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ABSTRACT

Teacher Gender Effects on Students' Socio-Emotional Skills*

Socio-emotional skills are recognized as key factors influencing both early and later life outcomes. However, there is limited evidence on how these skills are shaped within the classroom environment. This paper uses nationally representative survey data from England to examine the impact of teacher gender on students' socio-emotional skills. We employ a student fixed effects model. Our findings show that male teachers positively influence male students' prosocial behavior, while negatively affecting female students' peer problems. We provide support for the role model hypothesis and present novel evidence on how parents respond to teacher-student gender match by adjusting their investment strategies for daughters.

JEL Classification: D91, I21, J13, J24
Keywords: gender, teachers, socio-emotional skills, child development

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1 Introduction

Socio-emotional skills, described as aptitudes that enable individuals to establish social bonds and regulate their emotional responses, have been shown to be important for a vast range of outcomes such as academic achievement and labor market success (Almlund *et al.*, 2011; Borghans *et al.*, 2008; Deming, 2017; Sorrenti *et al.*, 2025; Woessmann, 2024).[1] While the formation of socio-emotional skills within family has been amply investigated (Attanasio *et al.*, 2022; Cunha & Heckman, 2007; Doyle *et al.*, 2017; Kosse *et al.*, 2020; Zumbuehl *et al.*, 2021) less is known about the shaping of these skills within the classroom. There is some evidence on pre-school settings shaping children's socio-emotional skills (Fort *et al.*, 2020; Morando & Platt, 2022). Chetty *et al.* (2011) show that high-quality kindergarten classes significantly improve non-cognitive measures in 4th and 8th grades which are strongly correlated with earnings. Evidence of impact of schools on socio-emotional skills formation is very scarce, possibly due to the fact that most datasets do not include information about both the school environment and students' socio-emotional skills or even if this information exist is not available longitudinally.[2]

This paper aims to close this gap by studying the effect of teacher gender in primary school on children's socio-emotional skills. Young people spend a considerable amount of time in school interacting with teachers. Along with parents, teachers are the primary educators of young people and the interactions between students and teachers greatly influence students' life outcomes, going way beyond classroom. The evidence up to date shows that when there is a demographic match between the student and the teacher, either in terms of gender or race, students who are matched with their teachers often perform better both in the short- and long-run (Dee, 2004; Card *et al.*, 2022).[3] However, the evidence up to date primarily focused on outcomes like teacher-assessed and standardized exams, progression to more advanced courses, school absences and exclusions, university enrollment, and adulthood income. Yet, the influence of teachers can be beyond these outcomes as the classroom environment might also impact

[1] See further Heckman *et al.* (2006); Knack & Keefer (1997); Carpenter & Seki (2011); Kosse & Tincani (2020) for labor market outcomes, Kaestner & Callison (2011); Dohmen *et al.* (2009) for health and well-being, and (Algan *et al.*, 2022) for crime.

[2] An exception is Miller (2022) who studies the impact of private schools on socio-emotional development of adolescence.

[3] For further evidence on different outcomes, see Antecol *et al.* (2015); Aucejo *et al.* (2022); Carrell *et al.* (2010); Chetty *et al.* (2014); Dee (2005, 2007); Fairlie *et al.* (2014); Gershenson *et al.* (2022); Holford & Sen (2024); Holt & Gershenson (2019); Lindsay & Hart (2017); Lusher *et al.* (2018); Kofoed *et al.* (2019); Winters *et al.* (2013)

students non-cognitive skills. Indeed, Gong *et al.* (2018) show that when students are taught by a teacher of the same gender, they have better mental health and higher levels of motivation.

There are several ways that teachers can impact students outcomes. The first and the most discussed theory is the role model hypothesis. Students, especially those from underrepresented groups may see the teachers from their own demographic groups as their role models and this might improve their outcomes through increased self-esteem or aspirations (Card *et al.*, 2022; Dee, 2004; Gong *et al.*, 2018). Second, it is possible that teachers from underrepresented groups might be better at giving advise to underrepresented students. As they share similar experiences, they might be better at understanding these students and they might provide better advice that would improve students from their own demographic groups (Canaan & Mouganie, 2023; Egalite & Kisida, 2018). And relatedly, third, they can provide better school and classroom experiences by shaping the way they teach which might improve students' enjoyment of school and classes leading to better outcomes for students (Egalite & Kisida, 2018).

In order to study the impact of teacher gender on students' socio-emotional skills, we use rich data from Millennium Cohort Study, a longitudinal survey following the individuals born in 2000 and their families every other year since cohort members were 9 months old. The dataset has rich information about child development at different stages and more importantly information from the teachers at age 7 and 11 when the children are in primary school in England. At these ages, teachers, parents, and children have all been surveyed so we have detailed information about them all. Students' socio-emotional skills have been measured using Strengths and Difficulties Questionnaire (Goodman, 1997). This validated measure has been used in the psychology and economics literature (e..g, Attanasio *et al.*, 2020; Papageorge *et al.*, 2019; Del Bono *et al.*, 2024) to examine different dimensions of socio-emotional skills: emotional problem, peer problems, conduct problems, hyperactivity, and prosociality. From the teacher survey, we have detailed information about teachers' characteristics, their education and experience, classroom characteristics as well as some school characteristics. Most importantly, we have data on teacher gender. In our data, 16% of primary school teachers are males while the official statistics for the latest years show that in England 14% of primary school teachers are male while the proportion of male teachers in primary and secondary schools is about 25%. (Fullard, 2023).

