Gender Peer Effects, Non-Cognitive Skills and Marriage Market Outcomes: Evidence from Single-Sex Schools in the UK*†

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1 Introduction

Peer effects have long been of interest to social scientists, because they affect the optimal organization of schools, jobs, neighborhoods, and other forums in which people interact. Since it is likely that at least some peer effects (which are, by definition, externalities) are not internalized, they create opportunities for social welfare-enhancing interventions.

One type of peer effects that are of particular interest in the education context are gender peer effects.[1] Their existence raises the question of how best to group students into classrooms according to their gender. One way of grouping students is to create separate classes or schools, i.e. so-called single-sex classes/schools. In recent years there has been a revival of the debate about the benefits of single-sex versus coeducational schooling. In 2006 the US Secretary of Education gave communities more flexibility in offering single-sex classes and permitted school districts to provide single-sex schools.[2] Also in the UK there has been an increased demand for single-sex schooling (in Inner London 40 percent of children attend single-sex' schools).

Thus it is not surprising that there is an ongoing debate about the effects of single-sex schooling among researchers, policy-makers and parents. Recent well-identified evidence suggests positive effects of single-sex schooling for academic outcomes and educational achievement, in particular for boys (see, e.g., Jackson (2012), Park, Behrman, and Choi (2012b), Park, Behrman, and Choi (2012a), Lee, Niederle, and Kang (2014)), negative (i.e. crime reducing) effects on crime (see, e.g., Jackson (2016)) and mixed

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[1] Another interesting context in which gender peer effects can play a role is the work place.

[2] In October 2006, the United States Secretary of Education announced the release of final Title IX single-sex regulations that give communities more flexibility in offering single-sex classes and permit school districts to provide single-sex schools.

results in terms of the effect on competitiveness (see, e.g., Booth and Nolen (2012), Lee, Turner, Woo, and Kim (2014)). Another related literature analyzes gender peer effects in coeducational settings and finds positive effects of a larger fraction of girls on cognitive ability and other educational outcomes (see, among others, Hoxby (2000), Lavy and Schlosser (2011), Black, Devereux, and Salvanes (2013),Anelli and Peri (2017)).[3]

The fact that single-sex schooling tends to have positive effects on educational achievement and academic outcomes (and that it is impossible to group everyone with a large fraction of girls which have been shown to have positive effects), raises the question why single-sex schools are not more prevalent. Another puzzling fact is that single-sex education is much more prevalent among girls than boys (for example, nowadays in Inner London 52 percent of girls and 27 percent of boys attend single-sex schools, in the UK overall 5 percent of girls versus 2.7 percent of boys). The latter fact implies that the debate on the advantages of single-sex versus coeducational schooling is more generally relevant, since policy reforms related to single-sex schooling might generate imbalanced sex ratios in coeducational public schools (e.g. the larger demand for all-girls schools, as has occurred in some places in the United Kingdom, has led to 59 percent of students at coeducational schools being boys).

This paper investigates a hypothesis which might help in explaining both puzzles. In particular, we address the question whether the limited interaction between youths of opposite gender implied by single-sex schooling might have negative effects on individuals' longrun marriage and family outcomes and whether these effects are particularly strong for boys. Such findings would help to explain why single-sex schooling is not more prevalent despite generally positive effects for academic achievement and educational outcomes and why it is even less common for boys than girls.

We address the following three questions. First, we analyze what are the determinants of single-sex education, i.e. who selects into single-sex schools. Second, we investigate the effects of single-sex education on individuals' longrun family formation outcomes (including marriage, marriage stability, children). Lastly, we shed some light on the mechanisms behind the effects of single-sex education on marriage outcomes. In particular, we explore the role of differences in preferences for marriage and having a family, the role of non-cognitive skills affected by attending a single-sex school and the role of differences in interaction with the opposite gender (including romantic relationships during teenage years).

To address these questions, we make use of the National Cohort Study (NCDS) of children who are born in one week in 1958 in Great Britain. This panel study follows the children until adulthood (until their forties/fifties), so that their marriage and family outcomes are observed. Moreover, one survey round was conducted at age 11, i.e. before the entry into secondary school which is either a single-sex or a co-ed school, so that we can analyze the determinants of choosing single-sex education. Another round was conducted at age 16, i.e. around four years after this choice, which allows us to investigate different potential mechanisms for the longrun effects on marriage outcomes. The data is

[3] See a more detailed discussion of the related literature at the end of the introduction.

extremely rich in terms of individual and family characteristics (among many others, family size and sibling composition, parents' education, occupation, interest in the education of their children, marital status, religion, ethnicity etc), measures of children's cognitive and non-cognitive skills, information on children's health, early development and physical appearance (including height, weight and questions on the child's attractiveness answered by teachers).

The key challenge in addressing the research question of interest is how to identify a causal effect of single-sex education, given that individuals self-select into single-sex schools. It has been shown that individuals selecting into single-sex schools tend to come from richer and more educated families and tend to have higher cognitive scores ex-ante. Thus credibly showing a positive causal effect of single-sex education on outcomes such as academic achievement and educational attainment is difficult because of an upward bias due to self-selection. In other words, individuals positively select into single-sex schools, i.e. have characteristics that lead them to perform better in terms of educational outcomes, and the correlation between single-sex schooling and later educational and labor market outcomes is positive. Thus controlling for individuals' characteristics using detailed data decreases the coefficient by reducing the bias. However, the concern remains that any remaining positive correlation between single-sex education and outcomes could still be driven by positive unobserved characteristics and might thus not be (entirely) causal. This identification problem is very similar to the one faced by studies aiming to identify the effect of Catholic/religious schools (see, e.g. Altonji, Elder, and Taber (2005) and Gibbons and Silva (2011)). Altonji, Elder, and Taber (2005) have therefore developed an approach that can provide bounds based on assumptions of the relative importance of selection on observables and unobservables.

The situation is different in our context. On the one hand, also we find that individuals are positively selected into single-sex schools. Their parents are more highly educated, richer, more likely married and Catholic/Christian and the individuals themselves fare better in terms of cognitive and non-cognitive skills, they have better health and are more attractive (in terms of teacher evaluation and being less likely overweight while of similar height). All these characteristics, which make individuals more likely to attend single-sex schools, are *positively* related to later marriage outcomes (and negatively to divorce). Thus if we were to find positive effects of single-sex schooling on marriage outcomes (and negative effects on divorce), we would again be worried that the effect was driven by positive self-selection.

However, we find *negative* effects on the likelihood of marriage (and positive, i.e. increasing, effects on the likelihood of divorce), despite people being positively selected into single-sex school. Thus, the *better* we control for, or match on, the different characteristics (family background, cognitive and non-cognitive scores, health and physical appearance/attractiveness) by adding the different groups of variables group-by-group, the *stronger* the effects become. In particular, we find that boys in single-sex schools are 4 percentage points less likely to ever having been married by 33 (only 10 percent have never been married or cohabiting by 33), 2 percentage points less likely by 42 (only 6 percent have never been married/cohabiting) and they are 3 percentage points more likely of being separated or divorced (mean 14 percent). The likelihood of having children (or number of children) is unchanged. For girls on the

other hand, we do not find significant effects of single-sex education on girls' likelihood to get married, separated/divorced or to have children.

Interestingly, when we investigate the determinants of attending single-sex schools, we find that –in addition to the positive selection in terms of individual characteristics and parental background– boys are significantly less likely to go to single-sex schools if they do not have a sister. This (and the fact that boys are substantially less likely to attend single-sex schools than girls) suggests that parents are indeed worried about limited interaction with the opposite gender if they were to send their son to single-sex schools and the belief that having a sister might mitigate this effect.[4]

To ensure the robustness of our results, we conduct the following robustness checks. First, we show that results are robust to employing different methods of matching (nearest neighbor, interval, kernel). Second, we show that there is a large common support in terms of propensity scores for individuals attending single-sex versus co-educational schools and that results remain unchanged whether we restrict the estimation to the common support or not. Third, we show that there is no differential attrition between individuals attending single-sex or co-educational schools.

Fourth, individuals can attend different types of secondary schools, such as private schools, public comprehensive schools, public grammar schools and public secondary modern schools.[5] Private schools and public grammar schools are more likely to be single-sex schools than public comprehensive or secondary modern schools. Since the first two types of schools tend to be of higher quality and have –if anything– positive effects on individuals' academic achievement and educational attainment, the selection is again positive in that this should make individuals at single-sex schools more likely to get married (and less likely to divorce or separate), and would thus bias effects towards zero. In addition we conduct the analysis separately be type of school and show that, among private schools, single-sex schools have even larger negative effects on the likelihood of ever getting married (decrease of 9 percentage points) but no effects on divorce, while for the different types of public schools, there are strongly positive (increasing) effects on the likelihood of separation/divorce but no effects on marriage. Lastly, we also present evidence that results are not driven by selection into single-sex schools based on sexual preferences (using information on the latter and on individuals' preferences for marriage and family).

The third question we address in this paper is to investigate possible channels through which single-sex schooling might affect marriage market outcomes. Whether a child/teenager spends most of his/her school day only among individuals of the same gender or not might affect a number of different aspects, such as (i) gender norms in the school/classroom and thereby preferences for marriage and family, (ii) the ability to interact with the opposite gender and (iii) non-cognitive skills/personality traits which might affect the ability to interact and/or the attractiveness in the marriage market. These aspects have received

[4] In the UK around 5 percent of girls compared to 2.5 percent of boys attend single-sex schools, in Inner London the fractions are more than 50 percent of girls compared to 27 percent of boys.

[5] Among public schools, the majority of individuals from our survey cohort attend public comprehensive schools. However, the switch from a tracked system with grammar and secondary modern schools towards comprehensive schools had not yet been completed, so a minority of students still attend the latter two types of schools.

very limited attention in the literature on single-sex schools or gender peer effects more generally and therefore we aim to contribute to the literature of gender peer effects on individuals' preferences and non-cognitive skills.

