		*.072*	
Ethnicity: Indian	-.372	***	-.371	***	-.367	***
	.070		*.071*		*.070*	
Ethnicity: Pakistani-Bangladeshi	-.711	***	-.697	***	-.694	***
	.052		*.053*		*.053*	
Ethnicity: Black	-.111		-.098		-.097	
	.110		*.111*		*.110*	
Ethnicity: Other	-.355	**	-.344	**	-.341	**
	.107		*.107*		*.107*	
Step-father	.157		.174		.171	
	.240		*.242*		*.242*	
Cohabiting couple	.119	***	.118	***	.117	***
	.027		*.027*		*.027*	
N	10,607		10,607		10,607	

Notes: Standard errors in italics. ***: p <.001; **: p <.01; *: p <.05; +: p <.10.
Reference categories: Female child, White ethnicity, and Married couple.

Source: MCS, Wave 1.

Table A.3.8.B. Father scores: DRM coefficients for control variables.

Control variables	**M1**		**M2**		**M3**	
Male child	-.018		-.019		-.019	
	.022		*.022*		*.022*	
Mother's age at child's birth	.004		.004		.004	
	.003		*.003*		*.003*	
Father's age at child's birth	-.017	***	-.017	***	-.017	***
	.003		*.003*		*.003*	
Number of siblings	-.090	***	-.090	***	-.091	***
	.013		*.013*		*.013*	
Equivalised family income (log)	.151	***	.151	***	.152	***
	.021		*.021*		*.021*	
Ethnicity: Mixed	-.161	*	-.165	*	-.162	*
	.067		*.067*		*.067*	
Ethnicity: Indian	-.314	***	-.325	***	-.319	***
	.074		*.074*		*.073*	
Ethnicity: Pakistani-Bangladeshi	-.758	***	-.767	***	-.765	***
	.047		*.049*		*.049*	
Ethnicity: Black	-.208	*	-.208	*	-.209	*
	.100		*.100*		*.100*	
Ethnicity: Other	-.551	***	-.550	***	-.548	***
	.101		*.101*		*.102*	
Step-father	.087		.098		.098	
	.305		*.303*		*.305*	
Cohabiting couple	.068	*	.066	*	.067	*
	.026		*.026*		*.026*	
N	10,607		10,607		10,607	

Notes: Standard errors in italics. ***: p <.001; **: p <.01; *: p <.05; +: p <.10. Reference categories: Female child, White ethnicity, and Married couple.

Source: MCS, Wave 1.

Table A.3.9.A. Mother scores: DRM coefficients for control variables.

Control variables	**M1**		**M2**		**M3**	
Male child	-.047	*	-.047	*	-.046	*
	.022		*.022*		*.022*	
Mother's age at child's birth	.010	**	.010	**	.010	**
	.003		*.003*		*.003*	
Father's age at child's birth	.002		.001		.001	
	.003		*.003*		*.003*	
Number of siblings	-.182	***	-.182	***	-.182	***
	.015		*.015*		*.015*	
Equivalised family income (log)	.064	**	.062	**	.060	**
	.021		*.021*		*.021*	
Ethnicity: Mixed	-.186	*	-.186	*	-.189	*
	.087		*.087*		*.087*	
Ethnicity: Indian	-.485	***	-.487	***	-.495	***
	.087		*.087*		*.087*	
Ethnicity: Pakistani-Bangladeshi	-.613	***	-.613	***	-.620	***
	.092		*.091*		*.091*	
Ethnicity: Black	-.549	***	-.550	***	-.553	***
	.105		*.105*		*.105*	
Ethnicity: Other	-.546	***	-.543	***	-.548	***
	.141		*.141*		*.141*	
Step-father	.049		.044		.043	
	.099		*.099*		*.099*	
Cohabiting couple	-.088	**	-.087	**	-.088	**
	.034		*.034*		*.034*	
Monthly hours of market work	-.005	***	-.005	***	-.005	***
	.001		*.001*		*.001*	
N	9,844		9,844		9,844	

Notes: Standard errors in italics. ***: p <.001; **: p <.01; *: p <.05; +: p <.10. Reference categories: Female child, White ethnicity, and Married couple.

Source: MCS, Wave 2.

Table A.3.9.B. Father scores: DRM coefficients for control variables.

