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Gender differences in educational aspirations and attitudes

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Non-technical summary

In recent years, the policy debate in the UK has increasingly focused on young people's educational aspirations, attitudes and expectations. It is generally expected that fostering positive aspirations towards learning can raise educational attainment particularly among children in economically disadvantaged groups with longer-term implications for productivity, poverty, wage and income inequality and intergenerational mobility. Policy interventions focused on changing expectations and aspirations are also likely to be more cost-effective than seeking to directly improve cognitive development itself. In this chapter we examine the extent to which gender differences in educational attitudes and aspirations emerge in the UK, and explore how these differences are mitigated by, or exacerbated by, a range of household and demographic characteristics.

Girls on average have been performing better than boys in GCSE exams since the late 1980s in the UK. Given the importance of education and academic attainment in defining life chances, it is crucial for policy purposes to be able to identify and therefore target population subgroups that are likely to have particularly negative attitudes to education. Understanding the individual and the family characteristics that can either mitigate or exacerbate differences in educational attitudes and aspirations of boys and girls can help identifying those groups of students who are at a greater risk of performing poorly at school.

We use data on children aged 11–15 from the British Youth Panel component of the British Household Panel Survey. Such data have been collected since 1994 and cover a wide range of domains including , for example, children's use of leisure time, their health and health-related behaviour, subjective well-being, aspirations and attitudes towards education and school, and their relationship with their families and peers.

We find that girls systematically report more positive educational attitudes and aspirations than boys even after controlling for a range of child and family-specific factors plus unobserved differences between children using panel data estimation techniques. More detailed analysis suggests the effects of gender on children's educational attitudes and aspirations differ according to parental education and parental educational attitudes, to their age and ultimately to fluctuations in the business cycle. Contrary to the predictions of social control and gender role socialisation theories, boys benefit to a greater extent than girls from living in a household with highly educated parents or where parents display positive attitudes towards education. Furthermore boys' attitudes and aspirations deteriorate at a very young age whereas girls are more sensitive to the economic climate. Our evidence suggest that policy makers can take advantage of the higher sensitivity of boys to their family background as a powerful leverage to reduce undesirable gender differences in educational outcomes as long as positive educational attitudes and aspirations have a causal effect on raising educational attainment and deterring participation in antisocial behaviours.

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Abstract: We use data from the youth component of the British Household Panel Survey to examine gender differences in educational attitudes and aspirations among 11-15 year olds. While girls have more positive aspirations and attitudes than boys, the impacts of gender on children's attitudes and aspirations vary significantly with parental education level, parental attitudes to education, child's age and the indirect cost of education. Boys are more responsive than girls to positive parental characteristics, while educational attitudes and aspirations of boys deteriorate at a younger age than those of girls. These findings have implications for policies designed to reduce educational attainment differences between boys and girls as they identify factors which exacerbate the educational disadvantage of boys relative to girls.

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1. Introduction

Large and persistent gender differences in educational attainment are well documented both in the UK and elsewhere. For example, the OECD (2010) reports that at age 15, girls score more highly than boys in reading tests in all 65 countries participating in the Programme for International Student Assessment (PISA).[1] In the UK the Department of Education reports that girls have performed better than boys in GCSE exams taken at age 16 since the early 1970s, although these differences have become particularly noticeable since the late 1980s (Broecke and Hamed 2008;).[2] In 2011, for instance, 83% of girls in England achieved at least five GCSE exams at Grades A-C compared with 76% of boys. These gender differences in GCSE performance over time in England are clearly illustrated in Figure 1. One possible source of these gender gaps in academic performance is gender-specific attitudes towards and aspirations for education (Buchmann et al. 2008). In this chapter we examine the extent to which gender differences in educational attitudes and aspirations emerge in the UK, and explore how these differences are mitigated by, or exacerbated by, a range of household and demographic characteristics. Given the importance of education and academic attainment in defining life chances, it is important for policy purposes to be able to identify and therefore target population subgroups that are likely to have particularly negative attitudes to education. Our research relates to two strands of literature. The first refers to the drivers of and importance of educational attitudes and aspirations, while the second relates to gender differences in academic attainment.

In recent years, policy debate in the UK has focused on moulding young people's educational aspirations and attitudes to help raise educational attainment (e.g. Cabinet Office 2011). Fostering positive educational aspirations, particularly among children in economically disadvantaged groups, is expected to raise attainment and have long-term implications for productivity, poverty, inequality and social mobility. Interventions to change aspirations are also likely to be more cost-effective than improving cognitive development itself (Cunha and Heckman 2007; Cunha et al. 2010), although there is limited evidence that such interventions

[1] PISA is an OECD project initiated in 1997 to evaluate educational systems around the world. Every three years, the performance of 15 year olds in reading, mathematics and science tests from participating countries is assessed.

[2] GCSEs are General Certificates of Secondary Education, which are academic qualifications awarded at age 16 in a specified subject, generally taken in a number of subjects. Performance in GCSEs largely determines the post-compulsory schooling opportunities available to the child – with attaining five GCSEs of grade A-C perceived as a key indicator of academic ability.

are successful (see Cummings et al. 2012; Gorard et al. 2012). Empirical evidence indicates positive correlations between aspirations, expectations and attainment, although the extent to which this is causal is debated (Chowdry et al. 2011; Goodman et al. 2011; Gregg and Washbrook 2011; Jacob and Wilder 2010; Khoo and Ainley 2005; Strand 2007). Differences in educational attitudes and aspirations by parental socio-economic background are large and persistent (Chowdry et al. 2011), and so targeting the educational aspirations and attitudes of young people from disadvantaged backgrounds can potentially reduce differences in school outcomes across socio-economic groups. Early interventions to improve the home learning environment during pre-school years, to improve a child's educational attitudes during primary school, and to encourage teenagers' ambitions for higher education throughout secondary school, could help attenuate the socio-economic gap in educational attainment (Gregg and Washbrook 2010). Policy initiatives in the UK to raise educational aspirations include Aimhigher, a school-based programme to promote higher education among students from disadvantaged backgrounds who live in areas of relative deprivation where participation in higher education is low.

Identifying drivers of children's attitudes and aspirations is important for a number of reasons. People attain higher levels of achievement at a particular activity if they value it more (Jessor and Jessor 1977; Wigfield and Eccles 2000), and positive attitudes and aspirations are positively correlated with subsequent attainment and education-related behaviour (Andrews and Bradley 1997; Chowdry et al. 2011; Khoo and Ainley 2005; Strand 2007). Positive educational attitudes and aspirations reduce engagement in deviant and antisocial behaviours (Hirschi 1969; Leblanc 1994; Torstensen 1990), and are inversely related with later life outcomes such as benefit receipt and early and lone parenthood among women (Edwards et al. 2001; Moore et al. 1995; Plotnick 1992). Assigning causality is problematical as unobservable factors are likely to affect both attitudes and aspirations and the outcomes of interest, and attitudes will be affected by previous academic performance (Bond and Saunders 1999; Goodman and Gregg 2010; Gorard et al. 2012; Gregg and Washbrook 2011; Jacob and Wilder 2010; Zafar 2009).

Gender differences in society are generally assigned to either nature or nurture, or to a mix of both (Marini 1990). According to the nature argument men and women differ in innate, biological and fairly time-invariant factors and for this reason show different behaviours and reactions to the same stimuli. In contrast, the nurture argument identifies the environment in

which individuals operate as the determinant of gender differences in beliefs, attitudes and behaviours. Empirical research has focused on the extent to which gender differences in, for example, competitiveness and risk aversion can explain differences in outcomes. Evidence suggests that within a single gender context (e.g. a single sex school) women are as competitive as men and no more risk averse (Booth et al. 2011; Booth and Nolen 2012; Booth and Nolen 2012). Hence gender differences appear sensitive to the environment and context, supporting the nurture argument. Gender differences in academic attainment have been related to higher returns to and lower effort costs of education for girls than for boys (Buchmann et al. 2008; Pekkarinen 2012). In fact, even though men still enjoy more positive labour market outcomes, both in terms of wage and employment probability, the wage returns to attaining an extra year of education and to higher relative to compulsory education are on average higher for women than men in the UK (Trostel at al 2002; Walker and Zhu 2003). An increase in demand for highly educated workers (Walker et al. 2001; Walker et al. 2008) and cultural changes that resulted in women getting married and having children at an older age have allowed them to fully enjoy the benefits associated with higher investments in human capital (Pekkarinen 2012). Other studies relate gender differences in academic attainment to the relatively poor behaviour of boys in the classroom (Gibb et al. 2008; Fergusson and Horwood 1997).

The importance to policymakers of gender equality in society is evidenced by legislation seeking to enforce the equal treatment of men and women at the workplace such as the 1970 Equal Pay Act, the 1975 Sex Discrimination Act and more recently the 2010 Equality Act. Understanding the relationships between young people's educational attitudes and aspirations and gender can contribute by providing grounds for specific policy intervention among children which reduce gender differences in educational attainment and investment and hence in labour market outcomes among adults. There is widespread evidence that girls have higher educational aspirations than boys (Schoon et al. 2007). They are, for example, more likely than boys to want to remain in post-compulsory education and less likely to want to leave education and enter full-time work at age 16 (Willitts et al. 2005). Research suggests that boys from low socioeconomic status families and from minority ethnic backgrounds have particularly low aspirations (Burke 2006). While these gender differences in educational attitudes and aspirations may help explain persistent gender differences in academic attainment, there is a lack of robust evidence on the role of gender in shaping educational attitudes and aspirations themselves.

In this paper we establish whether boys and girls have systematically different educational aspirations and attitudes and, furthermore, identify specific individual, household and background characteristics that either exacerbate or mitigate gender disparities in educational aspirations and attitudes. In doing so we test several established hypotheses put forward to explain gender differences in academic attainment. We find large and persistent gender differences in educational attitudes and aspirations, which are robust to controlling for a wide range of observed characteristics as well as individual-specific unobserved effects. In particular, girls report more positive attitudes to and higher aspirations for education than otherwise similar boys. These differences are large. Further analysis shows that, contrary to the predictions of gender role socialisation and social control theories, the educational aspirations and attitudes of boys are more sensitive to the home learning environment than those of girls. However, girls display more stable educational attitudes and aspirations than boys as they age and progress in the educational system, and they are more sensitive than boys to information on the business cycle.

The rest of the paper is organised as follows. First we discuss various theories related to gender differences in attitudes and aspirations. Next we introduce the data used in the research, the British Youth Panel component of the British Household Panel Survey, and describe the nature and patterns relating to the key variables of interest. Section 3 describes the estimation procedures adopted, and the specification of the models estimated, while Section 4 provides a discussion of the main results. Section 5 discusses some extensions to the core analysis. The final section summarises and concludes.

2. Theoretical background

There are various theories that predict gender differences in behaviours and hence might explain differences in educational attitudes and aspirations of boys and girls. In particular we draw on three main theories relating to gender role socialisation, social control and the investment in human capital from which we infer a number of hypotheses.

Gender role socialisation theories portray gender as a set of learned attitudes and behaviours that differ according to the individual's sex. Throughout their lives individuals operate within a social context where they observe and learn about gender roles and stereotypes and choose their gender identity. Children learn gender roles through their interactions with parents and

school teachers and through the influence of school and play material and the mass media (Marini 1990). The assimilation of gender roles can occur through imitation or through observational learning (Polavieja and Platt 2010). Once children become aware of differences in sex, they start understanding that boys and girls are distinct groups; at the same time, they receive more positive or negative parental reactions depending on whether they display behaviours appropriate for their sex group. Such feedback results in the formation of a gender identity (Fagot and Leinbach 1989) and the adoption of gender-appropriate values and codes of conduct.

According to the General Theory of Social Control individuals refrain from antisocial behaviours because they form bonds with prosocial values, prosocial people and prosocial institutions. The existence and strength of these bonds is positively related to social control which ultimately discourages people from adopting selfish and aggressive behaviours in order to pursue their primitive and hedonistic drives (Pratt et al. 2011). According to Gottfredson and Hirschi (1990) gender differences in antisocial behaviours are attributable to gender differences in early childhood and teen supervision. More specifically, girls are subject to stricter parental control than boys from a very young age which results in a higher level of self-control internalization (Fox 1977) and ultimately a lower propensity to engage in antisocial behaviours. However, gender differences in delinquency persist even after controlling for both social and self-control (Nakhaie et al. 2000).

Hence gender role socialisation theory suggests that children are socialised differently by their parents depending on their gender while social control theory suggests that parental supervision is generally higher for daughters than for sons. We therefore anticipate that the educational attitudes and aspirations of girls will be more sensitive than those of boys to specific individual, parental and household characteristics such as child's age, parental attitudes and education, parental migration, labour market status and household structure.

According to the theory of human capital, investment in education is optimal when the marginal costs of the investment equate the marginal benefits. Hence when deciding whether to pursue further education individuals need to weigh the benefits associated with a higher level of education against the costs of pursuing further education. Gender differences in investment in human capital may emerge if men and women differ in the costs they face and

in the benefits they enjoy from education.[3] The proportion of girls in higher education in the UK has outnumbered the proportion of boys since the early 1990s (Broecke and Hamed 2008), which provides grounds for suspecting that the costs and benefits of education might differ by gender. Hence the educational attitudes and aspirations of boys and girls may respond differently to any shocks to these costs and benefits, including the opportunity costs of investing in education (i.e. foregone earnings).