We do not find effects of single-sex education on individuals' preferences for marriage or having a family. However, we do find that boys who attended single-sex schools are less likely to attend parties and to have a romantic relationship as a teenager, which might affect their likelihood of marriage and divorce as an adult. Moreover, we find that boys who attended single-sex schools are more timid and more introverted at 16, which are traits which tend to negatively affect boys' marital chances. Indeed controlling for non-cognitive skills at age 16 (i.e. several years after enrollment into single-sex school at age 11/12), helps to explain about a third of the effect of single-sex schooling on boys' decreased marital changes.

To conclude gender peer effects resulting from attending a single-sex school can have important consequences for the interaction between different genders, including important long-run consequences on marriage outcomes and the stability of marriages. In the light of the fact that boys at single-sex schools are equally likely to aspire getting married and having a family, this result suggests negative effects on their well-being. Moreover, given that men from single-sex schools are equally likely to have children (and an equal number of children), the lower rate of marriage and the higher rate of separation and divorce suggests negative effects on children growing up in one-parent (or at least less stable) families.

Related literature: This paper is primarily related to the following two strands of the literature, the literature on single-sex schools and on gender peer effects, as discussed above. The recent well-identified literature on single-sex education has mostly found positive effects on academic achievement (see, e.g., Jackson (2012), Park, Behrman, and Choi (2012b), Park, Behrman, and Choi (2012a), Lee, Niederle, and Kang (2014)), mixed effects on competitiveness (Booth and Nolen (2012), Lee, Turner, Woo, and Kim (2014)) and negative (i.e. decreasing) effects on crime (Jackson (2016)).

The literature on gender peer effects is even larger and related to several different areas/contexts (for gender peer effects on schooling outcomes, see, e.g. Hoxby (2000), Lavy and Schlosser (2011) on educational attainment, Black, Devereux, and Salvanes (2013) on education, labor market outcomes and teenage child bearing and Anelli and Peri (2017) on major choices ; for gender interactions in the political arena, see e.g. Gagliarducci and Paserman (2012) and so forth).

Moreover, this paper is one of the few papers analyzing the relevance of (gender) peer effects on non-cognitive skills (notable exceptions on peer effects and non-cognitive skills are Chan and Lam (2014) and papers which show (gender) peer effects on risky teenage behaviors, such as teenage childbearing, see Black, Devereux, and Salvanes (2013)).

It is also related to an important literature on the relevance of non-cognitive skillls and personality traits for long-run outcomes (such as labor market outcomes, see, e.g., Borghans, Duckworth, Heckman

and ter Weel (2008), Cobb-Clark and Tan (2011), Jackson (2013), Gensowski (2014), Deming (2017) and for marriage outcomes, see e.g. Lundberg (2012)).

2 Background and Data

2.1 Education System in the UK

General: Nowadays, most children in Great Britain attend comprehensive schools that cater for all abilities, although many secondary schools group students by ability, at least for certain subjects (see McNally (2005)). Schooling is compulsory for children aged between 5 and 16 years. England, Wales and Northern Ireland have a very similar school system, while Scotland's education system is quite distinct in a number of ways (see e.g. McNally (2005) and Machin, McNally, and Wyness (2013)). Therefore we drop Scotland from our analysis.

What is taught is set out in the National Curriculum and organized into four 'Key Stages' (see, e.g., McNally (2005)). At the end of each Key Stage (i.e. at age 7, 11, 14 and 16), all pupils sit national tests (which are externally set and marked) in addition to teacher assessment. At age 16, students take their GCSE examinations (General Certificate of Secondary Education) in a range of subjects. From then on, students who remain in education may take the academic route, studying for A-levels in two or three subjects (often in a different institution) or pursue a vocational course of study.

Historically: Historically a selective system of education was introduced in 1945, where pupils were selected either into schools for the academically more able (grammar schools) or to education with a more vocational orientation (secondary moderns) based on an exam at age 11. This system was gradually abolished across local authorities in the 1960s and 1970s (see, e.g., Machin, McNally, and Wyness (2013) and Manning and Pischke (2006)). This implies that at the time when the children in our sample (born in 1958) enter secondary school (i.e. around 1969), the majority of schools were already comprehensive schools (about 55 percent in our sample), but about 12 percent were still (public) grammar schools, 24 percent (public) secondary modern schools and around 8 percent were private schools (the remainder of around 1 percent attended technical schools). In our analysis we will study heterogeneous effects by type of school.

Single-sex: By 2006, around 12 percent of secondary schools were single sex with more than half of them (57%) in the private sector (not state funded) and a third of them in the selective sector funded by the state or grammar schools (DfE, 2006). This means a substantial reduction in the last 40 years from more than 2500 single sex schools in the 1960s to just over 400 single sex schools nowadays (The Telegraph, 2008).

However, in recent years there has been a revival of the debate about the benefits of single-sex versus

coeducational schooling. In 2006 the US Secretary of Education gave communities more flexibility in offering single-sex classes and permitted school districts to provide single-sex schools. In the UK there has been an increased demand for single-sex schooling. For example, in Inner London close to 40 percent of students attend single-sex schools (52 percent of girls compared to 27 percent of boys)

In our sample of children born in 1958, 28 percent of children went to single-sex schools (close to 30 percent of girls and 26 percent of boys, see table 13).

Single-sex schools are more likely private or grammar schools than co-ed schools (see table 13, which shows that around 70 percent of private and grammar schools are single-sex schools, compared to 24 percent of secondary modern and 12 percent of comprehensive schools). At the same time, private schools and and grammar schools in the UK tend to be higher quality and a number of studies suggest that –if anything– they tend to improve students' educational and labor market performance (see, e.g. Dearden, Ferri, and Meghir (2002), Dustmann, Rajah, and van Soest (2003) for the UK context).

How does this affect our analysis? Since higher-educated and higher-earning individuals are more likely married (see, among many others, Lundberg (2012) and see our discussion in section 3.1), this implies that that single-sex students (who are more likely attending private and grammar school) are positively selected and should have better chances in the marriage market. However, despite a positive selection into single-sex schools, we will show that the effect of single-sex education is negative, that is single-sex educated men are less likely to ever having been married, and this effect is stronger the better we control for individual and family characteristics including cognitive and non-cognitive ability. Moreover, we show that results hold up or are even stronger, if we analyze the effect of single-sex education separately by school type.

2.2 The National Child Development Study (NCDS)

2.2.1 General

In this paper we make use of data from the National Child Development Study (NCDS), a multi-disciplinary study whose subjects are all the individuals that were born in the UK during the first week of March 1958. Following the initial birth survey in 1958, all members of the birth cohort have been traced in order to monitor their physical, educational, social and economic development until adulthood (for example at ages 11, 16 and 42). The survey contains detailed information not only on individual and family background characteristics, but also on health, physical appearance, standardized test scores on cognitive skills and measures of non-cognitive skills as well as on educational attainment, labor market and family outcomes and individuals' views.

For this reason these data are particularly suitable to address the questions of interest in this paper, since we observe individuals' characteristics at age 11 just before entering single-sex secondary education and individuals' marriage and family outcomes at age 42 as well as intermediate outcomes at age 16 (i.e. 4-5 years after entering –or not– single-sex schools) so that we can investigate different poten-

tial mechanisms. Moreover, we observe a wide range of characteristics which are important both for the decision to enter single-sex education and for marriage outcomes later on (see discussion in section **??**), such as individual and family characteristics (e.g. birth order, sibling gender composition, family size, religion, ethnicity, parents' marital status, education, occupation, financial situation, interest in children's learning development), individuals' cognitive and non-cognitive skills which have been shown to be relevant for schooling decisions as well as marriage outcomes, and health, early development and physical appearance (e.g. weight, height, BMI and even attractiveness) and even sexual development and preferences.

The NCDS has been widely used by economists, for example to estimate the returns to education (see, e.g. Blundell, Dearden, and Sianesi (2005) who use NCDS data and matching methods to estimate returns to education), to analyze the role of noncognitive skills (see, e.g. Carneiro, Crawford, and Goodman (2006) or to analyze the impact of obesity on labor market outcomes, see Lindeboom, Lundborg, and van der Klaauw (2009)).

2.2.2 Sample

The survey started with 17,416 individuals in 1958. Since the Scottish Educational System is quite distinct in several dimensions from the rest of the UK system (see e.g. McNally (2005) and Machin, McNally, and Wyness (2013) and our discussion in section 2.1), we drop Scotland from our analysis, which reduces the sample to 16,714 individuals.

By the year 2000, i.e. at age 42 of the surveyed individuals, 11,419 answered the questionnaire (i.e. around 70 percent of the original sample, excluding Scotland).[6] Moreover, we restrict the sample to those individuals with valid information for attendance at a single sex school which leave us with a sample of 11,156 individuals. From the sample used in the analysis, 27% reported that were attending a single sex school at the age of 16 (1974).

We use the individuals with non-missing information for cognitive skills and for social skills (social maladjustment score using the Bristol Guide) at age 11. This leaves us with 9,187 individuals, with 51% of them being men. In case other variables are reported as missing, we add dummy variables to account for this.

2.2.3 Variables Used

For the estimation of the determinants of attending a single-sex or co-educational school, we include the information available by the age of 11, i.e. just before children start secondary education and decide where to send their children to study.The variables used as predetermined characteristics at age 11 are described in the following and summary statistics can be found in Table 1.

[6] We show in the robustness section that there is no differential attrition between individuals at single-sex versus co-educational schools.

Individual and family background characteristics: We conduct the analysis separately by gender and include controls for birth order, family size fixed effect as well as information on the gender composition of siblings (dummy for "only brothers" and "only sisters"). Moreover, we control for ethnicity, whether the mother talks in English with the child, religion, parents' marital status, mothers' and fathers' education, labor force participation, occupation and indicators of region of residence.

Cognitive skills: We include dummies for the different quintiles of math and reading ability at age 11, based on standardized test scores.