Control variables	**M1**		**M2**		**M3**	
Male child	-.068	*	-.069	*	-.069	*
	.028		*.028*		*.028*	
Mother's age at child's birth	.012	**	.012	**	.012	**
	.004		*.004*		*.004*	
Father's age at child's birth	.001		.001		.001	
	.003		*.003*		*.003*	
Number of siblings	-.238	***	-.237	***	-.237	***
	.018		*.018*		*.018*	
Equivalised family income (log)	.083	**	.080	**	.080	**
	.027		*.027*		*.027*	
Ethnicity: Mixed	-.039		-.039		-.039	
	.081		*.081*		*.081*	
Ethnicity: Indian	-.404	***	-.408	***	-.408	***
	.100		*.101*		*.101*	
Ethnicity: Pakistani-Bangladeshi	-.324	***	-.324	***	-.324	***
	.089		*.089*		*.089*	
Ethnicity: Black	-.387	**	-.383	**	-.383	**
	.120		*.121*		*.121*	
Ethnicity: Other	-.165		-.159		-.159	
	.137		*.137*		*.137*	
Step-father	-.286	*	-.293	*	-.293	*
	.136		*.136*		*.136*	
Cohabiting couple	-.126	**	-.126	**	-.126	**
	.044		*.044*		*.044*	
Monthly hours of market work	-.006	***	-.006	***	-.006	***
	.001		*.001*		*.001*	
N	9,844		9,844		9,844	

Notes: Standard errors in italics. ***: p <.001; **: p <.01; *: p <.05; +: p <.10.
Reference categories: Female child, White ethnicity, and Married couple.

Source: MCS, Wave 2.

Table A.3.10.A. Mother scores: DRM coefficients for control variables.

Control variables	**M1**		**M2**		**M3**	
Male child	-.053	*	-.054	*	-.054	*
	.022		*.022*		*.022*	
Mother's age at child's birth	-.021	***	-.021	***	-.021	***
	.003		*.003*		*.003*	
Father's age at child's birth	.000		.000		.000	
	.002		*.002*		*.002*	
Number of siblings	-.149	***	-.150	***	-.150	***
	.013		*.014*		*.014*	
Equivalised family income (log)	.024		.023		.023	
	.020		*.020*		*.020*	
Ethnicity: Mixed	-.086		-.087		-.087	
	.077		*.076*		*.076*	
Ethnicity: Indian	-.239	**	-.254	**	-.256	**
	.081		*.083*		*.084*	
Ethnicity: Pakistani-Bangladeshi	-.565	***	-.577	***	-.579	***
	.068		*.071*		*.072*	
Ethnicity: Black	-.344	**	-.340	**	-.341	**
	.099		*.099*		*.100*	
Ethnicity: Other	.088		.081		.079	
	.125		*.126*		*.126*	
Step-father	-.067		-.066		-.066	
	.068		*.068*		*.068*	
Cohabiting couple	-.022		-.024		-.025	
	.030		*.030*		*.030*	
Monthly hours of market work	-.004	***	-.004	***	-.004	***
	.001		*.001*		*.001*	
N	9,173		9,173		9,173	

Notes: Standard errors in italics. ***: p <.001; **: p <.01; *: p <.05; +: p <.10. Reference categories: Female child, White ethnicity, and Married couple.

Source: MCS, Wave 3.

Table A.3.10.B. Father scores: DRM coefficients for control variables.

Control variables	**M1**		**M2**		**M3**	
Male child	.153	***	.152	***	.152	***
	.022		*.022*		*.022*	
Mother's age at child's birth	-.006	*	-.006	*	-.006	*
	.003		*.003*		*.003*	
Father's age at child's birth	-.012	***	-.012	***	-.012	***
	.003		*.003*		*.003*	
Number of siblings	-.152	***	-.150	***	-.150	***
	.014		*.014*		*.014*	
Equivalised family income (log)	.050	*	.050	*	.050	*
	.021		*.021*		*.021*	
Ethnicity: Mixed	-.009		-.007		-.007	
	.072		*.072*		*.072*	
Ethnicity: Indian	-.103		-.105		-.105	
	.075		*.074*		*.074*	
Ethnicity: Pakistani-Bangladeshi	-.409	***	-.409	***	-.409	***
	.082		*.082*		*.082*	
Ethnicity: Black	-.185	+	-.180	+	-.180	+
	.102		*.102*		*.102*	
Ethnicity: Other	-.223	+	-.224	+	-.224	+
	.120		*.120*		*.120*	
Step-father	-.197	*	-.197	*	-.197	*
	.087		*.087*		*.087*	
Cohabiting couple	-.014		-.015		-.015	
	.032		*.032*		*.032*	
Monthly hours of market work	-.007	***	-.007	***	-.007	***
	.001		*.001*		*.001*	
N	9,173		9,173		9,173	

Notes: Standard errors in italics. ***: p <.001; **: p <.01; *: p <.05; +: p <.10. Reference categories: Female child, White ethnicity, and Married couple.

Source: MCS, Wave 3.

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