2. Data and descriptive statistics

Data

We investigate the relationships between educational attitudes and aspirations and gender using data from the British Household Panel Survey (BHPS), and the British Youth Panel in particular. The BHPS is a panel survey which since 1991 has (re)interviewed the same individuals annually, with interviews generally taking place between October and December of each year until 2008. The first wave was designed as a nationally representative random sample of the population of Great Britain living in private households in 1991. These original respondents and any adult co-residents have been followed and interviewed at annual intervals ever since, with information collected about their incomes, labour market status and job characteristics (if employed), social and parental background, housing tenure and conditions, household composition, education, health and many other aspects of their lives. The BHPS is unique among British datasets in having annual snapshots of people's lives over a relatively long period.

Since 1994, all children aged 11–15 in sample households have completed a self-completion questionnaire – known as the British Youth Panel (BYP).[4] This collects a range of information on, for example, children's use of leisure time, their health and health-related behaviour, subjective well-being, aspirations and attitudes towards education and school, and their relationship with their families and peers. Initially, questions were recorded onto tape and children were supplied with a personal stereo and answer booklets, later replaced with laptop computers. This has two advantages: it helped to ensure that responses were

[3] Human capital does not exclusively refer to formal education or training but to a wider set of intangible assets embedded in people that influence their future real income. In order to increase their human capital and ultimately their future earnings, people can also invest in medical care, healthier life styles or any other activity that can improve their abilities (Becker 1962).

[4] Those 15-year olds turning 16 by 1 December in the current wave are interviewed as adults rather than in the youth survey, while 10-year olds turning 11 by this date are included. More information about the BYP is available at: http://www.iser.essex.ac.uk/bhps/documentation.

confidential as other household members would not be able to interpret the answers from the answer booklets alone (the answer booklets contain only the response categories and not the questions themselves), and it also allows the child to respond to the questions at their own pace. The full range of household information from the main adult survey is also available, making this a particular rich source of data for the analysis of children's behaviour. The BYP is essentially a rotating panel, as a core group remains within the panel for a maximum of five waves while each year the 16-year olds move into the adult survey and are replaced by a new cohort of 11 year-olds. Annual sample sizes vary across years, ranging from about 750 young people between waves 4 (1994) and 7 (1997), 950 in waves 8 (1998) and 9 (1999), and 1200-1400 from wave 10 (2000) onwards.[5] Year-on-year response rates among young people have exceeded 90% (see, for example, Taylor et al. 2010).

We draw on responses to four questions in particular. To capture children's attitudes to school and education more generally, we use responses to the questions: "How much does it mean to you to do well at school? Does it mean very little, a bit, quite a lot, a great deal?" and "How important do you think it is for you to get your GCSE exams? (Standard Grades in Scotland). Is it not at all important, not very important, important, very important?" The former was asked of all 11 to 15 year olds from waves 5 (1995) to 18 (2008), while the latter was asked of all 11 to 15 year olds between waves 12 (2002) and 18 (2008). We capture children's aspirations for participating in further or higher education through their responses to the questions "Do you want to leave school when you are 16, or do you plan to go on to sixth form or college?" and "Would you like to go on to do further full-time education at a college or University after you finish school?"[6] The former was asked of all 11-15 year olds between wave 4 (1994) and wave 18 (2008), while the latter was asked of children aged 13 to 15 between waves 12 (2002) and 18 (2008).

The BYP data have several advantages for investigating the relationships between young people's educational attitudes and aspirations and gender. Firstly they collect a number of measures relating to different aspects of the educational process directly from young people in a way that is likely to minimise biases in responses caused by factors related to the

[5] These variations in sample size are the result of the changing nature of the BHPS sample. Waves 8 and 9 include the low income sample from the British component of the European Community Household Panel (ECHP), while waves 10 onwards include the Wales, Scotland and Northern Ireland boost samples. All our descriptive statistics are weighted to allow for the changing sample composition.

[6] Age 16 is the youngest age at which children in the UK are legally entitled to leave school.

interview process. Secondly, they collect rich contextual information from the child, the parents, and the household, allowing a range of factors to be taken into account in identifying the effects of interest. Thirdly, they are panel data, allowing the use of panel data estimation methods which are able to incorporate unobserved individual or family-specific effects which may otherwise bias the effects of interest. This is important given that previous research has suggested that (unobserved) personality traits are correlated with academic motivation and achievements (Child 1989; De Raaad and Schouwenberg 1998; Entwistle 1972; Heaven 1990; Heaven et al. 2002). Finally, the 20-year period covered by the data allow us to identify average effects across multiple cohorts of children rather than for a single cohort.

The drawback of these data is the lack of information on revealed academic ability, and previous research has found a strong correlation between previous and subsequent educational attainment (e.g. Chowdry et al. 2011) and between prior attainment and future expectations, aspirations and attitudes (Bond and Sanders 1999; Gregg and Washbrook 2011; Jacob and Wilder 2010; Zafar 2009). The absence of information on revealed ability would only distort any gender effect if the access of young people and their families to information on attainment varied systematically with a young person's gender, which is very unlikely. Even though information on previous educational attainment might have gender-specific effects on educational attitudes and aspirations, access to the information is independent of gender. Furthermore, we estimate panel data models which incorporate time-invariant individual-specific unobserved heterogeneity which capture unobserved ability.

We also have no information about the school attended by the pupil, and school characteristics may have an important impact on educational aspirations and attitudes.[7] Chowdry et al. (2011), for example, report that school characteristics explain 16% of the differences in test scores between children from richer and poorer families. Again however, we would need boys and girls to systematically attend schools with different school characteristics for this to bias our estimates.

Descriptive statistics

[7] The BHPS collects information from those aged 16 and above on the type of school most recently attended, but this may not equate to the type of school attended when completing the youth questionnaire. At waves 12 and 17, parents of children aged 11-15 were asked about the type of school each child attends. Estimating specifications including this variable for this subset of children produces results consistent with those presented here.

We initially provide some descriptive evidence on gender differences in educational attitudes and aspirations. Table 1 summarises attitudes to school and GCSEs by gender and reveals that young people generally show extremely positive attitudes towards education. For example 60% of 11-15 year olds report that doing well at school means a great deal to them while 77% think that getting GCSEs is very important. Even though gender differences are small they are statistically significant, and girls have more positive attitudes than boys. For 62% of girls doing well at school means a great deal whereas only 59% of boys share the same view. Furthermore 77% of girls think that gaining their GCSE qualifications is very important compared with 76% of boys. Small gender differences persist in negative educational attitudes. For 7% of boys doing well at school meant a bit or very little to them, compared with 5% of girls. Overall girls not only tend to report more positive educational attitudes than boys but they tend to report less negative educational attitudes too.

In Table 2 we summarise educational aspirations by gender. Again we find that young people generally have high aspirations for further education. 87% of 11 to 15 year olds do not intend to leave education at the age of 16 and 75% of 13 to 15 year olds express a desire to go to university. Substantial and statistically significant gender differences emerge. For example 17% of boys want to leave school at the minimum legal age while 30% do not aspire to go to university. Girls are more likely than boys to aspire to higher education. Only 9% of 11 to 15 year old girls would like to leave school at age 16 while 19% of girls age 13 to 15 do not express a desire to go to university.

Comparing these aspirations to the actual participation rates in post-compulsory education indicates the presence of the aspirations-achievement paradox (Kao and Tienda 1998). The proportion of young people expressing a desire to remain in full-time education is consistently higher than actual attendance rates (Gutman and Akerman 2008, Jacob and Wilder 2010). For example 81% of girls in our sample report wanting to go to university, while according to the Higher Education Initial Participation Rate (HEIPR) for the academic year 2008/2009 the participation rate of 17 year old women was 51%.[8] Similarly 70% of boys in our sample declare their desire to attend university compared with an actual participation rate of 40%. The aspirations-achievement paradox suggests that raising educational

[8] The HEIPR is the probability that a 17 year old will participate in higher education by age 30 given the age-specific participation rate. Source: Department of Business Innovation and Skills (www.bis.gov.uk/assets/biscore/statistics/docs).

aspirations among young individuals will have only a very small effect on attendance rates in higher education after the age of 16. Despite this, maintaining high aspirations and expectations is important as evidence shows that even though high expectations might not translate into high attainment, low expectations generally translate into low attainment, particularly among boys of immigrant families (Burke 2006).

The longitudinal nature of the BHPS and the rotating panel feature of the BYP allow us to observe both how children's educational attitudes and aspirations change over time and how they evolve as children grow older and progress through secondary school and approach the end of compulsory education at age 16. Figure 2 plots the proportions of children to whom it means a great deal to do well at school and for whom it is very important to get GCSE qualifications by gender and over time. A number of patterns emerge: the proportion of girls for whom doing well at school means a great deal constantly rose during the late 1990s and fell through the early 2000s, reaching a peak of 74% in 1999, falling to 55% in 2004 and stabilising at 58% in 2008. The proportion of boys for whom doing well at school means a great deal has been constantly falling from an initial level of 66% in 1994 to 52% in 2008. A small and persistent gender gap is apparent except for 2006 when the proportion of boys for whom doing well at school means a great deal was 57% compared with 55% of girls. The small gender gap in the importance of getting GCSEs also persists over time, with about 77% of girls and 75% of boys reporting it to be very important each year. These high proportions probably reflect a general awareness of the importance of attaining compulsory education qualifications either in securing employment at age 16, or to gain entry into higher education. The larger gender differences in aspirations also persist over the sample period. Figure 2 shows that boys are consistently 10 percentage points more likely than girls to want to leave school at 16 (20% do so compared with 10% of girls). Similarly boys are 10 percentage points less likely than girls to want to go to university (70% do so compared with 80% of girls).

Figure 3 plots educational attitudes and aspirations by age and gender, pooling BYP data over time. Again important patterns emerge, as the figure suggests that gender differences increase as children age. In particular the educational attitudes and aspirations of boys tend to deteriorate by more than those of girls as they become older. For instance, 63% of 11 year old boys report that doing well at school means a great deal to them compared with 65% of girls aged 11. By age 15 only 54% of boys declare that doing well at school means a great deal

compared with 60% of girls. Similarly at age 11 75% of boys and 74% of girls report that taking GCSEs is very important, while by age 14 76% of boys and 80% of girls report the same positive educational attitudes. This proportion falls among boys and girls at age 15 (to 75% and 77%). Educational aspirations show a similar pattern with age. The proportion of children who wants to leave education at age 16 initially falls between the ages of 11 and 12 for both boys and girls, and then increases as children approach age 16, and by more for boys than girls. For example, roughly 18% of boys and 9% of girls report wanting to leave school after compulsory education at age 11 and this falls to 17% and 9% at age 12. By age 15 this proportion increases to 22% for boys and 11% for girls. Finally the aspirations of boys and girls for higher education diverge more dramatically with age. For example 69% of 13 year old boys report wanting to go to university and this falls to 66% among 15 year old boys. In contrast 78% of 13 year old girls declare wanting to pursue higher education, and this increases to 84% of 15 year old girls.

Hence children generally exhibit more positive attitudes and aspirations at younger ages. This is consistent with previous evidence suggesting that students adjust their educational aspirations to information acquired about their own ability as they pass through secondary school (Gutman and Akerman 2008). More specifically younger children tend to be more optimistic about their future while older children have a more realistic vision of their educational potential both in terms of their academic ability and of the costs and benefits associated with progressing into further education (Kao and Tienda 1998). In addition to this, gender differences, as predicted by social control and gender role socialisation theories, persist. Even though young students' educational attitudes and aspirations deteriorate with age, girls tend to report more positive attitudes and higher aspirations than boys and this is especially true after age 13. Social control theories suggest that due to tighter parental supervision, girls on average perform better at school than boys which translates into more positive educational attitudes and aspirations. This is particularly evident when comparing gender differences in willingness to attend higher education.

In what follows we examine the extent to which these gender and age specific trends are robust to controlling for a range of individual, household and parental background characteristics in a multivariate framework.

3. Estimation strategy

Model estimation

Our research question focuses on how young people's educational attitudes and aspirations differ between boys and girls, and our strategy to identify this is to exploit the panel nature of the BYP data. The estimation of panel data models which allow for time-invariant individual-specific unobserved characteristics is important in this context, as previous research has suggested that (unobserved) personality traits are correlated with academic motivation and achievements (Child 1964; De Raaad and Schouwenberg 1996; Entwistle 1972; Heaven 1990; Heaven et al. 2002). Failure to take such factors into account in estimation is likely to bias the estimated coefficients.

We assume that at a point in time t a young person, i, has an underlying, unobserved propensity to hold positive attitudes and aspirations towards education, denoted as $P_{i,t}^{*}$. This can be expressed as a function of range of observed child ($X_{i,t}$) and family-related ($F_{i,t}$) characteristics, the prevailing economic climate ($U_{r,t}$) and the unobserved (time-invariant) ability of the child (v_i). Specifically, the unobserved propensity to report a positive attitude to education is:

$$P_{it}^{*} = X_{it}\alpha + F_{it}\beta + U_{rt}\gamma + \varepsilon_{it} \quad (1)$$

$$\varepsilon_{it} = w_{it} + v_i \quad (2)$$

where α, β and γ are vectors of coefficients to be estimated, $i = 1,...,n$, $t = 1,...,T$. A young person reports a positive educational attitude or aspiration when his propensity crosses a threshold (zero in this case), that is, if $P_{it}^{*} > 0$ and =0 otherwise. By assuming the unobservable individual-specific heterogeneity is time-invariant, we decompose the error term ε_{it} into the individual-specific unobservable effect, v_i, and random error w_{it}.