Non-cognitive skills: We use information on children's non-cognitive skills based on questions to their school teachers in 12 different domains that relate to anxiety for acceptance by children, hostility towards children, hostility towards adults, writing off adults and adult standards, withdrawal, unforthcomingness, depression, anxiety for acceptance by adults, restlessness, inconsequential behavior, miscellaneous symptoms and miscellaneous nervous symptoms. Several of these questions can be translated into the "Big Five" personality traits, such as conscientiousness, introversion/extroversion, emotional stability, agreeableness/aggressiveness. For a discussion and application of those variables, see Carneiro, Crawford, and Goodman (2006).

Physical appearance: In terms of physical appearance, we include dummies for quintiles of height, a dummy for being obese, under- and overweight and measures of attractiveness as reported by the teacher (above and below normal "attractiveness").[7]

Health and early development: In terms of measures of health and early development we include mothers' age at birth as dummies (below 20, 20 to 30, 30 to 35, above 35) birth weight, whether the child was breastfed, whether the mother smoked during pregnancy indicators for early illnesses at birth and whether the child experienced a slow development as a toddler (wet by the age of 3, walking after 1.5 years, speaking after year 2).

Sexual orientation: The NCDS contain a variable on sexual development asked to the teacher in 1969 (child's age is 11). The exact question required that the teacher circle one characteristic about sexual development: Early, very keen, opposite sex, normal, abnormal tendency and delayed.

To analyze potential mechanisms leading to marriage market effects at age 42, we use intermediate

[7] Harper (2000) uses the same data (NCSD 1958) as this paper and shows that physical appearance has a substantial effect on earnings and employment patterns for both men and women and on outcomes in the marriage market. As discussed in more detail below, among women, those who are tall or obese are less likely to be married; while among men, lower marriage rates are found for those who are short or unattractive. Lindeboom, Lundborg, and van der Klaauw (2009) also use NCDS data to show the role of obesity for labour market outcomes.

outcomes at age 16, i.e. when the teenagers have attended single-sex or co-educational secondary schools for 4-5 years (for summary statistics, see Table 2).

Values related to marriage and family: At age 16, individuals were asked about whether they aspire getting married and whether they want to have children.

Interactions with teenagers of opposite gender: We use information on whether teenagers attended parties and whether they ever had a romantic relationship.

Non-cognitive skills: Teachers answer questions on individuals' non-cognitive skills at age 11 and at age 16. We use standardized zscores of the "Big Five" personality traits, such as conscientiousness, aggressiveness, introversion, emotional stability, which have been shown to be important for marriage (see discussion in the following section).

Our main outcomes of interest are marriage and family outcomes at age 42, in particular the likelihood of ever having been married or cohabiting by age 42, the likelihood of being separated or divorced by 42 and the likelihood of having any children (and number of children) by 42.

3 Empirical Analysis and Results

This paper aims to address the following three questions: First, we analyze who selects into single-sex schools. Second, our main goals is to investigate whether single-sex education affect people's long-run marriage and family outcomes. And lastly, we investigate what are potential mechanisms for the effects of single-sex education on marriage outcomes.

In the following section we analyze the decision to attend a single-sex school.

3.1 Determinants of Single-Sex School Attendance

In this section we analyze the determinants of enrollment in single-sex schools. This can help in shedding some light on families' motivation (and who expects high enough net benefits of single-sex education to decide to enroll). Moreover, this analysis can help us understand the selection into single-sex schools and thereby the direction of the bias we would expect.

We analyze the decision to attend a single-sex school by regressing the binary variable single-sex school attendance (yes/no) on a wide range of different predetermined characteristics of the child at age 11 or earlier. This is done separately by gender to allow for differential selection into single-sex school and because -as will be shown in the next sections- the effects of single-sex education on marriage and family outcomes differ substantially by gender.

As regressors we use characteristics which (i) have been shown to be important for the decision to attend single-sex school (or are likely to be relevant) and (ii) which have been shown (or are likely) to be relevant for the outcome of interest, namely marriage decisions broadly defined. This is important to understand which direction of bias we would expect in an OLS regression of marriage outcomes on attending a single-sex school and ultimately for giving the matching outcomes a causal interpretation.

In particular, we include the following four groups of characteristics of the individuals at age 11 (for summary statistics see the discussion in the previous section): First, we add controls for individual and family background characteristics, such as birth order, religion, ethnicity, region fixed effects, family size dummies, parents' education, fathers' occupation, mothers' labor force participation, families' financial well–being and so forth. Second, we include dummies for quintiles of test score performance on verbal and math tests. Third, we include measures of children's non-cognitive skills, such as emotional stability, aggressiveness, conscientiousness etc. Fourth, we include measure of health, early development and physical appearance such as a dummy for low birth weight, complications during pregnancy, mother smoking during pregnancy, child being delayed as toddler in terms of language and motor development, being under- or overweight or obese, quintiles of height and being attractive, regular and not attractive (as reported by the teacher).

Tables 3 and 4 present results on the determinants of single-sex schooling for boys and girls, respectively. The four columns show results for gradually adding the four groups of controls, as discussed above.

Starting with the determinants of single-sex enrollment for boys, Table 3 shows that boys who have more educated fathers in more skilled occupations (skilled and professional versus unskilled) are more likely to enroll. Moreover, boys whose parents are more interested in their education and who are raised Catholic or Christian more generally are also more likely to enroll in single-sex schools.Interestingly, other important and very robust determinant is whether boys only have brothers, in which case they are substantially (5 percentage points) less likely to choose single-sex education. This is consistent with parents being worried about limited interactions between genders for their sons and their belief that sisters might mitigate this concern somewhat. These results are unaffected by including further controls, as discussed below.

In terms of the role of cognitive skills, Table 3 shows that individuals scoring high on the verbal test are substantially more likely to enroll in single-sex school (coefficients on quintiles 4 and 5 of the verbal scores are positive compared to excluded category "quintile 3", coefficients on lower quintiles are negative, while dummies for math score quintiles are not significant when controlling also for verbal scores).

These results on family characteristics and individual characteristics including cognitive skills show that individuals are positively self-selected not only in terms of having characteristics that improve individuals' chance in the labor market but also in the marriage market. Fisman, Iyengar, Kamenica, and Simonson (2006) and Lee (2015) show that individuals prefer potential partners who are more educated,

with higher income, smarter, of higher social status. Lundberg, Pollak, and Stearns (2016) show that more educated individuals are more likely to be married.Xie, Raymo, K.Goyette, and Thornton (2003) find that five different measures of earnings potential, strongly and positively influence the likelihood of marriage for men, but not for women. Jalovaara (2003) finds that more educated and higher earning men are less likely divorced.

In particular for marriage outcomes other characteristics might be important, such as non-cognitive skills (which in fact have been shown by Almlund, Dickworth, Heckman, and Kautz (2011a), **?**, Deming (2017) and others to be very important also for labor market outcomes) and health and physical appearance, which we include in columns 3 and 4 of Table 3. We find that selection is also positve in terms of non-cognitive skills, in that individuals who are emotionally stable are more likely to enroll in single-sex schools, which is a characteristic which has been shows to be positively related to marriage and negatively to divorce (see Lundberg (2012)).

Lastly, in terms of health and physical appearance we find that only low birth weight is significant and negatively related to single-sex schooling, i.e. interpreting birth weight as one proxy for health, more healthy individuals enroll, while they are equally attractive and similar in all other proxies for health, early development and physical appearance. Again this implies that selection is –if anything– positive (see Guner, Kulikova, and Llull (2014) for the importance of health for marriage, while Harper (2000), Hammermesh and Biddle (1994) and others have shown the role of physical appearance/attractiveness for marriage outcomes, which implies it is important to understand their role in terms of selection into single-sex schools).[8] To conclude, the selection of boys into single-sex schools is strongly positive, i.e. those who decide to enroll in single-sex schools have characteristics that make them *more* likely to be married and less likely divorced, which is important for understanding which direction of bias one should expect.

Table 4 conducts the same analysis for girls. Also for girls we find positive selection on most characteristics. In particular, also girls who choose single-sex education are more likely from more educated and richer families and are less likely of higher birth order (conditional on family size fixed effects). Given that the literature has shown that higher birth order children do worse in terms of cognitive and non-cognitive skills, academic achievement and later labor market outcomes (see e.g. Black, Devereux, and Salvanes (2005)), this shows that again selection is positive. In contrast to boys, parents are not less likely to send their daughters to single-sex school if they only have daughters.

Also in terms of cognitive skills selection is positive (see Table 4, columns 2 to 4), i.e. girls who perform above average on the verbal test are more likely to attend single-sex schools (quintiles 4 and 5 are again positive, quintiles 1 and 2 negative). In terms of non-cognitive skills the evidence is mixed for

[8]Harper (2000) uses the same data (NCSD 1958) as this paper and shows that physical appearance has a substantial effect on earnings and employment patterns for both men and women and on outcomes in the marriage market. In particular, among women, those who are tall or obese are less likely to be married, while among men, lower marriage rates are found for those who are short or unattractive. Also Hammermesh and Biddle (1994) show the importance of beauty for success in the labor and marriage market using US and Canadian household survey data.

girls, in that girls choosing single-sex schools are less neurotic and less conscientious (which is correlated with lower likelihood of divorce but also negatively correlated to marriage, see Lundberg (2012)).

Lastly, column 4 in Table 4 shows that in terms of the role of health, early development and physical appearance/attractiveness, taller girls (fifth quintiles) and girls from older mothers are more likely to enroll in single-sex schools, where at least the former might imply a negative selection in terms of marriage chances.

To conclude selection for girls are slightly less clearcut compared to boys. For boys all relevant characteristics tend to be positively related to the likelihood of marriage (and negatively related to divorce), while for girls that is also the case except for the fact that "single-sex girls" are less conscientious and taller. These results are important for the direction of the bias we expect from a regression of longrun marriage (and divorce) outcomes on single-sex schooling.

openness, extroversion and neuroticism increase the likelihood of divorce (see also Gensowski (2014)).