We treat v_i as random, and also assume that the w_{it} are normally distributed and independent of the observed characteristics for all i and t, and estimate random effects models. One limitation of this framework is that it assumes that the time-invariant unobserved individual-specific effect (v_i) is independent of the observable characteristics. This is quite unrealistic here as, for example, we might expect young people with higher levels of unobserved ability to have parents with higher levels of educational attainment, to have more positive attitudes to education and to live in regions with lower levels of unemployment. In this case, the estimated coefficients

will pick up some of the effects of the unobservable v_i. To avoid this problem, we relax the assumption that v_i is independent of the observable time-varying characteristics in X_{it}, F_{it} and U_{rt}. Following Mundlak (1978) and Chamberlain (1984), we model the dependence between v_i and the observable characteristics by assuming that the regression function of v_i is linear in the means of all the time-varying covariates. This can be written:

$$v_i = a_1 + \overline{X}_i a_2 + \overline{F}_i a_3 + \overline{U}_r a_4 + \eta_i \quad (3)$$

We assume that η_i is independent of the X_{it} and w_{it} for all i and t, a_1 is the intercept and $\overline{X}_i$, $\overline{F}_i$ and $\overline{U}_i$ refer to the vector of means of the time varying child and family-related covariates and the region-specific unemployment rate for individual i over time. Equation (1) therefore becomes:

$$P_{it}^{*} = X_{it}\alpha + F_{it}\beta + U_{rt}\gamma + \overline{X}_i a_2 + \overline{F}_i a_3 + \overline{U}_r a_4 + \eta_i + w_{it} + a_1 \quad (4)$$

$i = 1,...,n$, $t = 1,...,T_i$, which is equivalent to the random effects probit with additional regressors.[9]

The disadvantage of this framework is that the individual specific unobserved effect may still be correlated with one or more of the time invariant observed characteristics, resulting in biased and inefficient estimates. As robustness checks we also estimate sibling fixed effects (or conditional) logit models. These sweep away the effects of any family or household characteristics which are constant across siblings, and have the advantage of allowing the unobserved family-specific effect to be arbitrarily correlated with observed characteristics in it X_{it}, F_{it} and U_{rt}.[10]

The estimation procedure in (4) allows us to identify average gender effects on the educational attitudes and aspirations of 11-15 year olds. Our theoretical framework and discussion in section 2 highlighted various mechanisms that suggest these average effects may hide heterogeneity across population subgroups. We investigate these heterogeneous gender

[9] We have also estimated probit models which explicitly recognise that responses to the educational attitudes and aspirations questions are likely to measure an underlying latent disposure to learning, and hence be correlated with each other. Estimates from these models are consistent with those presented here, and so are omitted for brevity.

[10] Estimates from sibling fixed effects models are generally consistent with those from the random effects models. Sample sizes inevitably fall due to the lack of variation across siblings in their educational attitudes and aspirations. Results are reported in tables 3FE-8FE in the APPENDIX.

effects by estimating a series of models including interaction terms between gender and other observed characteristics.

Model specification

To isolate the true impact of gender on educational attitudes and aspirations, we control for a range of child- and family-specific observed characteristics in our models, following pointers from economic theory and previous research. Economic theories of parental investment suggest that parents invest in their child's education as they care about their future wellbeing (Becker and Tomes 1986). Families with lower incomes will be less able to invest optimal amounts into their children's education or may be prevented from providing their children with an appropriate learning environment (Carneiro and Heckman 2002; Mayer 1997). Furthermore parental income has been shown to have significant impacts on educational attainment and explain the persistence of disadvantage across generations (Shavit and Blossfeld 1993), while parental wealth and socioeconomic status is inversely correlated with children's educational aspirations and expectations (Chowdry et al. 2011; Ermisch et al. 2001; Gregg and Washbrook 2011). We therefore include controls for parental income (a binary variable taking the value one if the child is in a household in the bottom quintile of the gross household income distribution at time *t*) and parental socioeconomic status and wealth (binary variables capturing whether or not the child lives in a workless household and housing tenure at time *t*). It is also important to control for the educational attainment of the child's parents, as there is a wide literature on the intergenerational transmission of cognitive abilities (Anger and Heineck 2010; Black et al. 2009; Bjorklund et al. 2009). We include a binary variable indicating whether or not the child has at least one (resident) parent with a university degree. Factors such as parental income, employment, wealth and education are likely to determine the home and school environments that they choose for their children. We do not assign any causal interpretation to the estimated effects of these controls as such variables are likely to capture wider processes operating within families. For example more able parents are more likely to both have higher incomes and to raise more cognitively developed children through better parenting, greater preference for educational investments, and/or genetic links in cognitive ability. Therefore rather than assigning causality, we acknowledge that these controls are capturing important determining factors (for example any impact of parental education could be due to parenting styles adopted rather than the education level attained itself).

A number of other household characteristics are included in the models, such as the number of siblings, whether or not the child is currently living in a lone parent household, and the age of the child's mother. These capture other household dynamics and environments that may influence the child's attitudes to schooling either directly or indirectly. We also control for the child's age.[11] There is an acknowledgement in the literature that children's educational aspirations and attitudes partly reflect their perceptions of the costs and benefits of education and schooling and any constraints faced, which develop as they age (Gutman and Akerman 2008).

There is evidence that young people from ethnic minorities have higher educational aspirations (Strand 2007), but that their parents may not have the information necessary to help these children achieve (Powney et al. 1998). Also teachers may lower the expectations of particular ethnic minority groups (Strand 2007). BHPS data contain information on ethnicity, however sample sizes are too small in the BYP sample to separately identify each group and it is not really acceptable to simply differentiate between white British respondents and the remainder because the residual category hides large and genuine diversity in behaviour between ethnic minority groups (National Equality Panel 2010). We instead classify young people according to whether their parents arrived in the UK after age 15 on the grounds that this is a more reasonable way of identifying disadvantage in terms of the educational system. Parents who arrived after age 15 had their compulsory schooling outside of the UK and, for most, English was not learnt during childhood.

Finally, in order to account for the opportunity cost of education, we make use of an external dataset to obtain information on labour market characteristics. More specifically, we derive regional unemployment rates as a proxy for the business cycle using data from the UK Labour Force Survey (LFS). The LFS is a nationally representative household survey which collects data on a range of individual and household characteristics, focussing in particular on employment status, education, and job characteristics. It has been collected quarterly since 1992, and we pool quarterly data within calendar years to calculate annual gender-specific ILO unemployment rates among young people aged 16-24 in each metropolitan region of the UK in each year. We match these to the BYP data by gender, region and year of interview.

[11] The BHPS collects information on risky behaviours. Nevertheless including these controls is problematic since the adoption of risky behaviours is likely to be endogenous and jointly determined with reported educational attitudes and aspirations.

All models also include year and region fixed effects. We present summary statistics for these controls in the Appendix.

4. Results

Estimates of the average gender effects on educational aspirations and attitudes, together with the estimated coefficients on other covariates, are presented in Tables 3 and 4. Table 3 presents estimates from models with educational attitudes as the dependent variables, while Table 4 presents estimates from models with educational aspirations as the dependent variables. These are all from random effects models which allow for correlation between the individual-specific unobserved terms and the time-varying observable characteristics. We first discuss estimates from Table 3. In the first set of estimates in this table, the dependent variable takes the value 1 if doing well at school means a great deal and 0 otherwise, while in the second set it takes the value 1 if getting GCSEs is perceived as being very important and 0 otherwise.[12] We also report marginal effects calculated at the sample means. In all models positive coefficients indicate that the relevant variable is associated with a more positive attitude to schooling while negative coefficients indicate a more negative attitude. We initially discuss estimates from the model where the dependent variable is the importance of doing well at school.

The estimated coefficient on the variable identifying whether or not the child is a girl is positive and statistically significant at the 1% level. Hence we find that girls are more likely than boys to report a positive attitude to school when controlling for other individual, household and background characteristics as well individual-specific unobserved characteristics such as ability. The marginal effect indicates that, all else equal, girls are almost 6 percentage points more likely than boys to report that doing well at school means a great deal. This is a relatively large effect, with only age, household employment status and parental migrant background having larger impacts. It is also consistent with previous research which found that girls display more positive attitudes towards working hard at school since they are less likely to be excluded from their peer groups, as opposed to boys who tend to be ostracised by their peers if they show positive educational attitudes and achieve positive results (Warrington et al 2000).

[12] We have also estimated ordered probits and random effects ordered probits that explicitly account for the ordered nature of the original variable. Estimates from such models are consistent with those presented here.

The estimated coefficients on the other controls reveal other important patterns which we describe below. For example, children aged 11 are 7 percentage points more likely to report that doing well at school means a great deal than an otherwise similar 15 year-old. This effect can be explained through a higher level of awareness about one's own educational ability and about the associated benefits and costs of schooling which develop with age. Less academically successful children may lose interest in education when receiving negative signals about their ability. The estimated coefficients on the socio-economic status variables are also in line with previous evidence. Generally children from less advantaged households are less likely than those from more advantaged households to state that doing well at school means a great deal to them. More specifically, living in a workless household on average decreases the probability of reporting highly positive attitudes to school by 8.6 percentage points relative to living in a household where at least one parent is employed. The coefficient on the regional youth unemployment rate is in line with previous evidence that positive attitudes to school are counter cyclical (Taylor and Rampino 2013). A one percentage point increase in the regional rate of unemployment among 16 to 24 year olds increases the probability of a child reporting that doing well at school means a great deal by 0.9 percentage points. Even though this effect seems small, the youth regional unemployment rate between 1994 until 2008 ranges from a minimum of 8% to a maximum of 28%.[13] Hence the discouraged worker effect (reflected in positive attitudes to education) produced by the differences in economic climate could be substantial. Finally, children whose parents arrived in the UK after the age of 15 have a significantly higher probability than those with parents exposed to the UK education system to report that doing well at school means a great deal, by 25 percentage points at sample means. This may reflect the fact that migrants tend to be positively selected and this may be transmitted to their children. A number of previous studies document how immigrant parents tend to display higher than average aspirations for their children to obtain educational qualifications as a means of social and occupational mobility (Kao and Tienda 1995; Strand 2007; Willitts et al. 2005). This may increase their children's educational attitudes.

The next set of estimates in Table 3 are from the model where the dependent variable takes the value 1 if getting GCSEs is perceived as very important and 0 otherwise. These estimates

[13] According to LFS data, the lowest youth unemployment rate was recorded at 8% in the South East in 2000 whereas the maximum was 28% in the Inner London metropolitan area in 1995.

again indicate that girls are significantly more likely to report positive attitudes to education than boys. In particular, girls are on average 3 percentage points more likely than boys to report that taking GCSE exams is very important to them. The estimated coefficients on other variables again reveal other important relationships. For example, 14 year-olds are on average 3.5 percentage points more likely than 15 year-olds to report that GCSEs are important. This may reflect the fact that 15 year olds have more information about their likely GCSE performance and consequently may be more likely to downplay their importance. The estimates also suggest that children place more importance on GCSEs when unemployment rates are high – the coefficient is positive and statistically significant. This provides further evidence for the opportunity cost and discouraged worker arguments which suggest that children view education more positively when the perceived probability of finding a job and the expected income outside of education are both low.

Estimates in Table 3 show that girls have more positive attitudes to school and education than otherwise similar boys. In Table 4 we examine whether such gender differences emerge in relation to children's educational aspirations. In the first set of estimates, the dependent variable takes the value 1 if the child reports wanting to leave school at age 16 and 0 otherwise. In these models, positive coefficients indicate that the child does not aspire to remain in education (and has low aspirations) while a negative coefficient indicates that the child does aspire to remain in education past compulsory schooling (and has higher aspirations). The effect of gender on the probability of wanting to leave education at age 16 is large and statistically significant. In particular, girls are 7 percentage points less likely than otherwise similar boys to want to leave education at the minimum compulsory schooling age. This is consistent with both the previous literature (Khoo and Ainley 2005; Gutman and Akerman 2008) and with actual behaviour as revealed in the HEIRP which shows that larger proportions of girls than boys remain in education post 16.

Other factors emerge as significant correlates of aspirations for participation in post-compulsory education. As for educational attitudes age is important. We find that 15 year-old children are more likely to want to leave education at age 16, with a probability some 1.5 to 2.0 percentage points higher than 12-14 year olds. This probably reflects the acquisition of new information relating both to the costs and benefits of remaining in education and to the opportunities available. Parental education is also an important factor contributing to children's aspirations – those with parents educated to degree level are 5 percentage points

less likely to report wanting to leave education at 16 than those with less educated parents. This is likely to reflect the home environment, culture towards education and parental attitudes. We also find that children with migrant parents who were not exposed to the UK educational system have more positive educational aspirations, being some 4 percentage points less likely to want to leave school at 16 than those with parents who did progress through the UK system. This is likely to reflect the positive selection of migrants together with more positive aspirations towards education and hopes for their children that migrants hold.