3.2 The Effects of Single-Sex Schooling on Marriage and Family Outcomes

Main idea behind strategy: In the last section we saw that in particular boys are clearly positively selected into single-sex schools, i.e. they have characteristics that tend to make them more likely married (and less likely divorced or separated). This suggests and upward bias of a regression of marriage outcomes on single-sex education and we would expect coefficients to decrease the more and better controls we include (or the better we match on such pre-determined characteristics). Thus if the direct correlation between single-sex education and marriage is positive, better controls should decrease coefficients towards zero. If however there is a negative (or zero) correlation, including more controls should lead the coefficient to become more and more negative (and the coefficient larger in absolute value). While in the former case where the coefficient is decreasing in absolute value, i.e. moving towards zero with better controls, the concern would remain that unobservables might be driving the remaining positive correlation. However in the latter case, which as we will see below is the case in our context, more and better controls or matching increases coefficients in absolute value and thus strengthening our confidence in the effect, since unobservables could only overturn results if selection based on those is basically going in the opposite direction.

Based on this argument, we show results of regressing "ever having been married or cohabiting by 42" and "separation or divorce by 42" on individual characteristics which we enter group-by-group. In addition to estimating the effect of single-sex education using ordinary least squares (OLS), we also apply matching methods. Matching dominates simple OLS a priori (see, e.g. Blundell, Dearden, and Sianesi (2005)), because it can quickly reveal the extent to which the treated and non-treated groups overlap in terms of pre-treatment variables. Thus it offers easy diagnostic tools to assess the achieved balancing and it relieves the researcher from the choice of the specification of the linear regression, i.e. avoids bias due to wrong functional form assumptions.

Since matching subjects on an n-dimensional vector of characteristics is typically unfeasible for large n, the method of propensity score matching proposes to summarize pre-treatment characteristics of each subject into a single-index variable (the propensity score) which makes the matching feasible. Various methods have been proposed in the literature to overcome this problem and three of the most widely used are Nearest Neighbor Matching, Radius Matching and Kernel Matching, which we use in our analysis.

3.2.1 Main Results

Tables 5 and 6 display the effects of single-sex education on individuals' chance of ever having been married or cohabiting by age 42 for male and female students respectively, presenting the coefficient of an OLS regression (column 1) or the different matching estimators (columns 2 to 4) and standard errors and t-statistics in round and squared brackets, respectively. Different rows reflect which groups of control variables we are including. In particular, in row 1 we only include individual and family background characteristics; in row 2 we add dummies for quintiles of verbal and math test scores, in row 3 we add measures for non-cognitive skills and in row 4 we also include measures of health, early development and physical appearance/attractiveness.

Table 5 shows that for male students attending single-sex schools affects the likelihood of ever having been married or cohabiting negatively. Moreover, coefficients increase in absolute value comparing the first to the second, then the third and then fourth row, i.e. they become stronger and stronger negative (and increase in significance) the more groups of control variables we add. This is not surprising in the light of the fact that boys are positively selected into single-sex schools i.e. we expect an upward bias of the coefficient of single-sex schooling on marriage towards zero and this is reduced the more controls we include, so that the coefficient becomes more and more negative the better we control for pre-determined characteristics. In addition moving from the OLS regression to the different matching estimators (i.e. "controlling" in more flexible ways) further increases the coefficients in absolute value. In particular, there is a significant negative effect of about 2 percentage points of single-sex education and male students' likelihood of ever getting married or cohabiting by age 42 (i.e. given that only around 6 percent of men have never been married or cohabiting by 42 which is increased by 2 percentage points if attending single-sex schools, these are relatively large effects).

Table 6 shows that there are (consistently and robustly) no effects of single-sex education on female students' marriage outcome and the effect is a precisely estimated zero.

In Table 7 we present results of the effect of single-sex education on male students' likelihood of being separated or divorced by age 42. While male students' were selected into single-sex schools in a way that decreased the likelihood of divorce, the effect of single-sex education on the likelihood of separation or divorce is positive and again increasing in magnitude the more controls are included (which reduce the downward bias). Single-sex education increases the likelihood of divorce or separation by 3-4 percentage points, which is equivalent to a 20-30 percent increase (around 14 percent of men have been separated/divorced by 42).

Again for women there is no effect of single-sex education on the likelihood of separation or divorce.

To look more broadly at family outcomes we also investigated the effect on the likelihood of having a children (and the number of children), but do not find any effects neither for men or women in terms of those outcomes (see Table 8). This is important since the negative effects on marriage and marriage stability are likely to negatively affect children which men who attended single-sex schools are equally likely to have, since those children are more likely to grow up in single-parent household or at least in less stable families.

3.2.2 Robustness

In this section we conduct a number of robustness checks and present some results on heterogeneous effects. First, we have shown that results are not sensitive to the use of different matching estimators. Second, we show that the common support of the propensity score for treatment group (single-sex school attendance) and control group (co-educational schools) is large (between 0 and 0.8, see Figure 4) and results are thus –not surprisingly– very robust to restricting the estimation to the common support or not (see Table 9). Third, we show that even though there is some attrition between age 16 and age 42, attrition is not differential between (male or female) single-sex students and students attending co-educational schools (see Table 10).

Fourth, we show that results do not seem to be driven by selection based on sexual preferences. We test this based on information on sexual development and preferences at age 11. Table 11 shows that selection into single-sex schools is not correlated to those characteristics and also controlling for those additional characteristics does not change our results (see Table 12). In the following section on mechanisms we present further evidence on this point by showing that preferences for marriage and family are not different between students of single-sex or co-educational schools at age 16.

Lastly, we investigate the concern that there are different types of secondary schools, such as public comprehensive schools (which are the majority), public grammar schools and secondary modern schools and private schools (see Table 13). Moreover, single-sex schools are clearly overrepresented among private schools and public grammar schools, which tend to be of higher quality and –if anything– positively affect students' academic achievement and educational outcomes. This fact goes again in the direction of (and is likely one reason for) the positive selection of individuals into single-sex schools, which we have shown biases effects on marriage and divorce towards zero.

Moreover, we show that effects remain if we conduct the estimation separately by type of school. Table 14 shows effects separately for private and public schools and for public comprehensive schools, i.e. the largest group among the public schools. Interestingly, the negative effects on the likelihood of ever being married or cohabiting is even stronger for private schools, i.e. attending a private single-sex versus a private co-educational school decreases the likelihood of marriage by nearly 10 percentage points. One potential explanation which will be discussed more in the next section is that private schools are more

likely boarding schools than public ones, and boarding schools might have even stronger effects on the time an individual spends with either only same-sex peers or mixed-gender peers. In terms of divorce we do not find significant effects of single-sex education in the case of private schools.

For public schools, the findings are reversed in that we find large positive (i.e. increasing) effects on divorce of attending a public single-sex versus co-educational school of about 5 percentage points, but no effects on the likelihood of ever having been married/cohabiting by age 42. Those effects are very similar for public comprehensive schools suggesting that the effects are similar for the different types of public schools.

3.3 Mechanisms

In this section we investigate possible mechanisms by which attendance of a single-sex school might affect boys' marriage outcomes and marital stability. Whether a boy is surrounded by only boys as his peers or boys and girls might affect a number of different aspects, such as (i) gender norms and gender stereotypical behavior in the school/classroom and thereby preferences for marriage and family, (ii) knowledge of and the ability to interact with the opposite sex due to having had frequent or only limited interactions and (iii) non-cognitive skills/personality traits, which in turn might affect the likelihood of marriage and divorce.

These aspects have received very limited attention in the literature (exceptions are papers which investigate whether single-sex education affects skills and preferences, such as the likelihood of being competitive or risk averse (see, e.g., Booth and Nolen (2012) and Lee, Turner, Woo, and Kim (2014)) and gender norms such as which subjects/majors to choose (see, e.g. Jackson (2012), Park, Behrman, and Choi (2012b), Park, Behrman, and Choi (2012a)) and thus we aim to contribute to the literature of gender peer effects on individuals' non-cognitive skills and on their preferences, norms and values.

To shed some light on the role of different potential mechanisms, we analyze the effect of single-sex education on three different types of intermediate outcomes, as discussed above, which are measured at age 16, i.e. 4-5 years after starting secondary schooling in either a single-sex or co-educational school. Of course, this does not give conclusive causal evidence on the role of these channels, but suggestive evidence on which mechanisms are likely to have played a role. To further investigate the latter, we also show by how much effects are reduced if we control for or match on pre-determined characteristics at age 11 and also for intermediate outcomes at age 16.

3.3.1 Preferences for Marriage and Family

Tables 15 and 16 show that attending a single-sex school does not affect individuals' stated preferences/aspirations for marriage or for having a family (effects are relatively precisely estimated zeros).

This is an important finding not only for understanding potential mechanisms, but also for interpret-

ing the implications of negative marriage effects (increasing divorce effects) on men's well-being. In particular, the fact that men who attended single-sex schools are not less likely to want to get married and have a family, but that they are significantly less likely to be (and stay) married suggests important negative effects on men's utility (in this dimension).

Also this finding suggests that single-sex education seems to either make men less "attractive in the marriage market" and/or reduces their ability to interact with women and thus to find and keep a (suitable) partner. We investigate these explanations in the following sections.

3.3.2 Opportunities to Interact with the Opposite Gender

Teenagers spend a lot of time in school or with peers of their school. Thus whether they attend a single-sex school or not crucially affects how much time they spend with the opposite gender (also because hobbies such as sports are often also gender segregated). Thus for students at single-sex schools there are substantially fewer opportunities to interact and thereby learn interacting with the opposite sex (such as competing, forming and having friendships and also romantic interactions).

While it is clear that there is much less time of interacting with the opposite gender in single-sex schools, we investigate whether this also affects interactions in a romantic sense, using as proxies the likelihood to attend parties and to have had a romantic relationship as a teenager.