The subsequent column in Table 4 reports estimates from models of aspirations towards higher education, where the dependent variable takes the value 1 if the child reports wanting to attend university and zero if they do not want to go to university. Positive (negative) coefficient estimates imply that the covariate is associated with a higher (lower) probability of wanting to go to university. In these models sample sizes are smaller because the question was only asked of 13-15 year olds from 2002 onwards. The effect of gender on the aspiration for pursuing higher education is again large and statistically significant. Girls aged 13 to 15 are 15 percentage points more likely to report they want to go to university than otherwise similar boys. Parental education also plays an important role in shaping children's aspirations. Living in a household in which at least one of the parents attained a degree or higher level of education increases the child's aspirations for university by 15 percentage points. These effects are likely to reflect different learning environments, culture of learning and parental styles and aspirations of each group. Children whose parents arrived in the UK after the age of 15 have a significantly higher probability than those with parents exposed to the UK education system to report that they want to go to university by 16 percentage points at sample means. Children of immigrants, especially if the latter are positively selected, tend to show particularly high educational aspirations, although evidence suggests that differences across ethnic groups also exist (Kao and Tienda 1998).

The results from these multivariate models provide strong evidence that both the educational attitudes and aspirations of girls and boys are different. In particular, girls consistently report more positive attitudes to education and higher educational aspirations than otherwise similar boys. This is consistent with much previous research. Girls report more positive attitudes to school and education than boys (Khoo and Ainley 2005; Gunzelmann and Connell 2006), they admit their intent to proceed beyond compulsory education (Kao and Tienda 1998; Khoo

and Ainley 2005; Jacob and Wilder 2010) and actually participate more than boys in higher education (Khoo and Ainley 2005; Pekkarinen 2012). A number of hypotheses have been put forward to explain these gender differences. For example, theories of social control state that women are exposed to higher normative restrictions than men and for this reason have higher standards for good behaviour (Gottfredson and Hirshi 1990). According to Fox (1977) even at very young ages girls are encouraged to show more passive and controlled conducts than boys in order to comply with what he refers to as the "nice girl" construct. Women and girls internalise this construct to the point where their aspirations coincide with the control level the society is willing to exert on them. Hence the fact that girls are more likely than boys to report that doing well at school means a great deal, or that getting GCSEs is very important, reflects the fact that they have been brought up to display more responsible and socially acceptable behaviours. Gender differences in educational aspirations are also consistent with social control theory. This implies that greater educational expectations among girls are fostered by higher parental control for daughters (Feliciano and Rumbaut 2011). Under tighter parental and social supervision girls develop more responsible educational attitudes which can foster better educational attainments and ultimately higher educational aspirations.

However thus far we have estimated gender effects averaged across the sample as a whole. These may differ across population subgroups, according to a range of hypotheses suggested by the literature on gender gaps in academic attainment. For policy purposes it is important to understand what factors either mitigate or exacerbate these gender differences. We do this by estimating a series of models which include interaction terms between gender and a range of key covariates.

Investigating heterogeneous gender effects

So far we have found strong evidence of gender differences in educational attitudes and aspirations. We next investigate the extent to which these differences vary across other child and family characteristics. Since educational attitudes and expectations are strongly correlated with subsequent attainment (Khoo and Ainley 2005; Strand 2008; Chowdry et al. 2011), identifying characteristics associated with narrowing and expanding gender differences in educational attitudes and aspirations will help guide policy makers concerned with gender educational attainment gaps. Investigating heterogeneous gender effects allows us to determine, for example, which sub-groups of boys display the least positive educational

attitudes and the lowest educational aspirations, which is fundamental for the design of more efficient policies.

We allow gender differences to vary by parental education, parental attitudes, cultural differences, household structure, labour market exposure, costs of education and child's age based on relevant theories and hypotheses described previously. Following social control and gender role socialisation theories we might expect, for example, that girls and boys react differently to similar learning environments which could ultimately translate into developing different educational attitudes and aspirations. More specifically we expect girls to be more responsive than boys to parental education since daughters are subject to stricter parental supervision (Fox 1977; Feliciano and Rumbaut 2005; Gottfredson and Hirschi 1990).[14]

Interactions with parental education

We initially introduce into the model interaction terms between gender and parental level of education (whether or not at least one parent has a university degree) with estimates presented in Table 5. As previously, all models are estimated using random effects probit models with additional regressors. Our estimates indicate that gender effects on children's educational attitudes and aspirations differ depending on the educational level of their parents. These results are not consistent with the hypothesis that girls respond more positively to parental education than boys, as differences in educational attitudes between boys and girls only emerge for children for whom neither parent has a university degree. Hence boys benefit more than girls from having highly educated parents in terms of their educational attitudes.

The first column of Table 5 presents estimates from the model where the dependent variable takes the value 1 if it means a great deal to the child to do well at school, and zero otherwise. Girls with at least one parent with a university degree are on average 7 percentage points more likely to report that doing well at school means a great deal relative to similar boys for whom neither parent has a degree (the reference category). Girls for whom neither parent has a university degree are almost 2 percentage points more likely to report that doing well at school means a great deal than otherwise similar boys with similarly educated parents.

[14] We have also estimated models including interactions between gender and whether the child lives in a household where both parents migrated to the UK after age 15, where neither parents work, whether the child comes from a single-parent household and whether the household has an income in the bottom 20% of the income distribution. Estimates show that girls report more positive educational attitudes and higher educational aspirations than boys and that the attitudes and aspirations of boys are relatively constant across differences in these characteristics.

However parental education has no statistically significant impact on the probability of boys reporting a very positive attitude to school – the estimated coefficient on having a highly educated parent is positive (0.045) but not statistically significant from zero. The bottom section of the table summarises results from Wald tests of equality of coefficients. These show that we cannot reject the null hypothesis that boys and girls with highly educated parents have the same probabilities of reporting that doing well at school means a great deal. However, we do reject this hypothesis for boys and girls with less educated parents, where girls have more positive attitudes than boys. Furthermore, the Wald tests indicate no differences in the sizes of the effects by parental education for either gender group.

The next column presents estimates from models where the dependent variable takes the value 1 if the child reports that it is very important to get GCSEs, and zero if they report that it is not at all important, not very important or important. Results are nearly identical to the ones obtained for the previous outcome. More specifically girls for whom at least one parent has a university degree are 6 percentage points more likely to report that taking GCSEs is very important relative to otherwise similar boys for whom neither parent has a degree. Furthermore girls with less educated parents are 1.6 percentage points more likely than similar boys to report that taking GCSEs is very important. Hence girls report more positive attitudes to GCSEs than boys among those with both highly educated and less highly educated parents. As in the previous model, the Wald tests of equal coefficients reveal no significant size differences in the estimates except for boys and girls with less educated parents.

The third column of Table 5 presents estimates from the model where the dependent variable takes the value 1 if the child wants to leave school at age 16, and zero otherwise. Overall a more stimulating learning environment, proxied by parental educational attainment, encourages teenagers to stay in education at age 16 but differences in magnitude emerge by gender. More specifically, a boy for whom at least one parent has a degree is 5.8 percentage points less willing to leave school at age 16 relative to a similar boy for whom neither parent has a degree. A girl living with highly educated parents is 6.4 percentage points less willing to leave school at age 16 than an otherwise similar boy for whom neither parent has a degree, while a girl for whom neither parent has a degree is 7.3 percentage points less likely to want to leave education at age 16 than an otherwise similar boy. These differences are statistically significant as indicated by the Wald tests. Boys with less educated parents tend to have the

lowest aspirations for post-compulsory education, while the aspirations for post-compulsory education among girls are negatively affected by parental education, although the difference in the marginal effects is very small. Boys, however benefit the most from having highly educated parents in terms of their aspirations for post-compulsory education. These results contradict our hypothesis that girls, who tend to be under higher parental supervision, are more responsive to parental characteristics than boys.

The last column presents estimates from models where the dependent variable takes the value 1 if the child reports that he wants to go to university, and zero otherwise, and these clearly replicate the same pattern observed for the previous outcome. Children with highly educated parents are more likely to have university aspirations themselves relative to those with less educated parents, by 15 percentage points among boys and 5 percentage points among girls (0.206-0.157). Girls with less educated parents are 16 percentage points more likely to have university aspirations relative to otherwise similar boys, and in fact have a similar probability of aspiring to university than an otherwise similar boy with at least one highly educated parent. Girls from highly educated households are most likely to have university aspirations and are 21 percentage points more likely to report they want to go to university than otherwise similar boys living in households where neither parents have a university degree. The Wald tests reported at the bottom of table 5 indicate that the differences in the estimated coefficients are all highly statistically significant.

Overall we find that parental education has only small, positive impacts on the educational attitudes of boys and girls. Girls in general report more positive educational attitudes than boys with similarly educated parents, although differences in the sizes of coefficients for boys and girls in highly educated households are on the margins of statistical significance. These estimates do not confirm our hypothesis based on social control and gender role socialisation theories which predict that girls will be more sensitive to parental characteristics than boys. Instead, more highly educated parents may provide a more learning based home environment which benefits the children irrespective of their gender.

Educational aspirations are more strongly correlated with parental education. Again, girls in general have higher educational aspirations than boys with similarly educated parents. Boys for whom neither parent has a university degree on average have the lowest educational aspirations, while girls with highly educated parents generally have the highest. These

estimates however, are also not consistent with the hypothesis that girls are more highly influenced than boys by parental characteristics. We hypothesised that, since daughters tend to be under stricter parental supervision than sons, they would be more inclined to follow positive family role models or to display more responsible behaviours relative to sons. Instead estimates suggest that boys benefit relatively more than girls from a stimulating home learning environment in terms of educational aspirations. Hence it is essential to pay particular attention to teenage boys in less educated households when trying to target educational attainment disadvantages through educational aspirations.

Interactions with parental attitudes to education

We next include interactions between the child's gender and the attitudes to education of the child's parents. At waves 12 and 17 (2002 and 2007), parents of children aged 11-15 were for each child asked (1) "How important do you think it is for 'child' to complete his/her GCSE level/Standard Grades exams? Is it very important, important, not very important, not at all important?"; (2) "And how important do you think it is for 'child' to stay on and complete his/her A level/Highers exams? Is it very important, important, not very important, not at all important?"; and (3) "Would you personally like to see 'child' going onto university or college when they finish/finished their schooling?". We interpret responses to these questions as permanent, time invariant measures of parental attitudes to education, and so allocate the responses to each observation for the relevant child.[15] A child is identified as having parents with positive attitudes to education if at least one parent reports it is very important that the child completes their GCSEs, complete their A level exams or would like to see the child go to university, as appropriate.[16] We include these as interactions with gender, with estimates presented in Table 6.[17] Our results provide evidence against our initial hypothesis based on gender role socialisation and social control theory that girls would be more responsive to parental influence than boys.

[15] It may be argued that parental attitudes will reflect the revealed ability of the child and so will evolve as the child ages. However in further analysis (not shown) we find that parental attitudes are independent of child age at date of interview, suggesting that all else equal parents of younger children (for whom information on ability will be limited) have the same attitudes as those of older children (for whom more information on ability will have been revealed). Furthermore, we find that parental attitudes to education are stable both across children and over time. For example about 90% of parents with two children aged 11-15 in 2002 report the same aspirations for both, while 80% of parents with children aged 11-15 in both 2002 and 2007 report the same aspirations in both periods.

[16] A-Level exams are typically taken at the end of two years of study at age 18, and represent the university entrance-level qualification.

[17] These models are restricted to data from 1998-2008 as responses to the parental attitudes questions are conditional on having a child aged 11-15 in 2002 or 2007.

The first column presents estimates from models where the dependent variable takes the value 1 if the child reports that it means a great deal to do well at school and zero if it means very little, a bit or quite a bit. The reference category for our estimates is boys living in a household where neither parents view GCSEs as important. Gender differences emerge in these models. More specifically, a girl from a household where neither parent believes that GCSEs are very important is on average 24 percentage points more likely to declare that doing well at school means a great deal than an otherwise similar boy. However boys benefit to a greater extent than girls from positive parental educational attitudes: if at least one of the parent in the household views GCSEs as important then they are on average 29 percentage points more likely to report that doing well at school means a great deal to them relative to boys for whom neither parent views GCSEs as important. In contrast, having at least one parent who views GCSEs as important increases the probability that a girl reports doing well at school means a great deal by 9 percentage points relative to when neither parent views GCSEs as important (32.7 – 24). Hence boys whose parents do not view GCSEs as important are on average the least likely to declare that doing well at school means a great deal. This is confirmed by the Wald tests reported at the bottom of Table 6. No gender differences emerge for children with at least one parent thinking that GCSEs are important (a p-value of 0.128). This contradicts our initial hypothesis that girls would be more responsive to parental characteristics than boys. In fact, according to social control and gender role socialisation theories parents tend to supervise daughters more than sons especially when they have very traditional gender role values (Feliciano and Rumbaut 2005). Consequently girls are generally under higher parental pressure and this tighter parental supervision from a very young age results in daughters achieving better educational outcomes than boys. Our estimates suggest that parents with positive educational attitudes may exert similar parental supervision on sons and daughters. However among children for whom neither parent views GCSEs as important, girls have significantly more positive attitudes to school than boys (a p-value of 0.026).

The next column presents estimates from models where the dependent variable takes the value 1 if the child reports that it is very important to get GCSEs, and zero if they report that it is not at all important, not very important or important. Our reference category is the same as previously: boys for whom neither parent thinks that GCSEs are important. These estimates are similar to those from the previous model. In particular, positive parental

attitudes towards GCSEs are more important for boys than girls. Girls are equally likely to report that getting GCSEs as very important, irrespective of the attitudes of their parents. The Wald tests indicate that for girls the interaction terms are not statistically different from each other (a p-value of 0.107), and girls are 37 percentage points more likely to view GCSEs as very important than boys for whom neither parent views GCSEs as important. Parental attitudes towards GCSEs are more important for boys. Boys with at least one parent who views GCSEs as important are 35 percentage points more likely themselves to view GCSEs as very important than boys for whom neither parent views GCSEs as important. Again these findings are not consistent with our hypothesis based on social control and gender role socialisation theories, which indicate girls would be more responsive to parental characteristics given that daughters are on average under tighter parental control than sons.