Tables 17 and 18 show that indeed single-sex education negatively affects male students' likelihood to attend parties (reduction by around 6 percentage points) and their likelihood of having had a romantic relationship by age 16. The latter effects are not relatively small given that few people report having had a romantic relationship by age 16, but are robust and strongly significant.

3.3.3 Non-cognitive Skills

In this section we investigate the effect of single-sex education on boys' non-cognitive skills. One possible reason for why the gender of ones' peers might affect an individuals' non-cognitive skills is that the distribution of certain non-cognitive skills differs by gender (for example conscientiousness and agreeableness) and thus what fraction of peers belongs to a certain gender affects the distribution of non-cognitive skills among the peers. The literature of (gender) peer effects on individuals' non-cognitive skills is still limited (as discussed in the introduction) and thus one goal of this paper is to contribute to this literature.

Tables 19 and 20 presents the results. We find that attending a single-sex school leads male students to be more conscientious, but also more timid (less aggressive) and more introverted at age 16.

While being more conscientious tends to increase marriage chances of men, being more timid (less aggressive) and more introverted reduces the likelihood of marriage (see our discussion in section **??** and see Lundberg (2012) who investigates the role of personality traits for marriage and marital stability).

Given our results and the findings on the role of personality traits in the literature, it is plausible that the effects on boys' non-cognitive skills play a role for the effects on longrun marriage outcomes.

3.3.4 Can these Changes Account for Observed Effects?

We now provide some further evidence on the actual role of the mechanisms discussed above, by including measures of non-cognitive skills at age 16 as additional controls in our regression and matching analysis to see how much this explains in terms of the gap in marriage and divorce rates between boys from single-sex versus co-educational schools.

Table 21 shows that including measures of non-cognitive skills as controls in a regression of the likelihood of ever being married or cohabiting on single-sex education reduced the effect by about a third, suggesting that effects of single-sex schooling on non-cognitive skills/personality traits is indeed one of the likely mechanisms behind the longrun marriage effects. Table 22 shows the same analysis for the outcome "divorce or separation", in which case the effect on non-cognitive skills explains less of the longrun effects on marital stability.

4 Conclusion

TO BE COMPLETED

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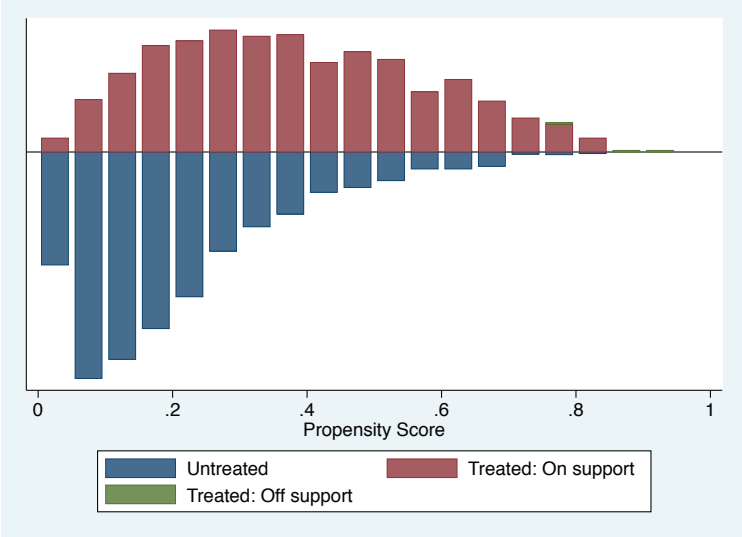
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APPENDIX

Figures



Tables

Table 1: Summary statistics: Variables at age 11 (ADD STD ER)

	Summary Statistics at Age 11			
	Boys		Girls	
	Single-sex	Co-ed	Single-sex	Co-ed
Indiv. and Family Background				
Birth order	1.7552	1.9832	1.7880	2.0226
Only brothers	0.1759	0.1991	0.2178	0.1996
Only sisters	0.1989	0.1853	0.1768	0.1727
Only child	0.0501	0.0503	0.0519	0.0536
Three children	0.1947	0.1962	0.1915	0.2062
Four children	0.1106	0.1382	0.1192	0.1348
Five children or more	0.1154	0.1705	0.1224	0.1724
White	0.7406	0.7419	0.7297	0.7549
Language English	0.7406	0.7759	0.7534	0.7764
Parents read rarely to child	0.4708	0.4721	0.4715	0.4660
Parents little interest in child's educ	0.1113	0.1926	0.1025	0.1660
Father's education: less than HS	0.7538	0.8458	0.7412	0.8577
Father's education: post HS	0.1099	0.0517	0.1179	0.0450
Mother's education: less than HS	0.7559	0.8441	0.7431	0.8473
Mother's education: post HS	0.0682	0.0369	0.0833	0.0384
Father: professional	0.2663	0.1707	0.3133	0.1649
Father: skilled job	0.3985	0.4381	0.3658	0.4482
Father: unskilled job	0.0355	0.0505	0.0295	0.0477
Mother working part-time	0.1655	0.1758	0.1531	0.1833
Free school meals	0.0584	0.0833	0.0557	0.0874
Any financial difficulties	0.1008	0.1333	0.1025	0.1386
Mom married/partner at birth	0.8922	0.9063	0.8712	0.9142
Religion: Catholic/Christian	0.1405	0.0964	0.1781	0.1202
Religion: Anglican	0.4193	0.4220	0.3453	0.3749
Cognitive Skills				
Reading score quintile 1	0.1356	0.2353	0.1140	0.2294
Reading score quintile 2	0.0925	0.1506	0.1089	0.1631
Reading score quintile 4	0.1829	0.1464	0.2210	0.1612
Reading score quintile 5	0.2747	0.1185	0.2172	0.0973
Math score quintile 1	0.1662	0.2033	0.1300	0.1977

Continued on next page

Table 1 – *Continued from previous page*

	Summary Statistics at Age 11			
	Boys		Girls	
	Single-sex	Co-ed	Single-sex	Co-ed
Math score quintile 2	0.1711	0.1894	0.1563	0.1847
Math score quintile 4	0.1439	0.1479	0.1576	0.1442
Math score quintile 5	0.1871	0.1489	0.2140	0.1663
Non-cognitive Skills				
Zscore introverted/extroverted	-0.0324	0.1030	-0.1326	-0.0467
Zscore agreeable/aggressive	0.0170	0.0637	-0.1156	-0.0292
Zscore conscientiousness	-0.1005	-0.2590	0.2767	0.2088
Zscore emotional stability	-0.0218	0.1213	-0.1223	-0.0748
Health, early development, physical appearance				
Attractive Child	0.4499	0.4400	0.5676	0.5516
Unttractive Child	0.0800	0.0937	0.0769	0.0994
Height of child quintile 1	0.1530	0.1855	0.1307	0.1884
Height of child quintile 2	0.2045	0.2227	0.1973	0.1942
Height of child quintile 4	0.1697	0.1668	0.1858	0.1743
Height of child quintile 5	0.1196	0.0998	0.1627	0.1258
Obese	0.2907	0.2754	0.2972	0.2776
Overweight	0.1391	0.1287	0.0615	0.0629
Underweight	0.0202	0.0301	0.0307	0.0325
Right handed	0.6321	0.6710	0.6618	0.6928
Smoke during pregnancy	0.2510	0.3079	0.2518	0.3176
Previous complications	0.0800	0.0838	0.0724	0.0869
Low Birth Weight	0.0292	0.0491	0.0519	0.0663
Illness at birth	0.0313	0.0277	0.0211	0.0258
Mom obese	0.0195	0.0262	0.0205	0.0245
Mom's age at child's birth 20-29	0.5522	0.5896	0.5368	0.5817
Mom's age at child's birth 30-34	0.1836	0.1850	0.2120	0.1908
Mom's age at child's birth 35 or more	0.2142	0.1780	0.2191	0.1703
Multiple Birth	0.0209	0.0250	0.0263	0.0189
Breastfed over one month	0.4013	0.3830	0.4254	0.3797
Late walking	0.0459	0.0437	0.0314	0.0312
Late speaking	0.0612	0.0702	0.0455	0.0453
Wet after 3 years old	0.0348	0.0316	0.0320	0.0349
Mom worked during pregnancy	0.3700	0.3582	0.3414	0.3578

Table 2: Summary statistics: Variables at ages 16, 33 and 42

	Summary Statistics at Ages 16, 33 and 42			
	Boys		Girls	
	Single-sex	Co-ed	Single-sex	Co-ed
Personality variables at 16				
Zscore Cautious/Impulsive	-0.0608	0.0336	0.0477	-0.0336
Zscore Moody/Even Tempered	0.0750	-0.0215	0.0366	-0.0208
Zscore Timid/Aggressive	-0.0110	0.1051	-0.0450	-0.0930
Zscore Flexible/Rigid	-0.0291	0.0524	-0.0298	-0.0341
Zscore Social/Withdrawn	0.0035	0.0935	-0.1035	-0.0611
Zscore Lazy/Hardworking	0.0121	-0.1921	0.1738	0.1344
Young life at 16				
Child attend parties at all	0.6081	0.6468	0.7093	0.7194
First relationship 16 or younger	0.0012	0.0040	0.0139	0.0193
Family outcomes at 33 and 42				
Never married/cohabiting at 33	0.1178	0.0934	0.0733	0.0533
Never married/cohabiting at 42	0.0568	0.0441	0.0362	0.0308
Separated/Divorced at 42	0.1538	0.1458	0.1522	0.1822
Any children at 42	0.6453	0.6619	0.7783	0.8023

Table 3: Determinants of Boys Attending Single-Sex Schools

	Selection into single-sex school			
	(1) Baseline	(2) + Cogn.	(3) +Non-Cogn.	(4) +Health/ Phys. Appear.
Individual and Family Characteristics				
Birth order	-0.0026	-0.0012	-0.0027	-0.0054
	(0.0044)	(0.0044)	(0.0047)	(0.0055)
Only brothers	-0.0315	-0.0277	-0.0394*	-0.0417**
	(0.0195)	(0.0193)	(0.0203)	(0.0204)
Religion: catholic/christian	0.0772***	0.0619***	0.0615***	0.0637***
	(0.0199)	(0.0194)	(0.0208)	(0.0208)
White	0.0225	0.0156	0.0111	0.0121
	(0.0141)	(0.0140)	(0.0152)	(0.0154)
Language English	-0.0186	-0.0170	-0.0142	-0.0142
	(0.0196)	(0.0196)	(0.0207)	(0.0207)
Parents little interest	-0.0416***	-0.0272*	-0.0302**	-0.0277*
in childs educ	(0.0141)	(0.0140)	(0.0147)	(0.0148)
Father's educ: less than HS	-0.0436**	-0.0247	-0.0056	-0.0101
	(0.0209)	(0.0206)	(0.0215)	(0.0215)
Father's educ: post HS	0.0785**	0.0696**	0.0662*	0.0599*
	(0.0323)	(0.0319)	(0.0341)	(0.0342)
Mother's educ: less than HS	-0.0615***	-0.0405**	-0.0299	-0.0312
	(0.0193)	(0.0194)	(0.0202)	(0.0203)
Mother's educ: post HS	-0.0072	-0.0113	-0.0080	-0.0028
	(0.0359)	(0.0352)	(0.0379)	(0.0382)
Father: professional	0.0861***	0.0608***	0.0623***	0.0681***
	(0.0207)	(0.0205)	(0.0214)	(0.0216)
Father: skilled job	0.0430***	0.0365**	0.0331**	0.0366**
	(0.0156)	(0.0155)	(0.0161)	(0.0163)
Mom married at child's birth	-0.0056	-0.0035	-0.0128	0.0373
	(0.0216)	(0.0212)	(0.0239)	(0.0345)
Mom worked part-time	-0.0025	-0.0007	0.0042	0.0054
	(0.0153)	(0.0150)	(0.0158)	(0.0161)
Free school meals	-0.0027	0.0074	0.0208	0.0255

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Table 3 – *Continued from previous page*

	Selection into single-sex school			
	(1) Baseline	(2) + Cogn.	(3) +Non-Cogn.	(4) +Health/ Phys. Appear.
	(0.0219)	(0.0216)	(0.0228)	(0.0229)
Any financial difficulties	-0.0146	-0.0079	-0.0072	-0.0039
	(0.0179)	(0.0177)	(0.0186)	(0.0187)
Cognitive skills				
Verbal score quintile 1		-0.0219	-0.0232	-0.0275
		(0.0174)	(0.0176)	(0.0177)
Verbal score quintile 2		-0.0299*	-0.0298*	-0.0300*
		(0.0170)	(0.0171)	(0.0171)
Verbal score quintile 4		0.0687***	0.0744***	0.0740***
		(0.0196)	(0.0197)	(0.0197)
Verbal score quintile 5		0.1811***	0.1894***	0.1888***
		(0.0210)	(0.0213)	(0.0215)
Math score quintile 1		0.0069	0.0139	0.0159
		(0.0183)	(0.0195)	(0.0194)
Math score quintile 2		0.0042	0.0010	0.0020
		(0.0182)	(0.0191)	(0.0192)
Math score quintile 4		-0.0125	-0.0213	-0.0212
		(0.0197)	(0.0205)	(0.0206)
Math score quintile 5		0.0116	0.0038	0.0034
		(0.0197)	(0.0208)	(0.0209)
Non-Cognitive skills				
Conscientiousness			-0.0000	-0.0003
			(0.0037)	(0.0037)
Neuroticism			-0.0423***	-0.0419***
			(0.0143)	(0.0144)
Health, Early Developm, Physical Appearance				
Attractive Child (age 11)				-0.0185
				(0.0132)
Unttractive Child (age 11)				-0.0102
				(0.0213)
Height of child at 11 quintile 5				-0.0282
(excl quint 3)				(0.0259)

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Table 3 – *Continued from previous page*

	Selection into single-sex school			
	(1) Baseline	(2) + Cogn.	(3) +Non-Cogn.	(4) +Health/ Phys. Appear.
Overweight at age 11				0.0101
				(0.0185)
Low Birth Weight				-0.0779***
				(0.0263)
Illness at birth				0.0596
				(0.0378)
Mom's age at birth 30-34				-0.0174
(excl less 20)				(0.0323)
Late walking				0.0275
				(0.0296)
Late speaking				0.0054
				(0.0233)
Wet after 3 years old				0.0418
				(0.0332)
Family Size and Region FE	Yes	Yes	Yes	Yes
Observations	4691	4691	4691	4691

Notes: Coefficients on some (insignificant) variables are left out due to space constraints.

Table 4: Determinants of Girls Attending Single-Sex Schools

	Selection into single-sex school			
	(1) Baseline	(2) + Cogn.	(3) +Non-Cogn.	(4) +Health/ Phys. Appear.
Individual and Family Characteristics				
Birth order	-0.0053	-0.0051	-0.0061	-0.0114**
	(0.0043)	(0.0043)	(0.0046)	(0.0055)
Only brothers	0.0285	0.0261	0.0343	0.0355
	(0.0212)	(0.0211)	(0.0226)	(0.0226)
Religion: catholic/christian	0.1021***	0.0907***	0.0875***	0.0858***
	(0.0183)	(0.0180)	(0.0192)	(0.0192)
White	-0.0070	-0.0146	-0.0011	-0.0001
	(0.0153)	(0.0152)	(0.0165)	(0.0165)
Language English	0.0070	0.0040	0.0099	0.0126
	(0.0200)	(0.0198)	(0.0208)	(0.0209)
Parents little interest	-0.0418***	-0.0351**	-0.0359**	-0.0371**
in child's educ	(0.0146)	(0.0148)	(0.0150)	(0.0150)
Father's educ: less than HS	-0.0413*	-0.0293	-0.0230	-0.0215
	(0.0220)	(0.0218)	(0.0233)	(0.0233)
Father's educ: post HS	0.0851**	0.0811**	0.0872**	0.0864**
	(0.0337)	(0.0333)	(0.0354)	(0.0356)
Mother's educ: less than HS	-0.0523**	-0.0382*	-0.0340	-0.0313
	(0.0205)	(0.0203)	(0.0215)	(0.0216)
Father: professional	0.1576***	0.1236***	0.1214***	0.1151***
	(0.0216)	(0.0217)	(0.0225)	(0.0225)
Father: skilled job	0.0304*	0.0256	0.0236	0.0220
	(0.0164)	(0.0163)	(0.0169)	(0.0170)
Mom married at child's birth	-0.0650***	-0.0645***	-0.0374	0.0287
	(0.0226)	(0.0223)	(0.0250)	(0.0364)
Mom worked part-time	-0.0256	-0.0261*	-0.0323*	-0.0286*
	(0.0157)	(0.0156)	(0.0165)	(0.0167)
Free school meals	-0.0264	-0.0165	-0.0165	-0.0146
	(0.0225)	(0.0224)	(0.0232)	(0.0238)
Any financial difficulties	-0.0027	0.0125	0.0110	0.0211

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Table 4 – *Continued from previous page*

	Selection into single-sex school			
	(1) Baseline	(2) + Cogn.	(3) +Non-Cogn.	(4) +Health/ Phys. Appear.
	(0.0191)	(0.0189)	(0.0199)	(0.0201)
Cognitive skills				
Verbal score quintile 1		-0.0313	-0.0399**	-0.0376*
		(0.0194)	(0.0199)	(0.0201)
Verbal score quintile 2		-0.0397**	-0.0434**	-0.0429**
		(0.0177)	(0.0179)	(0.0180)
Verbal score quintile 4		0.0821***	0.0814***	0.0806***
		(0.0199)	(0.0201)	(0.0202)
Verbal score quintile 5		0.1502***	0.1543***	0.1516***
		(0.0231)	(0.0233)	(0.0234)
Math score quintile 1		-0.0236	-0.0086	-0.0075
		(0.0192)	(0.0204)	(0.0205)
Math score quintile 2		-0.0062	0.0058	0.0064
		(0.0193)	(0.0203)	(0.0204)
Math score quintile 4		0.0112	0.0218	0.0217
		(0.0210)	(0.0220)	(0.0222)
Math score quintile 5		0.0207	0.0197	0.0201
		(0.0201)	(0.0208)	(0.0208)
Non-Cognitive skills				
Neuroticism			-0.0260**	-0.0258**
			(0.0130)	(0.0131)
Conscientiousness			-0.0115**	-0.0124**
			(0.0058)	(0.0058)
Health, Early Developm, Physical Appearance				
Attractive Child (age 11)				-0.0117
				(0.0153)
Unttractive Child (age 11)				-0.0230
				(0.0233)
Height of child at 11 quintile 5				0.0514**
(excl quint 3)				(0.0258)
Overweight at age 11				-0.0284
				(0.0254)

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Table 4 – *Continued from previous page*

	Selection into single-sex school			
	(1) Baseline	(2) + Cogn.	(3) +Non-Cogn.	(4) +Health/ Phys. Appear.
Low Birth Weight				-0.0039
				(0.0265)
Illness at birth				-0.0051
				(0.0391)
Mom's age at birth 30-34				0.0587*
(excl less 20)				(0.0330)
Late walking				0.0085
				(0.0369)
Late speaking				0.0232
				(0.0317)
Wet after 3 years old				0.0405
				(0.0356)
Family Size and Region FE	Yes	Yes	Yes	Yes
Observations	4496	4496	4496	4496

Table 5: The effect of single-sex education on male students' marriage outcomes: Ever married/cohabiting

	Ever married/Cohabiting by 42			
	OLS	PSM Radius Calip		PSM -
BOYS		0.02	0.01	Kernel
1 Specification	-0,011	-0,014	**-0,015**	**-0,015**
Base (Ind and Fam Backgr)	(0,009)	(0,009)	(0,009)	(0,009)
	[-1,245]	[-1,562]	[-1,666]	[-1,664]
2 Specification	-0,011	**-0,015**	**-0,016**	**-0,017**
+ Cognitive Skills	(0,009)	(0,009)	(0,009)	(0,009)
	[-1,210]	[-1,696]	[-1,712]	[-1,742]
3 Specification	-0,012	**-0,017**	**-0,018**	**-0,019**
+ Non Cognitive Skills	(0,009)	(0,01)	(0,01)	(0,010)
	[-1,285]	[-1,702]	[-1,732]	[-1,851]
4 Specification	-0,012	**-0,017**	**-0,019**	**-0,019**
+ Attractiveness/Health	(0,009)	(0,01)	(0,01)	(0,011)
	[-1,285]	[-1,692]	[-1,802]	[-1,825]

Notes: The table shows the effects of single-sex education with standard errors in round brackets and t-statistics in squared brackets.