The third column of table 6 reports estimates from models where the dependent variable takes the value 1 if the child declares he wants to leave school at age 16, and zero if they instead want to go on to further education. Here we interact gender with parental attitudes towards the importance of A level exams and our reference category corresponds to boys living in households where neither parent thinks it is very important for his/her child to complete A-level exams. Since the estimated outcome is the probability of wanting to leave education after compulsory schooling negative coefficients are a sign of higher educational aspirations. Estimates indicate that if at least one parent views A-level exams as important then the probability that the child wants to leave school at age 16 is lower for both boys and girls. More specifically, girls with at least one parent who views A-levels as very important are on average 18 percentage points less likely to want to leave school at 16 than a boy for whom neither parent thinks A-levels are very important. Boys with parents with positive attitudes towards A-levels are 14 percentage points less likely to want to leave education at age 16. Girls with parents who view A-levels as very important are 13 percentage points less likely to want to leave school at 16 than an otherwise similar boy. The Wald tests indicate that girls are less likely than boys to want to leave school at age 16 irrespective of parental attitudes to A Levels, while boys and girls with parents who view A levels as very important are less likely to want to leave at 16 than those with parents who do not view A Levels as very important

In the final column of table 6 we report estimates from models where the dependent variable takes the value 1 if the child reports wanting to go to university, and zero otherwise. Here we

interact gender with parental attitudes towards university. Boys for whom neither parent exhibits positive university aspirations represent our reference category and have the lowest probability of wanting to go to university. Girls with at least one parent who wants them to go to university are 56 percentage points more likely to want to go to university than an otherwise similar boy living in a household where neither parent wants him to go to university. Having at least one parent with positive educational attitudes increases the chances of a 13 to 15 year old boy wanting to go to university by 47 percentage points relative to a boy whose parents do not wish him to pursue higher education. The Wald tests for equality of coefficients reveal that the university aspirations of boys are more positively affected than those of girls by having a parent with positive aspirations. This is not consistent with theory that suggests that girls are more receptive of parental characteristics since they are generally under higher parental supervision than boys. In contrast to our previous evidence, we do not observe a statistically significant difference between boys and girls in having parents with less positive attitudes (although note the smaller sample sizes here). Hence the gender difference among children in university aspirations is driven by differences in the extent to which boys and girls respond to the aspirations of their parents.

Overall our evidence indicates that although girls have more positive educational attitudes than boys, the latter benefit to a greater extent from positive parental attitudes. This may be because parents with more positive educational attitudes supervise and monitor their children more closely, independently from the child's gender, than parents with less positive educational attitudes and generate a more positive home-learning environment. Our evidence relating to educational aspirations is not consistent with social control and gender role socialisation theories. The educational aspirations of girls are slightly less responsive to parental attitudes than those of boys, even though on average both girls and boys benefit from having at least one parent who would like them to go to university. The fact that we find large, positive and significant effects on the positive parental attitudes and aspirations indicators for boys has important policy implications. For example, it suggests that it is possible to improve the educational attitudes and aspirations of boys in particular by improving the educational attitudes and aspirations of parents. Although we have also found parental education to be important this cannot be easily influenced by policy initiatives. However designing specific policies aimed at improving parental educational attitudes and aspirations for their children is more practical and, according to our estimates, will have a positive impact on educational attitudes and aspirations of boys in particular. As the literature

suggests that educational attitudes and aspirations are important drivers of educational attainment, raising children's attitudes and aspirations via the attitudes and aspirations of their parents may help to both boost educational attainment in general and reduce the gender gap in attainment.

Interactions with age

We next investigate whether gender effects on children's educational attitudes and aspirations vary according to their age. We might expect, for example, that boys and girls develop their educational attitudes and aspirations at different ages if there are gender-specific rates of maturity and responsibility development (Buchmannet al. 2008). For example, according to social control theories, daughters are subject to tighter parental control. Moreover girls are taught and encouraged to be quieter, more passive and more controlled than boys even as infants (Fox 1970). Consequently girls may develop more positive educational attitudes and higher educational aspirations at a younger age than boys, and maintain them as they are consistent with family expectations and societal norms for women. We examine this by interacting gender with age, with estimates shown in Table 7. Again these models are estimated using random effects probit models with additional regressors. We find evidence of gender-specific age effects in models of both educational attitudes and aspirations.

The first column of Table 8 presents estimates from the model where the dependent variable takes the value 1 if it means a great deal to the child to do well at school, and zero otherwise. The reference category in each model is represented by boys at age 15. What emerges is that independently of their gender, children are more likely to report that doing well at school is very important at younger ages. In fact 11 year old girls and boys are respectively 13 and 9 percentage points more likely than similar 15 year old boys to display positive educational attitudes. In addition Wald tests confirm that the magnitudes of the coefficients at age 11 are higher than those estimated for older ages for both genders. However for girls, all ages have more positive attitudes to education than a 15 year old boy, but this is true for boys only until age 12. More specifically from age 12 until age 15 girls are on average between 7 and 9 percentage points more likely than 15 year old boys to report that doing well at school is very important. In addition Wald test results do not identify significant differences in the magnitudes of the coefficients suggesting that by age 12 the probability of girls reporting that doing well at school is very important stabilises. In contrast the educational attitudes of boys deteriorate when they reach age 13. This decline might be related to their key stage 2 results.

In fact if boys achieve lower scores than girls at Key Stage 2 they might adjust their ability beliefs downward which could negatively affect their educational attitudes.

The next column presents estimates from models where the dependent variable takes the value 1 if the child reports that it is very important to get GCSEs, and zero if they report that it is not at all important, not very important or important. Our reference category is the same as previously: 15 year old boys. Estimates again reveal important gender patterns. Coefficients are statistically significant only for girls, and boys do not adjust their educational attitudes with age. Their probability to report that GCSEs are important does not vary with age. This result is confirmed by Wald tests which show no significant difference in coefficient sizes for boys. Contrary to what we found in the previous model, the educational attitudes of younger girls are not statistically different from those of 15 year old boys. On the other hand, 13 year old girls are 7 percentage points more likely to report that GCSEs are important than 15 year old boys. Furthermore this persists until age 15. Even though the reported marginal effects vary with girls' age, Wald tests indicate no significant size differences in the estimated coefficients. Hence 13 to 15 year old girls are on average between 5 and 8 percentage points more likely than 11 to 15 year old boys to report that GCSEs are very important. Again boys display the lowest levels of educational attitudes whereas girls recognise the importance of GCSEs qualifications as they approach key-stage 3 and GCSE tests. Boys do not realise the importance of GCSEs until it is too late, which is confirmed by statistics showing that the gender educational attainment gap narrows at A-levels.[18]

The third column of table 8 reports estimates from models where the dependent variable takes the value 1 if the child declares he wants to leave school at age 16, and zero if they instead want to go on to further education. Our reference category corresponds to 15 year old boys. Since the estimated outcome is the probability of wanting to leave education after compulsory schooling negative coefficients are a sign of higher educational aspirations. From our estimates we can infer that girls are on average 6 percentage points less likely to want to leave school at age 16 than similar 15 year old boys. This is statistically significant and holds for each age category, and is supported by Wald tests. Hence irrespective of their age girls are always 6 percentage points more likely to report they want to stay in education after age 16

[18] According to Andrew Hall, director general of AQA exam board, gender gaps in GCSEs results might be related boys and girls maturing at different rates, as gender differences at A Level are marginal (http://www.bbc.co.uk/news/education-14661746). However we believe that boys who obtain A-level qualifications are a particularly selected group of boys who probably cared about their GCSEs results too.

than 15 year old boys. The interactions between age and gender for boys reveal that boys between 11 and 14 years old are on average between 2 and 3 percentage points less likely to want to leave school at 16 than similar 15 year olds. Thus 15 year old boys have the lowest educational aspirations.

In the final column of table 8 we report estimates from models where the dependent variable takes the value 1 if the child reports wanting to go to university, and zero otherwise. Information on university aspirations was only available for children between age 13 and 15 and so sample sizes are smaller. As for each of the models described so far 15 year old boys are the reference category. The most striking result from our estimates is the fact that none of the interaction terms between gender and age is statistically significant for boys implying that the aspirations for higher education do not evolve as boys grow older. On the contrary, the aspirations of girls to go to university become more positive as they age. More specifically 13 year old girls are 12 percentage points more likely to want to go to university than 15 year old boys. This increases to 14 percentage points at age 14 and to 16 percentage points at age 15. Wald tests confirm that girls are overall more likely than boys to want to go to university, and that their aspirations for higher education increase with age.

Thus we find that the educational attitudes of girls are more positive and more stable than those of boys. Those of boys deteriorate as they age. This gender pattern may be related to how boys and girls socialise. More specifically we witness how homosocial preferences have different effects for males and females (Lipman-Blumen 1976; Booth 2009; Warrington et al. 2000). The fact that girls socialise with girls and boys socialise with boys during their teenage years accentuates gender characteristics even further (Favara 2011). Since girls tend to be subject to tighter parental control, the fact that they spend most of their time with other girls produces a positive peer-effect which results in more positive educational attitudes. On the contrary, since boys tend to be under less parental supervision and mainly socialise with other boys, they tend to be negatively affected by their peers at school. It is very common among boys to adopt a very sluggish attitude towards education both as a consequence of lower attainment and as a necessity to be accepted by their own peers (Warrington at al. 2000; Gunzelmann and Connell 2006). This may explain why the educational attitudes of boys deteriorate at a younger age than those of girls.

Girls also have higher aspirations than boys at all ages and such gender differences in

aspirations persist across ages. On the other hand aspirations for university among boys are not only lower than among girls but also do not evolve as they age. Fumagalli (2013) found evidence that the educational aspirations of boys are more sensitive to low test scores than those of girls'. Hence when boys obtain a negative evaluation their aspirations are negatively affected and if this event occurs at a younger age it might compromise their educational aspirations quite early in life. For these reasons targeting boys from a very young age should be a main goal for policy makers if they are concerned with gender gaps in educational attainment and participation. Providing young boys with a suitable role model able to help them realize the benefits associated with high educational attainment can potentially close these gender gaps in educational aspirations.

Interactions with indirect costs of education

We next include interactions between gender and the youth regional unemployment rate. The higher incidence of women in higher education may be related to gender differences in either the costs or benefits associated to the investment in human capital. According to the theory of human capital (Becker 1962) returns to education consist of the future earnings associated with a specific level of schooling. Evidence is mixed for the UK but in general the returns to education among women are greater than (or at least no smaller than) than those among men (Trostel at al 2002; Walker et al. 2003). The costs of education are threefold, relating to effort, direct, indirect and costs. The effort costs of education are those related to the student's ability level. Higher ability individuals need to exert a lower level of effort to attain a given educational attainment relative to lower ability students. Even though there is no strong evidence of gender differences in ability, girls outperform boys at school. These differences have generally been ascribed to a higher likelihood to engage in antisocial behaviours and disruptive conduct in the classroom among boys (Gottfredson and Hirshi 1990; Fergusson and Horwood 1997; Gibb et al. 2008). Unfortunately no specific measures of ability or classroom behaviour are available within the BHPS and we are not able to identify gender differences in effort costs of education. Direct costs of education can generally be proxied by tuition fees which are not gender specific and so unlikely to be a source of gender differences in participation in higher education.[19] The indirect costs of education are related to foregone

[19] Even though gender differences in university fees do not exist, it is possible that parental financial resources might have gender-specific effects on children's educational aspirations and attitudes. For instance, a girl living in a less affluent household with traditional gender values might be discouraged from her parents to pursue higher education but the opposite might be true for her male sibling who is viewed as a future bread winner. We tested this using both random and fixed effects specifications in which we allowed gender differences to vary

earnings (the opportunity costs of education). Once reaching legal school leaving age students are faced with the choice of either acquiring further human capital or entering the labour market and seeking work. The opportunity costs of education will be highly correlated with the prevailing labour market conditions. Gender differences in the opportunity costs of education will emerge if one gender is more heavily affected than the other by fluctuations in the business cycle, which is particularly true for occupations characterised by high levels of gender segregation (Abrahamson and Sigelman 1987; Langton and Konrad 1998). We use information on the prevailing youth unemployment rate to capture the opportunity costs of education, with estimates presented in Table 8. During economic downturns the unemployment rate increases making it more challenging to find and keep a job. This is especially true for young people entering the labour market for the first time. Discouraged worker theory predicts a positive relationship between youth unemployment rates and the probability of staying in school after compulsory education and potentially with educational aspirations and attitudes.

Our estimates suggest that the business cycle has gender-specific effects on educational attitudes and aspirations. The first column of Table 8 reports estimates from the model where the dependent variable takes the value 1 if it means a great deal to the child to do well at school and zero otherwise. The coefficient estimate for boys is not statistically significant, and so fluctuations in the unemployment rate have no impact on the educational attitudes of boys. Girls, on the other hand, respond to the business cycle in a way consistent with the discouraged worker hypothesis. A one point increase in the regional youth unemployment rate increases the probability that a girl reports that doing well at school means a great deal by 1.1 percentage points. Wald tests show that the sizes of the effects for boys and girls are significantly different.

The following column displays results on the estimation of the model where the dependent variable takes the value 1 if the child reports that it is very important to get GCSEs, and zero if they report that it is not at all important, not very important or important. A one percentage point increase in the youth regional unemployment rate increases the probability that a girl reports that taking GCSEs is very important by 1.6 percentage points, and the likelihood of boys to report more positive educational attitudes by 1.3 percentage points (significant at the

across household income through an interaction between child's gender and household income. However the interactions were not statistically significant.

10 percent level). The Wald test confirms that girls are more responsive than boys to business cycle fluctuations.

The third column of Table 8 presents estimations for the model where the dependent variable takes the value 1 if the child wants to leave school at age 16 and zero otherwise. Negative coefficient estimates are a sign of a positive effect on educational aspirations. A one point increase in the regional youth unemployment rate reduces the probability that a boy wants to leave school at age 16 by 0.1 percentage points, which is not statistically significant. However for girls a 1 percentage point increase in the unemployment rate raises the probability that a girl wants to stay in education at age 16 by 1 percentage point. The Wald test confirms the higher responsiveness of girls to the macroeconomic climate.

The last column of Table 8 reports estimates from the model where the dependent variable takes the value 1 if the child says he wants to go to university and zero otherwise. A one percentage point increase in the regional youth unemployment rate has no effect on the probability that a 13 to 15 year old boy reports he wants to go to university. For girls it increases the probability by 1.4 percentage points (significant at the 10 percent level). Hence the business cycle has little effect on the aspirations for university of 13 to 15 year olds. This might be because the macroeconomic climate at the time of interview is not an important factor in the decision to pursue higher education at some point in the future.

Thus we find that only girls are responsive to the business cycle when reporting their educational attitudes and aspirations. As predicted by discouraged worker theory, girls display more positive educational attitudes and higher educational aspirations when the opportunity costs of education fall. A possible explanation for why boys seem indifferent to business cycle fluctuations could be misplaced confidence relating to traditional gender roles. Boys may wrongly believe that they will find a job because of their traditional bread winner role within the household, and underestimate the importance of the economic climate in evaluating their labour market opportunities. Girls may be more aware of their potential labour market disadvantage and so adjust their educational attitudes and expectations in response to negative macroeconomic shocks.

5. Conclusions

In this paper we have investigated the effect of gender on young people's educational attitudes and aspirations using panel data from the BYP, covering the period 1994-2008. These data allow us to estimate models that take into account individual-specific unobserved effects, which are important in this context. Our first observation is that, on average, young people have very positive educational attitudes and aspirations. For example larger proportions of young people report wanting to stay on in education post-16 and wanting to attend university than actually do so. This indicates that low aspirations are not an issue per se, and that further improving educational aspirations in this age group is unlikely to have a substantial impact on subsequent educational choices.

In the raw data, we find that 11- 15 year old boys and girls report different levels of educational aspirations and attitudes. Girls tend to view their school work, the importance of GCSEs, participating in post-compulsory schooling and attending university more positively than boys. Furthermore, these findings generally hold in econometric models that control for a range of child- and family-specific characteristics and year and region indicators. This is consistent with theories of gender role socialisation and social control according to which boys and girls are socialised differently by their parents. More specifically, daughters are subject to stricter parental supervision as well as higher normative control and hence tend to engage in behaviours that are considered as appropriate and desirable by the society including displaying and reporting positive educational attitudes and aspirations.

More detailed analysis suggests the effects of gender on children's educational attitudes and aspirations differ according to parental education and parental educational attitudes, to their age and ultimately to fluctuations in the business cycle. In particular we find that even though the effect of parental education on attitudes to schooling and to the importance of GCSE examinations does not vary by gender, its impacts on children's educational aspirations do. Contrary to expectations based on gender role socialisation and social control theories that parental background is more important for girls than boys, we find that the educational aspirations of boys are more positively affected by parental education than those of girls. A similar pattern emerges when relating children's attitudes and aspirations with those of their parents. Although girls display more positive educational attitudes and higher educational aspirations than boys, they benefit less than boys from parents with positive attitudes.

These findings have clear policy implications. If improving educational attitudes and

increasing educational aspirations are believed to positively affect educational attainment and discourage teenagers from engaging in deviant behaviours, then designing policies to improve the educational attitudes of parents of boys coming from disadvantaged areas can reduce the gender gap in educational attainment. Moreover, targeting parental educational attitudes is likely to be more feasible and effective than trying to increase parental education of boys and girls in secondary school.

Our evidence highlights the need for early intervention for teenage boys when promoting positive educational attitudes and aspirations. In contrast to girls, the educational attitudes of boys deteriorate after age 12, while their aspirations do not improve with age. These gender specific age patterns may be related to peer effects, and if so intervention programmes introducing tutors with higher education for boys may improve their educational attitudes and aspirations. Moreover our evidence does not support single sex schools, as boys should be able to socialise with girls of the same age and background who on average display more positive educational attitudes and aspirations.

Finally, according to our estimates only girls adjust their educational attitudes and aspirations in response to the economic climate. Girls react positively to increases in youth unemployment which is consistent with the opportunity cost of education and the discouraged worker arguments: girls view education more positively when the perceived probability of finding a job and the expected salaries are low. Boys however appear unresponsive to the business cycle. This might reflect misplaced confidence where they believe they will be able to find a job independently from the economic climate. Policies targeting boys with more information on the benefits from investing in education will increase their awareness about the consequences of an unfavourable youth labour market, which may improve their educational attitudes and aspirations and consequently their educational attainment.

These findings have clear policy implications. If positive educational attitudes and aspirations have a causal effect on raising educational attainment and deterring participation in antisocial behaviours, then policy makers should target appropriate interventions on boys. In particular, implementing appropriate policies aimed at maintaining positive educational attitudes and aspirations towards boys and their parents in neighbourhoods and schools where a high proportion of the population have low qualifications can potentially reduce the gender gap in educational attitudes and aspirations and eventually the gender gap in educational attainment.

Creating and promoting a culture where boys appreciate and understand the value of education as a means to improve their life chances is key to assure their motivation does not fade as they progress through secondary school. Policy makers can take advantage of the higher sensitivity of boys to their family background as a powerful leverage to reduce undesirable gender differences in educational outcomes.

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Figure 1. Percentage of School leavers achieving 5 or more GCSE/O/CSE grade A/A* to C: Department of Education 1963- 2011

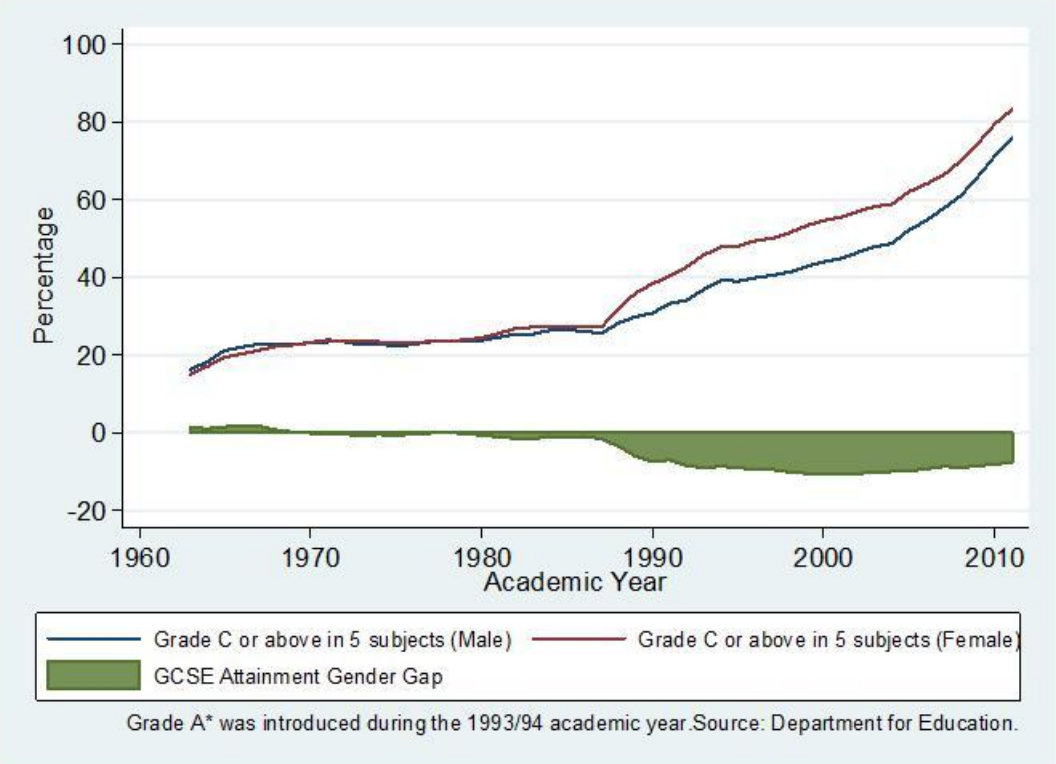

Table 1. Attitudes to schooling among 11-15 year olds by gender: BHPS 1994 - 2008

	How important is for you to do well at school?			How important is for you to get GCSE exams?		
	Boys	Girls	Both	Boys	Girls	Both
Very little/not at all	1.5	1.0	1.2	0.6	0.7	0.7
A bit /not very	5.5	4.2	4.9	1.7	1.3	1.5
Quite a lot/important	34.0	33.0	33.5	21.3	20.8	21.1
A great deal/Very important	59.0	61.9	60.4	76.4	77.2	76.8
N observations	8,041	7,828	15,869	4,514	4,460	8,974

Notes: Column percentages. Weighted young person's weights. Gender differences statistically significant at the 1% level.

Table 2. Attitudes to further education among 11-15 year olds by gender: BHPS 1994 - 2008

	Wants to leave school at age 16	Would like to go to university
Boys	17.2	69.6
Girls	8.6	81.1
Both	12.9	75.2
N observations	14,036	5,203

Notes: Weighted young person's weights. Gender differences statistically significant at the 1% level.

Figure 2. Educational aspirations and attitudes among 11-15 year olds by gender over time: BHPS 1994-2008

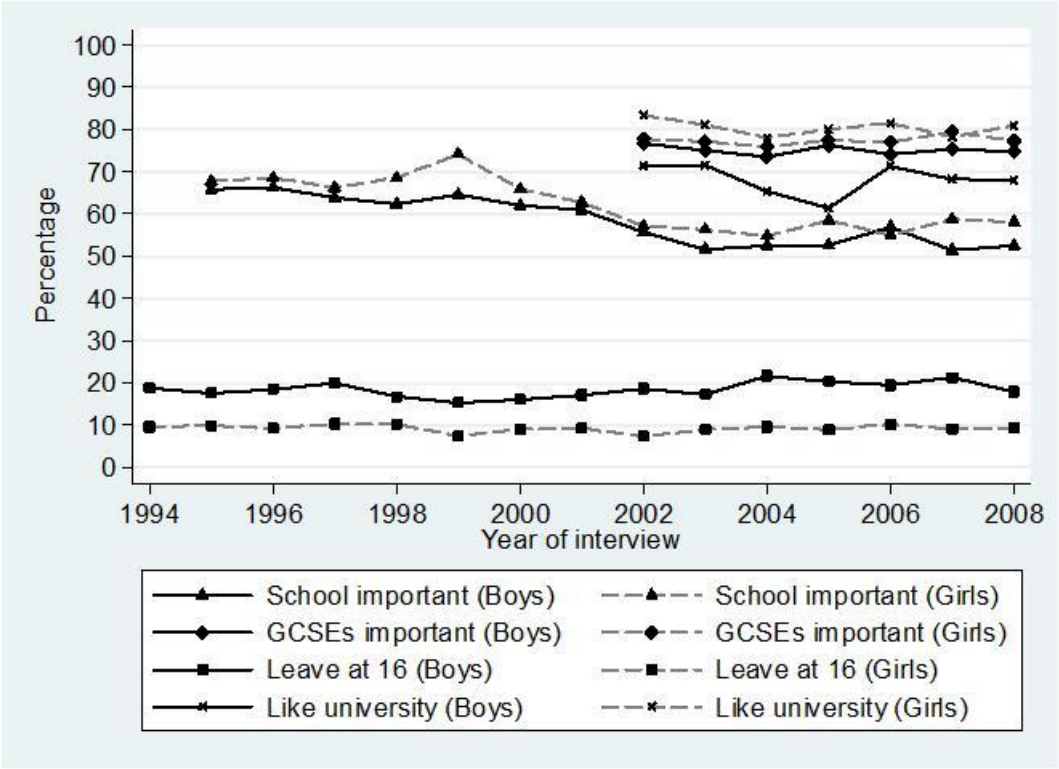

Figure 3. Educational aspirations and attitudes among 11-15 year olds by gender over age: BHPS 1994-2008