Table 6: The effect of single-sex education on female students' marriage outcomes: Ever married/cohabiting

	Never married/cohabiting by 42			
	OLS	PSM Radius Calip		PSM -
GIRLS		0.02	0.01	Kernel
1 Specification	0,001	-0,009	-0,006	-0,004
Base (Ind and Fam Backgr)	(0,007)	(0,007)	(0,007)	(0,007)
	[0,158]	[-1,240]	[-0,864]	[-0,604]
2 Specification	0,000	-0,004	-0,002	-0,004
+ Cognitive Skills	(0,007)	(0,008)	(0,008)	(0,008)
	[-0,014]	[-0,557]	[-0,285]	[-0,468]
3 Specification	0,002	-0,007	-0,008	-0,006
+ Non Cognitive Skills	(0,008)	(0,008)	(0,008)	(0,008)
	[0,223]	[-0,822]	[-0,927]	[-0,724]
4 Specification	0,002	-0,004	-0,006	-0,005
+ Attractiveness/Health	(0,008)	(0,008)	(0,008)	(0,008)
	[0,195]	[-0,458]	[-0,672]	[-0,635]

Notes: The table shows the effects of single-sex education with standard errors in round brackets and t-statistics in squared brackets.

Table 7: The effect of single-sex education on male students' marriage outcomes: Separated/divorced

	Separated/Divorced by 42			
	OLS	PSM Radius Calip		PSM -
BOYS		0.02	0.01	Kernel
1 Specification	**0,030**	0,017	0,021	0,023
Base (Ind and Fam Backgr)	(0,014)	(0,014)	(0,014)	(0,014)
	[2,098]	[1,216]	[1,479]	[1,573]
2 Specification	**0,033**	0,018	0,023	**0,025**
+ Cognitive Skills	(0,014)	(0,014)	(0,015)	(0,015)
	[2,301]	[1,306]	[1,581]	[1,690]
3 Specification	**0,041**	**0,026**	**0,029**	**0,030**
+ Non Cognitive Skills	(0,016)	(0,015)	(0,016)	(0,016)
	[2,621]	[1,686]	[1,829]	[1,818]
4 Specification	**0,041**	**0,026**	**0,030**	**0,032**
+ Attractiveness/Health	(0,016)	(0,015)	(0,016)	(0,017)
	[2,621]	[1,718]	[1,845]	[1,940]

Notes: The table shows the effects of single-sex education with standard errors in round brackets and t-statistics in squared brackets.

Table 8: The effect of single-sex education on male students' family outcomes: Having children

	Having Children			
	OLS	PSM Radius Calip		PSM -
BOYS		0.02	0.01	Kernel
1 Specification	-0,019	-0,007	-0,014	-0,013
Base (Ind and Fam Backgr)	(0,019)	(0,020)	(0,021)	(0,019)
	[-0,995]	[-0,375]	[-0,663]	[-0,677]
2 Specification	-0,013	-0,021	-0,005	-0,013
+ Cognitive Skills	(0,019)	(0,021)	(0,021)	(0,020)
	[-0,662]	[-1,008]	[-0,235]	[-0,649]
3 Specification	-0,016	-0,025	-0,016	-0,021
+ Non Cognitive Skills	(0,021)	(0,022)	(0,019)	(0,022)
	[-0,794]	[-1,117]	[-0,820]	[-0,947]
4 Specification	-0,015	-0,016	-0,014	-0,021
+Appearance/Health	(0,021)	(0,023)	(0,024)	(0,022)
	[-0,735]	[-0,729]	[-0,604]	[-0,923]

Notes: The table shows the effects of single-sex education with standard errors in round brackets and t-statistics in squared brackets.

Table 9: Robustness: Restriction to common support

	Restriction to Common Support			
BOYS	OLS	PSM Radius Calip 0.02	0.01	PSM - Kernel
Ever married/cohab by 33	**-0,025**	**-0,035**	**-0,034**	**-0,035**
	(0,013)	(0,015)	(0,015)	(0,015)
	[-1,902]	[-2,351]	[-2,314]	[-2,400]
Ever married/cohab by 42	-0,011	**-0,018**	**-0,019**	**-0,019**
	(0,009)	(0,011)	(0,011)	(0,010)
	[-1,216]	[-1,703]	[-1,775]	[-1,808]
Separated/divorced by 42	**0,039**	**0,030**	**0,031**	**0,030**
	(0,016)	(0,017)	(0,017)	(0,017)
	[2,532]	[1,790]	[1,807]	[1,823]
Child by 42	-0,015	-0,016	-0,017	-0,019
	(0,021)	(0,023)	(0,023)	(0,022)
	[-0,735]	[-0,729]	[-0,753]	[-0,874]

Notes: The table shows the effects of single-sex education controlling for/matching on individuals and family background variables, cognitive and noncognitive skills, physical appearance, early development and health.

Table 10: Sample attrition

	Attrition: Yes/No			
	(1)	(2)	(3)	(4)
	Baseline	+ Backgr	+Cog/Noncogn	+Beauty/Health
BOYS				
Single-sex school	0.01	0.01	0.01	0.01
	(0.01)	(0.01)	(0.01)	(0.01)
Controls				
Ind and Fam Backgr	No	Yes	Yes	Yes
Cog and noncog skills	No	No	Yes	Yes
Health, phys appearance	No	No	No	Yes
Observations	4767	4767	4767	4767
GIRLS				
Single-sex school	0.01	0.01	-0.00	0.00
	(0.01)	(0.01)	(0.01)	(0.01)
Controls				
Ind and Fam Backgr	No	Yes	Yes	Yes
Cog and noncog skills	No	No	Yes	Yes
Health, phys appearance	No	No	No	Yes
Observations	4562	4562	4562	4562

Table 11: Determinants of single-sex schooling

	Selection into single-sex school	
	Boys	Girls
Sexually normal	-0.16	0.06
	(0.25)	(0.14)
Sexually abnormal	-0.32	0.11
	(0.28)	(0.16)
Sexually delayed	-0.21	0.07
	(0.26)	(0.15)
Sexually keen	-0.17	0.03
	(0.26)	(0.15)
Controls		
Ind and Fam Background	Yes	Yes
Cognitive Scores	Yes	Yes
Noncognitive skills	Yes	Yes
Health and Appearance	Yes	Yes
Observations	4242	4320

Table 12: Robustness: Main result controlling for sexual development

	Never married/Cohabiting by 42			
	OLS	PSM Radius Calip		PSM -
BOYS		0.02	0.01	Kernel
1 Specification	0,01	0,01	0,01	0,01
Base (Ind and Fam Backgr)	(0,01)	(0,01)	(0,01)	(0,01)
	[1,27]	[1,56]	[1,63]	[1,63]
2 Specification	0,01	0,01	**0,02**	**0,02**
+ Cognitive Skills	(0,01)	(0,01)	(0,01)	(0,01)
	[1,21]	[1,56]	[1,81]	[1,80]
3 Specification	0,01	**0,02**	**0,02**	**0,02**
+ Non-Cognitive Skills	(0,01)	(0,01)	(0,01)	(0,01)
	[1,27]	[1,91]	[1,86]	[1,84]
4 Specification	0,01	**0,02**	**0,02**	**0,02**
+ Attractiveness/Health	(0,01)	(0,01)	(0,01)	(0,01)
	[1,22]	[1,70]	[1,78]	[1,81]
5 Specification	0,01	**0,02**	**0,02**	**0,02**
+ Sexual development	(0,01)	(0,01)	(0,01)	(0,01)
	[1,33]	[1,82]	[1,73]	[1,74]

Notes: The table shows the effects of single-sex education with standard errors in round brackets and t-statistics in squared brackets.

Table 13: Summary statistics: Types of schools

	Types of Schools					
	Boys			Girls		
	Single-sex	Co-ed	All	Single-sex	Co-ed	All
Private	301	105	406	281	62	343
	74.1%			81.9%		
Public: Comprehensive	376	2766	3142	419	2508	2927
	12.0%			14.3%		
Grammar	403	188	591	485	223	708
	68.1%			68.5%		
Secondary Modern	331	1048	1379	360	948	1308
	24.0%			27.5%		
All	1438	4118	5556	1561	3753	5314
	25.9%			29.4%		

Table 14: Robustness: Results by type of school

	Effects by School Type			
BOYS	OLS	PSM Radius Calip 0.02	0.01	PSM - Kernel
Public Schools				
Separated/Divorced at 42	**0,045**	**0,052**	**0,049**	**0,050**
	(0,019)	(0,022)	(0,022)	(0,022)
Never Married/Cohab at 42	0,009	0,014	0,016	0,014
	(0,011)	(0,014)	(0,013)	(0,013)
- Public School: Compreh				
Separated/Divorced at 42	**0,065**	**0,068**	0,049	0,045
	(0,031)	(0,032)	(0,032)	(0,031)
Never Married/Cohab at 42	0,020	0,008	0,016	0,017
	(0,018)	(0,020)	(0,020)	(0,019)
Private Schools				
Separated/Divorced at 42	0,083	0,008	0,008	0,008
	(0,072)	(0,053)	(0,053)	(0,053)
Never Married/Cohab at 42	**0,079**	**0,121**	**0,101**	**0,091**
	(0,042)	(0,043)	(0,032)	(0,052)

Notes: The table shows the effects of single-sex education controlling for/matching on individuals and family background variables, cognitive and noncognitive skills, physical appearance, early development and health.

Table 15: The effect of single-sex education intermediate outcomes at age 16: Preferences for marriage and family

	Not Wanting to Marry			
	OLS	PSM Radius Calip		PSM -
BOYS		0.02	0.01	Kernel
1 Specification	-0,005	-0,008	-0,007	-0,007
Base (Ind and Fam Backgr)	(0,006)	(0,006)	(0,006)	(0,006)
	[-0,864]	[-1,257]	[-1,081]	[-1,135]
2 Specification	-0,004	-0,004	-0,004	-0,003
+ Cognitive Skills	(0,006)	(0,007)	(0,007)	(0,007)
	[-0,596]	[-0,635]	[-0,566]	[-0,508]
3 Specification	0,003	0,004	0,004	0,003
+ Non-Cognitive Skills	(0,007)	(0,008)	(0,007)	(0,007)
	[0,396]	[0,520]	[0,498]	[0,369]
4 Specification	0,001	-0,003	-0,001	0,000
+ Attractiveness/Health	(0,007)	(0,008)	(0,008)	(0,007)
	[0,153]	[-0,427]	[-0,184]	[0,019]

Notes: The table shows the effects of single-sex education with standard errors in round brackets and t-statistics in squared brackets.

Table 16: The effect of single-sex education intermediate outcomes at age 16: Preferences for marriage and family

	Not Wanting to Have Children			
	OLS	PSM Radius Calip		PSM -
BOYS		0.02	0.01	Kernel
1 Specification	0,004	0,004	0,004	0,005
Base (Ind and Fam Backgr)	(0,006)	(0,006)	(0,006)	(0,006)
	[0,740]	[0,690]	[0,659]	[0,749]
2 Specification	0,004	0,004	0,004	0,004
+ Cognitive Skills	(0,006)	(0,006)	(0,006)	(0,006)
	[0,718]	[0,662]	[0,548]	[0,610]
3 Specification	0,010	0,004	0,008	0,009
+ Non-Cognitive Skills	(0,007)	(0,007)	(0,007)	(0,007)
	[1,399]	[0,615]	[1,065]	[1,205]
4 Specification	0,008	0,007	0,006	0,006
+ Attractiveness/Health	(0,007)	(0,007)	(0,007)	(0,007)
	[1,130]	[0,893]	[0,803]	[0,887]

Notes: The table shows the effects of single-sex education with standard errors in round brackets and t-statistics in squared brackets.

Table 17: The effect of single-sex education intermediate outcomes at age 16: Experience/interaction

	Attending Parties by 16			
	OLS	PSM Radius Calip		PSM -
BOYS		0.02	0.01	Kernel
1 Specification	**-0,050**	**-0,063**	**-0,059**	**-0,056**
Base (Ind and Fam Backgr)	(0,016)	(0,017)	(0,017)	(0,017)
	[-3,043]	[-3,651]	[-3,451]	[-3,292]
2 Specification	**-0,045**	**-0,045**	**-0,048**	**-0,048**
+ Cognitive Skills	(0,017)	(0,018)	(0,018)	(0,018)
	[-2,716]	[-2,498]	[-2,696]	[-2,704]
3 Specification	**-0,058**	**-0,061**	**-0,061**	**-0,060**
+ Non-Cognitive Skills	(0,018)	(0,020)	(0,020)	(0,019)
	[-3,151]	[-3,024]	[-3,092]	[-3,073]
4 Specification	**-0,058**	**-0,061**	**-0,059**	**-0,060**
+ Appearance/Health	(0,018)	(0,020)	(0,020)	(0,020)
	[-3,194]	[-3,028]	[-2,932]	[-3,083]

Notes: The table shows the effects of single-sex education with standard errors in round brackets and t-statistics in squared brackets.

Table 18: The effect of single-sex education intermediate outcomes at age 16: Experience/interaction

	Romantic relationship by 16			
	OLS	PSM Radius Calip		PSM -
BOYS		0.02	0.01	Kernel
1 Specification	-0,004	**-0,005**	**-0,005**	**-0,005**
Base (Ind and Fam Backgr)	(0,002)	(0,002)	(0,002)	(0,002)
	[-1,683]	[-2,595]	[-2,598]	[-2,537]
2 Specification	-0,004	**-0,006**	**-0,005**	**-0,005**
+ Cognitive Skills	(0,003)	(0,002)	(0,002)	(0,002)
	[-1,545]	[-2,692]	[-2,438]	[-2,342]
3 Specification	-0,004	**-0,005**	**-0,005**	**-0,005**
+ Non-Cognitive Skills	(0,003)	(0,003)	(0,003)	(0,002)
	[-1,323]	[-2,130]	[-2,142]	[-2,193]
4 Specification	-0,004	**-0,005**	**-0,005**	**-0,006**
Base + Cog + NonCog + Health	(0,003)	(0,003)	(0,003)	(0,002)
	[-1,243]	[-1,826]	[-2,020]	[-2,312]

Notes: The table shows the effects of single-sex education with standard errors in round brackets and t-statistics in squared brackets.

Table 19: The effect of single-sex education intermediate outcomes at age 16: Noncognitive skills

	Cautious/Impulsive			
	OLS	PSM Radius Calip		PSM -
BOYS		0.02	0.01	Kernel
1 Specification	**-0,077**	**-0,077**	**-0,081**	**-0,073**
Base (Ind and Fam Backgr)	(0,030)	(0,031)	(0,030)	(0,032)
	[-2,515]	[-2,493]	[-2,717]	[-2,318]
2 Specification	**-0,064**	**-0,062**	**-0,072**	**-0,059**
+ Cognitive Skills	(0,031)	(0,032)	(0,030)	(0,033)
	[-2,056]	[-1,946]	[-2,378]	[-1,798]
3 Specification	**-0,069**	**-0,066**	**-0,073**	**-0,062**
+ Non-Cognitive Skills	(0,032)	(0,035)	(0,033)	(0,036)
	[-2,141]	[-1,905]	[-2,208]	[-1,733]
4 Specification	**-0,069**	**-0,063**	**-0,069**	**-0,059**
+ Attractiveness/Health	(0,032)	(0,035)	(0,033)	(0,036)
	[-2,141]	[-1,784]	[-2,083]	[-1,643]

Notes: The table shows the effects of single-sex education with standard errors in round brackets and t-statistics in squared brackets.

Table 20: The effect of single-sex education intermediate outcomes at age 16: Noncognitive skills

	Timid/Aggressive			
	OLS	PSM Radius Calip		PSM -
BOYS		0.02	0.01	Kernel
1 Specification	**-0,081**	**-0,085**	**-0,086**	**-0,083**
Base (Ind and Fam Backgr)	(0,025)	(0,025)	(0,024)	(0,026)
	[-3,305]	[-3,357]	[-3,555]	[-3,214]
2 Specification	**-0,082**	**-0,079**	**-0,084**	**-0,075**
+ Cognitive Skills	(0,025)	(0,026)	(0,025)	(0,027)
	[-3,290]	[-3,064]	[-3,423]	[-2,839]
3 Specification	**-0,089**	**-0,084**	**-0,085**	**-0,079**
+ Non-Cognitive Skills	(0,026)	(0,028)	(0,027)	(0,029)
	[-3,420]	[-2,969]	[-3,168]	[-2,738]
4 Specification	**-0,089**	**-0,077**	**-0,079**	**-0,076**
+ Attractiveness/Health	(0,026)	(0,029)	(0,027)	(0,029)
	[-3,420]	[-2,697]	[-2,939]	[-2,579]

Notes: The table shows the effects of single-sex education with standard errors in round brackets and t-statistics in squared brackets.

Table 21: Potential mechanisms behind effects of single-sex schools on marriage outcomes

	Never married/Cohabiting at 42			
	OLS		PSM - Kernel	
	Benchmark	Personality Controls	Benchmark	Personality Controls
1 Specification	0.011	0.005	0.015 *	0.011
Base (Ind and Fam Backgr)	(0.009)	(0.009)	(0.009)	(0.009)
2 Specification	0.011	0.004	0.017 *	0.011
+ Cognitive Skills	(0.009)	(0.009)	(0.009)	(0.010)
3 Specification	0.012	0.004	0.019 *	0.014
+ Non-Cognitive Skills	(0.009)	(0.010)	(0.010)	(0.011)
4 Specification	0.012	0.004	0.019 *	0.013
+ Attractiveness/Health	(0.009)	(0.010)	(0.011)	(0.011)

Table 22: Potential mechanisms behind effects of single-sex schools on marriage outcomes

	Separated/Divorced at 42			
	OLS		PSM - Kernel	
	Benchmark	Personality Controls	Benchmark	Personality Controls
1 Specification	0.030 **	0.032 ***	0.023	0.025 *
Base (Ind and Fam Backgr)	(0.014)	(0.014)	(0.014)	(0.015)
2 Specification	0.033 ***	0.035 ***	0.025 *	0.025
+ Cognitive Skills	(0.014)	(0.015)	(0.015)	(0.016)
3 Specification	0.041 ***	0.040 ***	0.030 *	0.030 *
+ Non-Cognitive Skills	(0.016)	(0.016)	(0.016)	(0.017)
4 Specification	0.041 ***	0.040 ***	0.032 *	0.028
+ Attractiveness/Health	(0.016)	(0.016)	(0.017)	(0.017)