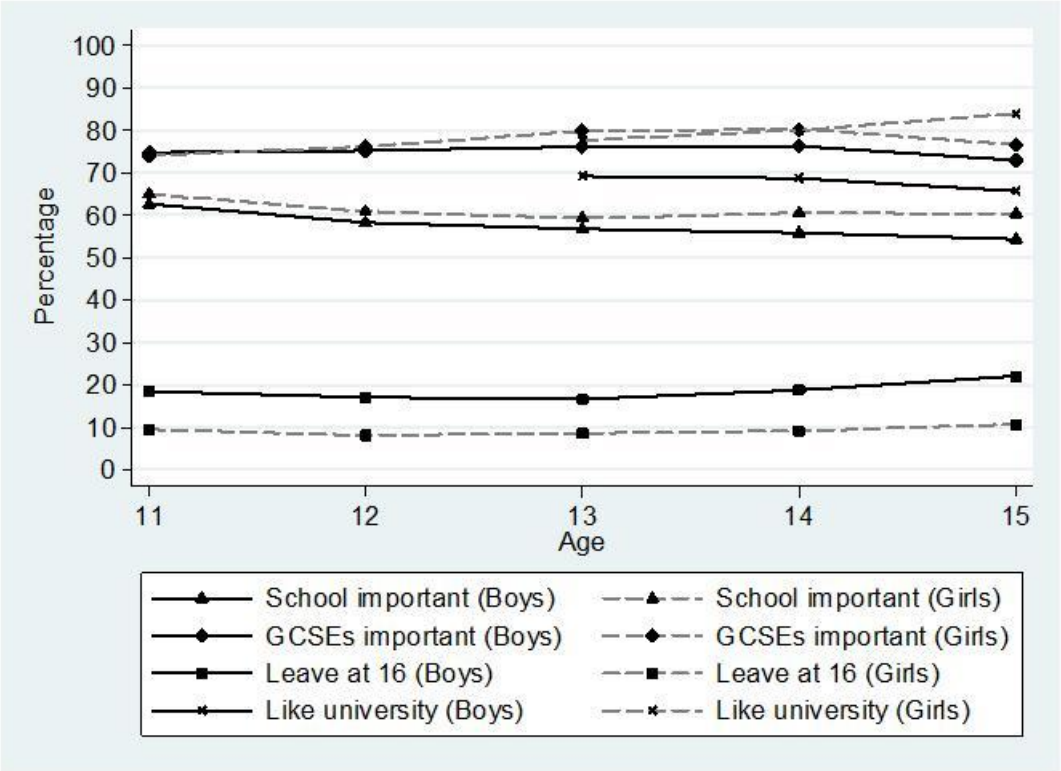

Table 3. Determinants of educational attitudes: BHPS 2002-2008

	Do well at school		Important to get GCSEs	
RE probit with additional regressors	Coeff	Marginal effects	Coeff	Marginal effects
Girl	0.152	0.056	0.129	0.033
	[3.88]		[2.66]	
Age 11	0.202	0.072	-0.072	-0.019
	[4.51]		[1.08]	
Age 12	0.075	0.027	-0.004	-0.001
	[1.76]		[0.06]	
Age 13	0.033	0.012	0.103	0.026
	[0.80]		[1.74]	
Age 14	0.036	0.013	0.142	0.035
	[0.91]		[2.47]	
Single parent household	-0.057	-0.021	-0.093	-0.024
	[0.63]		[0.76]	
Number of siblings	0.005	0.002	0.099	0.024
	[0.13]		[1.66]	
Mother's age/10	-0.013	0.005	-0.016	0.004
	[0.64]		[0.55]	
At least one parent has degree	0.044	0.016	0.088	0.022
	[0.84]		[1.39]	
Workless household	-0.272	-0.102	-0.163	-0.045
	[2.42]		[0.99]	
Tenant	-0.153	-0.057	0.174	0.043
	[1.44]		[1.16]	
Low income household	0.037	0.014	0.097	0 .024
	[0.73]		[1.37]	
Youth Regional Unemployment Rate	0.024	0.009	0.040	0.010
	[2.01]		[2.10]	
Both parents in UK after age 15	0.844	0.243	-0.224	-0.061
	[4.09]		[0.77]	
Year indicators	Yes		Yes	
Region indicators	Yes		Yes	
Individual means of TVC	Yes		Yes	
Rho	0.497		0.420	
Log-likelihood	-9430		-4445	
N observations	15501		8656	
N individuals	4831		3091	

Notes: Dependent variable takes the value 1 if doing well at school/getting GCSEs means a great deal/is very important and 0 otherwise. All models also include year and region fixed effects. TVC refers to time-varying covariates. Marginal effects are from the random effects probit with additional regressors calculated at the sample means. Absolute t-statistics in brackets.

Table 4. Determinants of educational aspirations: BHPS 2002-2008

	Leave school at 16		Go to university	
RE probit with additional regressors	Coeff	Marginal effects	Coeff	Marginal effects
Girl	-0.836 [12.37]	-0.071	0.608 [8.80]	0.149
Age 11	-0.115 [1.64]	-0.010		
Age 12	-0.249 [3.69]	-0.020		
Age 13	-0.236 [3.62]	-0.019	-0.068 [1.04]	-0.017
Age 14	-0.177 [2.88]	-0.015	-0.033 [0.53]	-0.008
Single parent household	-0.137 [0.99]	-0.012	-0.280 [1.56]	-0.072
Number of siblings	-0.108 [1.68]	-0.009	-0.002 [0.03]	-0.001
Mother's age/10	0.025 [0.74]	-0.002	0.053 [1.35]	-0.013
At least one parent has degree	-0.958 [9.21]	-0.051	0.734 [7.56]	0.145
Workless household	0.176 [1.11]	0.017	-0.021 [0.09]	-0.005
Tenant	-0.106 [0.67]	-0.009	-0.020 [0.09]	-0.005
Low income household	-0.050 [0.66]	-0.004	0.104 [1.01]	0.025
Youth Regional Unemployment Rate	-0.027 [1.40]	-0.002	0.019 [0.70]	0.004
Both parents in UK after age 15	-0.225 [0.74]	-0.017	1.137 [2.18]	0.160
Year indicators	Yes		Yes	
Region indicators	Yes		Yes	
Individual means of TVC	Yes		Yes	
Rho	0.671		0.524	
Log-likelihood	-4497		-2624	
N observations	13943		5152	
N individuals	4859		2515	

Notes: Dependent variable takes the value 1 if the child reports wanting to leave school at age 16/wanting to go to university and 0 if he/she wants to go to college/sixth form/does not want to go to university . All models also include year and region fixed effects. TVC refers to time-varying covariates. Marginal effects are from the random effects probit with additional regressors calculated at the sample means. Absolute t-statistics in brackets.

Table 5: Gender effects on educational attitudes and aspirations – estimates from models with interactions with parental education

RE probit with additional regressors	Do well at school		Important to get GCSEs		Leave school at 16		Go to university	
	Coeff	ME	Coeff	ME	Coeff	ME	Coeff	ME
Girl*At least one parent has degree (β_{g1})	0.195 [2.58]	0.069	0.237 [2.59]	0.056	-1.634 [9.81]	-0.064	1.304 [8.70]	0.206
Girl*No parent has degree (β_{g0})	0.153 [3.58]	0.056	0.119 [2.21]	0.030	-0.864 [12.28]	-0.073	0.620 [8.34]	0.147
Boy*At least one parent has degree (β_{b1})	0.046 [0.65]	0.017	0.062 [0.73]	0.016	-1.064 [8.28]	-0.058	0.769 [6.22]	0.158
Boy*No parent has degree (β_{b0})	reference		reference		reference		reference	
p value $\beta_{g1}=\beta_{b1}$	0.106		0.112		0.004		0.002	
p value $\beta_{g0}=\beta_{b0}$	0.000		0.027		0.000		0.000	
p value $\beta_{g1}=\beta_{g0}$	0.572		0.194		0.000		0.000	
p value $\beta_{b1}=\beta_{b0}$	0.516		0.462		0.000		0.000	
Log-likelihood	-9430		-4445		-4496		-2624	
N observations	15501		8656		13943		5152	
N individuals	4831		3091		4859		2515	

Notes: Estimates from random effects probit models with additional regressors. See text for details. All models also include controls for age, household type, number of siblings, mother's age, whether living in a workless household, whether living in a low income household, housing tenure, migrant status of parents, annual gender-specific youth regional unemployment rate, year and region indicators. Marginal effects calculated at the sample means. P-value presents results from chi-squared tests of the null hypothesis that the estimated coefficient on the interaction between gender and parents having high educational attainment is equal to that between gender and parents not having high educational attainment. Absolute t-statistics in brackets.

Table 6: Gender effects on educational attitudes and aspirations – estimates from models with interactions with parental attitudes

RE probit with additional regressors	Do well at school		Important to get GCSEs		Leave school at 16		Go to university	
	Coeff	ME	Coeff	ME	Coeff	ME	Coeff	ME
Girl*At least one parent views GCSEs as important(β_{g1})	0.880 [3.04]	0.327	1.132 [4.06]	0.370				
Girl*Not view GCSEs as important(β_{g0})	0.804 [2.23]	0.240	0.762 [2.16]	0.124				
Boy*At least one parent views GCSEs as important(β_{b1})	0.779 [2.69]	0.290	1.041 [3.73]	0.348				
Boy*Not view GCSE as important (β_{b0})		reference		reference				
Girl*At least one parent views A-levels as important(γ_{g1})					-1.852 [9.20]	-0.178		
Girl*Not view A-levels as important (γ_{g0})					-0.798 [3.46]	-0.046		
Boy*At least one parent views A-levels as important(γ_{b1})					-1.043 [5.72]	-0.144		
Boy*Not views A-levels as important (γ_{b0})						reference		
Girl*At least one parent wants child to go to university(δ_{g1})							1.858 [3.42]	0.557
Girl*Not want child go to university (δ_{g0})							1.221 [1.60]	0.149
Boy*At least one parent wants child to go to university(δ_{b1})							1.443 [2.67]	0.467
Boy*Not want child go to university (δ_{b0})								reference
p value $\beta_{g1}=\beta_{b1}$	0.128		0.198					
p value $\beta_{g0}=\beta_{b0}$	0.026		0.031					
p value $\beta_{g1}=\beta_{g0}$	0.740		0.114					
p value $\beta_{b1}=\beta_{b0}$	0.007		0.000					
p value $\gamma_{g1}=\gamma_{b1}$					0.000			
p value $\gamma_{g0}=\gamma_{b0}$					0.001			
p value $\gamma_{g1}=\gamma_{g0}$					0.000			
p value $\gamma_{b1}=\gamma_{b0}$					0.000			
p value $\delta_{g1}=\delta_{b1}$							0.000	
p value $\delta_{g0}=\delta_{b0}$							0.110	
p value $\delta_{g1}=\delta_{g0}$							0.251	
p value $\delta_{b1}=\delta_{b0}$							0.008	
Log-likelihood	-3468		-2173		-1323		-888	
N observations	5709		4446		4943		1874	
N individuals	1413		1404		1403		867	

Notes: Estimates from random effects probit models with additional regressors. See text for details. All models also include controls for age, household type, parental education, number of siblings, mother's age, whether living in a workless household, whether living in a low income household, housing tenure, migrant status of parents, parental attitudes to GCSEs/A Levels/university (as appropriate), annual gender-specific youth regional unemployment rate, year and region indicators. Marginal effects calculated at the sample means. P-value presents results from chi-squared tests of the null hypothesis that the estimated coefficient on the interaction between gender and parents having positive attitudes to education is equal to that between gender and parents not having positive attitudes to education. Uses BHPS data on parental attitudes to education collected at waves 12 and 17. Absolute t-statistics in brackets.

Table 7: Gender effects on educational attitudes and aspirations – estimates from models with interactions with child's age

RE probit with additional regressors	Do well at school		Important to get GCSEs		Leave school at 16		Go to university	
	Coeff	ME	Coeff	ME	Coeff	ME	Coeff	ME
Girl*Age 11 (β_{g11})	0.371	0.129	0.015	0.004	-0.929	-0.055		
	[5.60]		[0.16]		[8.59]			
Girl*Age 12 (β_{g12})	0.251	0.089	0.143	.0345	-1.090	-0.061		
	[3.86]		[1.59]		[9.89]			
Girl*Age 13 (β_{g13})	0.189	0.067	0.317	0.073	-1.088	-0.060	0.552	0.118
	[2.92]		[3.53]		[10.04]		[5.53]	
Girl*Age 14 (β_{g14})	0.251	0.088	0.360	0.081	-1.125	-0.061	0.673	0.139
	[3.91]		[4.06]		[10.56]		[6.82]	
Girl*Age 15 (β_{g15})	0.227	0.080	0.218	0.051	-0.949	-0.053	0.875	0.163
	[3.46]		[2.44]		[9.04]		[8.34]	
Boy*Age 11 (β_{b11})	0.257	0.092	0.055	0.014	-0.206	-0.019		
	[4.28]		[0.63]		[2.34]			
Boy*Age 12 (β_{b12})	0.122	0.044	0.063	0.016	-0.322	-0.029		
	[2.12]		[0.77]		[3.79]			
Boy*Age 13 (β_{b13})	0.099	0.036	0.109	0.027	-0.303	-0.027	0.130	0.033
	[1.75]		[1.35]		[3.62]		[1.53]	
Boy*Age 14 (β_{b14})	0.046	0.017	0.142	0.035	-0.180	-0.017	0.097	0.025
	[0.84]		[1.78]		[2.28]		[1.18]	
Boy*Age15 (β_{b15})		reference		reference		reference		reference
p value $\beta_{g11}=\beta_{b11}$	0.070		0.631		0.000			
p value $\beta_{g12}=\beta_{b12}$	0.036		0.347		0.000			
p value $\beta_{g13}=\beta_{b13}$	0.157		0.017		0.000		0.000	
p value $\beta_{g14}=\beta_{b14}$	0.001		0.013		0.000		0.000	
p value $\beta_{g15}=\beta_{b15}$	0.001		0.015		0.000		0.000	
p value $\beta_{g11}=\beta_{g12}$	0.028		0.098		0.113			
p value $\beta_{g11}=\beta_{g13}$	0.001		0.000		0.121			
p value $\beta_{g11}=\beta_{g14}$	0.042		0.000		0.060			
p value $\beta_{g11}=\beta_{g15}$	0.020		0.023		0.849			
p value $\beta_{g12}=\beta_{g13}$	0.256		0.030		0.980			
p value $\beta_{g12}=\beta_{g14}$	0.997		0.008		0.736			
p value $\beta_{g12}=\beta_{g15}$	0.687		0.381		0.179			
p value $\beta_{g13}=\beta_{g14}$	0.265		0.602		0.710		0.162	
p value $\beta_{g13}=\beta_{g15}$	0.516		0.243		0.173		0.001	
p value $\beta_{g14}=\beta_{g15}$	0.674		0.085		0.074		0.029	
p value $\beta_{b11}=\beta_{b12}$	0.011		0.911		0.152			
p value $\beta_{b11}=\beta_{b13}$	0.004		0.499		0.249			
p value $\beta_{b11}=\beta_{b14}$	0.000		0.302		0.759			
p value $\beta_{b11}=\beta_{b15}$	0.000		0.528		0.019			
p value $\beta_{b12}=\beta_{b13}$	0.675		0.553		0.815			
p value $\beta_{b12}=\beta_{b14}$	0.171		0.328		0.085			
p value $\beta_{b12}=\beta_{b15}$	0.171		0.328		0.085			
p value $\beta_{b13}=\beta_{b14}$	0.332		0.673		0.131		0.681	
p value $\beta_{b13}=\beta_{b15}$	0.080		0.178		0.000		0.127	
p value $b_{b14}=b_{b15}$	0.403		0.075		0.023		0.237	
Log-likelihood	-9428		-4441		-4494		-2617	
N observations	15501		8656		13943		5152	
N individuals	4831		3091		4859		2515	

Notes: Estimates from random effects probit models with additional regressors. See text for details. All models include controls for household type, parental education, number of siblings, mother's age, whether living in a workless household, whether living in a low income household, housing tenure, migrant status of parents, annual gender-specific youth regional unemployment rate, year and region indicators. Marginal effects calculated at the sample means. P-value presents results from chi-squared tests of the null hypothesis that the estimated coefficients on the interactions between gender and age are equal. Absolute t-statistics in brackets.

Table 8: Gender effects on educational attitudes and aspirations – estimates from models with interactions with indirect costs of education

RE probit with additional regressors	Do well at school		Important to get GCSEs		Leave school at 16		Go to university	
	Coeff	ME	Coeff	ME	Coeff	ME	Coeff	ME
Girl*Youth Regional Unemployment Rate (β_{gu})	0.030 [2.44]	0.011	0.046 [2.37]	0.016	-0.066 [3.36]	-0.010	0.045 [1.64]	0.014
Boy*Youth Regional Unemployment Rate (β_{bu})	0.020 [1.61]	0.008	0.036 [1.85]	0.013	-0.007 [0.37]	-0.001	0.001 [0.02]	0.000
p value $\beta_{gu}=\beta_{bu}$	0.000		0.005		0.000		0.000	
Log-likelihood	-9432		-4445		-4498		-2625	
N observations	15501		8656		13943		5152	
N individuals	4831		3091		4859		2515	

Notes: Estimates from random effects probit models with additional regressors. See text for details. All models also include controls for age, household type, parental education, number of siblings, mother's age, whether living in a workless household, whether living in a low income household, housing tenure, migrant status of parents, year and region indicators. Marginal effects calculated at the sample means. P-value presents results from chi-squared tests of the null hypothesis that the estimated coefficients on the interactions between gender and the unemployment rate are equal. Absolute t-statistics in brackets.

APPENDIX

Mean of explanatory variables by child's aspirations and attitudes

Variable	Doing well at school means a great deal		Getting GCSEs very important		Wants to leave school at 16		Wants to go to university	
	Yes	No	Yes	No	Yes	No	Yes	No
Girl	0.508	0.471	0.504	0.473	0.332	0.528	0.543	0.382
Age 11	0.226	0.188	0.202	0.223	0.198	0.198	-	-
Age 12	0.215	0.214	0.208	0.214	0.187	0.209	-	-
Age 13	0.193	0.205	0.208	0.189	0.182	0.202	0.344	0.359
Age 14	0.194	0.205	0.208	0.184	0.208	0.208	0.348	0.344
Single parent household	0.193	0.240	0.209	0.251	0.258	0.202	0.209	0.281
Number of siblings	1.115	1.081	1.053	1.069	1.157	1.071	0.945	1.007
	1.036	*1.016*	*0.970*	*1.036*	*1.089*	*1.003*	*0.953*	*1.072*
Mother's age/10	3.900	3.910	4.004	3.974	3.802	3.932	4.094	3.987
	0.883	*0.929*	*0.835*	*0.822*	*0.858*	*0.905*	*0.853*	*0.832*
At least one parent has degree	0.177	0.167	0.208	0.177	0.055	0.200	0.228	0.093
Workless household	0.042	0.048	0.036	0.047	0.080	0.037	0.039	0.060
Tenant	0.270	0.310	0.253	0.299	0.453	0.251	0.244	0.334
Low income household	0.251	0.291	0.257	0.315	0.362	0.242	0.242	0.330
Youth Regional Unemployment Rate	13.619	13.312	13.382	13.054	13.548	13.651	13.404	13.079
	3.000	*2.761*	*2.559*	*2.431*	*2.813*	*3.042*	*2.601*	*2.415*
Both parents in UK after age 15	0.014	0.005	0.006	0.007	0.006	0.012	0.009	0.002
One parent in UK after age 15	0.035	0.028	0.033	0.028	0.014	0.035	0.033	0.019

Notes: Standard deviations in italics.

Table 3FE. Determinants of educational attitudes: BHPS 2002-2008

	Do well at school	Important to get GCSEs
	Coeff	Coeff
Girl	0.241	0.214
	[4.40]	[2.37]
Age 11	0.095	-0.221
	[1.31]	[1.96]
Age 12	-0.054	-0.115
	[0.81]	[1.10]
Age 13	-0.065	0.036
	[0.99]	[0.36]
Age 14	0.011	0.140
	[0.17]	[1.43]
Single parent household	-0.269	0.024
	[2.64]	[0.16]
Number of siblings	0.078	0.054
	[1.61]	[0.68]
Workless household	-0.490	-0.270
	[3.02]	[1.03]
Tenant	-0.008	0.366
	[0.07]	[1.97]
Low income household	0.122	0.069
	[1.71]	[0.64]
Youth Regional Unemployment Rate	-0.002	0.053
	[0.12]	[1.89]
Year indicators	Yes	Yes
Log-likelihood	-5186	-2073
N observations	11931	5245
N individuals	1604	862

Notes: Dependent variable takes the value 1 if doing well at school/getting GCSEs means a great deal/is very important and 0 otherwise. All models also include year fixed effects. Absolute t-statistics in brackets.

Table 4FE. Determinants of educational aspirations: BHPS 2002-2008

	Leave school at 16	Go to university
	Coeff	Coeff
Girl	-1.128	0.849
	[11.97]	[6.48]
Age 11	0.117	
	[1.03]	
Age 12	-0.143	
	[1.32]	
Age 13	-0.229	-0.178
	[2.18]	[1.55]
Age 14	-0.261	-0.119
	[2.60]	[1.13]
Single parent household	-0.020	-0.376
	[0.13]	[1.64]
Number of siblings	-0.103	-0.030
	[1.38]	[0.26]
Workless household	0.046	0.470
	[0.19]	[1.25]
Tenant	-0.104	0.196
	[0.55]	[0.72]
Low income household	-0.120	0.031
	[1.10]	[0.20]
Youth Regional Unemployment Rate	-0.018	0.045
	[0.69]	[1.17]
Year indicators	Yes	Yes
Log-likelihood	-1899	-896
N observations	5312	2400
N individuals	767	560

Notes: Dependent variable takes the value 1 if the child reports wanting to leave school at age 16/wanting to go to university and 0 if he/she wants to go to college/sixth form/does not want to go to university. All models also include year fixed effects. Absolute t-statistics in brackets.

Table 5FE: Gender effects on educational attitudes and aspirations – estimates from models with interactions with parental education

	Do well at school	Important to get GCSEs	Leave school at 16	Go to university
	Coeff	Coeff	Coeff	Coeff
Girl*At least one parent has degree	0.653	0.723	-1.271	1.483
	[3.22]	[2.04]	[3.18]	[3.10]
Girl*No parent has degree	0.215	0.131	-1.154	0.897
	[3.58]	[1.32]	[11.79]	[6.36]
Boy*At least one parent has degree	0.290	0.121	-0.458	0.886
	[1.43]	[0.35]	[1.33]	[1.96]
Boy*No parent has degree	reference	reference	reference	reference
Log-likelihood	-5184	-2070	-1898	-894
N observations	11931	5245	5312	2400
N individuals	1604	862	767	560

Notes: Estimates from fixed effects logit models. All models also include controls for age, gender, household type, number of siblings whether living in a workless household, whether living in a low income household, housing tenure and year indicators. Absolute t-statistics in brackets.

Table 6FE: Gender effects on educational attitudes and aspirations – estimates from models with interactions with parental attitudes

	Do well at school	Important to get GCSEs	Leave school at 16	Go to university
	Coeff	Coeff	Coeff	Coeff
Girl*At least one parent views GCSEs as important	-0.048 [0.07]	0.154 [0.21]		
Girl*Not view GCSEs as important	-0.004 [0.01]	0.340 [0.45]		
Boy*At least one parent views GCSEs as important	-0.295 [0.44]	-0.169 [0.23]		
Boy*Not view GCSE as important	reference	reference		
Girl*At least one parent views A-levels as important			-0.641 [1.73]	
Girl*Not view A-levels as important			-1.422 [3.52]	
Boy*At least one parent views A-levels as important			0.679 [1.84]	
Boy*Not views A-levels as important			reference	
Girl*At least one parent wants child to go to university				-14.487 [0.01]
Girl*Not want child go to university				13.873 [0.03]
Boy*At least one parent wants child to go to university				-15.179 [0.01]
Boy*Not want child go to university				reference
Log-likelihood	-1837	-977	-493	-250
N observations	4425	2560	1451	702
N individuals	656	442	233	197

Notes: Estimates from fixed effects logit models. All models also include controls for age, gender, household type, parental education, number of siblings, mother's age, whether living in a workless household, whether living in a low income household, housing tenure, parental attitudes to GCSEs/A Levels/university (as appropriate) and year indicators. Uses BHPS data on parental attitudes to education collected at waves 12 and 17. Absolute t-statistics in brackets.

Table 7FE: Gender effects on educational attitudes and aspirations – estimates from models with interactions with child's age

	Do well at school	Important to get GCSEs	Leave school at 16	Go to university
	Coeff	Coeff	Coeff	Coeff
Girl*Age 11	0.359	-0.098	-0.974	
	[3.51]	[0.62]	[5.90]	
Girl*Age 12	0.228	0.165	-1.282	
	[2.32]	[1.07]	[7.61]	
Girl*Age 13	0.164	0.415	-1.456	0.671
	[1.66]	[2.68]	[8.78]	[3.76]
Girl*Age 14	0.330	0.521	-1.592	0.904
	[3.33]	[3.38]	[9.60]	[5.14]
Girl*Age 15	0.331	0.408	-1.401	1.289
	[3.26]	[2.58]	[8.56]	[6.82]
Boy*Age 11	0.157	0.054	-0.088	
	[1.62]	[0.36]	[0.62]	
Boy*Age 12	-0.010	0.006	-0.314	
	[0.11]	[0.05]	[2.31]	
Boy*Age 13	0.030	0.063	-0.349	0.161
	[0.33]	[0.46]	[2.60]	[1.09]
Boy*Age 14	0.021	0.162	-0.319	0.084
	[0.23]	[1.19]	[2.48]	[0.60]
Boy*Age15	reference	reference	reference	reference
Log-likelihood	-5185	-2068	-1895	-889
N observations	11931	5245	5312	2400
N individuals	1604	862	767	560

Notes: Estimates from fixed effects logit models. All models also include controls for household type, parental education, number of siblings, whether living in a workless household, whether living in a low income household, housing tenure and year indicators. Absolute t-statistics in brackets.

Table 8FE: Gender effects on educational attitudes and aspirations – estimates from models with interactions with indirect costs of education

	Do well at school	Important to get GCSEs	Leave school at 16	Go to university
	Coeff	Coeff	Coeff	Coeff
Girl*Youth Regional	0.007	0.062	-0.073	0.083
Unemployment Rate	[0.43]	[2.18]	[2.73]	[2.09]
Boy*Youth Regional	-0.010	0.046	0.007	0.023
Unemployment Rate	[0.59]	[1.63]	[0.26]	[0.59]
Log-likelihood	-5187	-2073	-1903	-897
N observations	11931	5245	5312	2400
N individuals	1604	862	767	560

Notes: Estimates from fixed effects logit models. All models also include controls for age, household type, parental education, number of siblings, whether living in a workless household, whether living in a low income household, housing tenure and year indicators. Absolute t-statistics in brackets.