Studying the impact of teachers on students' outcomes is challenging. In an ideal setting,

students would be randomly allocated to teachers and then researchers can study the differences in students outcomes based on the teacher allocation as in Dee (2004). Without experiments, this is not possible. Simple estimation methods, such as OLS, fails to give unbiased estimates. First, to derive unbiased estimates from OLS, the allocation of teachers to students needs to be random. This might not be the case if parents choose schools or if schools allocate students to the classrooms based on some rules. To test this issue, we investigate whether we can predict the gender of the teachers that the students are exposed to with student and family level characteristics at age 7 and 11 and find no significant correlation which shows that there is no selection into teacher gender based on observable characteristics. Another issue is omitted variable bias. There might be several unobservable characteristics that are important for the development of child skills and not controlling for these characteristics might lead to biased estimates. Despite the availability of rich survey data that enables us to control for multiple family, child, and school-related variables, such measures may prove inadequate in addressing unobservable characteristics. In order to control for the unobservable characteristics, we exploit the longitudinal structure of the data. Specifically, we employ a within-individual fixed effects model by using two data points corresponding to each cohort member at ages 7 and 11. This approach allows us to control for unobserved factors that remain constant over time such as genetic endowments, enabling us to derive a more reliable estimation of the impacts of teacher gender on children's socio-emotional skills.

Our results show that having a male teacher at primary school positively impacts male students' socio-emotional skills while having a negative impact on female students' skills. More specifically, female students exposed to a male teacher have a 11.9% of standard deviation more peer problems (statistically significant at 5% level). These issues reflects social withdrawal, peer rejection, or difficulties in forming relationships and may be related to social anxiety or neurodevelopmental conditions. On the other hand, male students exposed to a male teacher have 14.3% of a standard deviation higher prosociality (statistically significant at 5% level), reflecting empathy, social conscience, and the ability to form positive relationships. Interestingly, the only dimension where both female and male students are positively impacted by male teachers is prosociality, although for female students the effect is half the one of male students and not statistically significant. These results show that while having a male teacher might exacerbate some internalizing issues for girls, there is a positive impact for boys' prosociality.

Our rich data allows us to recover some of the possible mechanisms. We first focus on teachers' prosociality. We use data from UK Household Longitudinal Study, a nationally representative survey to study how teachers and males vary in their prosociality. Consistent with the findings of the literature, we find females and teachers to be more prosocial. However, when it comes to frequent prosociality which is measured by donating to a charity (either money or time) weekly, females do not differ based on their jobs while male teachers donate more than male non-teachers providing evidence that there is a gender and occupation difference in prosociality that favors male teachers. This suggests that male students may view their teachers as role models, which could serve as a potential channel through which prosocial behavior is enhanced among male students.

The role model hypothesis could explain the findings on prosociality but is less likely to be able to explain the negative impact on female students' peer relationships. We hence test whether the enjoyment of the school experience for female students differ form the one of male students when exposed to a male teacher. We find that being exposed to a male teacher in primary school positively impact enjoyment of school by 8.4ppt and enjoyment of courses by 14.9% of a standard deviation for male students only. While the coefficients are positive for female students too, they have a lower magnitude compared to those of male students and are not statistically significant.

Finally, we analyze parental investments, an outcome that has not been studied in this particular strand of literature. The assumption of most papers on the teacher - student demographic characteristics match ignores that not only students, but also parents, could react to the gender of the teacher. Specifically, we study how parental investment changes when the students are exposed to a male teacher. Our findings reveal a notable increase of 15.8% of a standard deviation in educational investments made by parents of female students when their children are exposed to a male teacher but there is no impact for male students. This can be driven by parents perceiving male teachers not to be beneficial for their daughters' (but not for their sons') education and they might increase their educational investment as a result to substitute the role of female teacher. Our findings point to the relevance of considering the behavioral parental responses when considering the impact of the teacher-student gender match.

Our study makes several contributions. First, we contribute to the literature on teacher effects by studying the impact of the gender of the teacher on a new outcome: students' socio-

emotional skills. While the large body of the literature studies the impact of teachers on test scores, some studies study the impact of teacher gender on students non-cognitive outcomes such as mental health and behavior (e.g., Jackson, 2018; Lindsay & Hart, 2017; Holt & Gershenson, 2019). Gong *et al.* (2018) consider the impact of male teachers on depression, sadness and unhappiness and Liang *et al.* (2024) study the impact of teacher composition on confidence, depression, smoking, and drinking. They find that teacher gender (and gender composition of teachers) play an important positive role in these non-cognitive outcomes. We extend this literature by studying the impact of teacher's gender on children's socio-emotional skills at early ages, using a standardized validate measure which has largely been shown to determine future outcomes such as academic achievement (e.g., Sorrenti *et al.*, 2025) and earnings (e.g., Kosse & Tincani, 2020).

Our second contribution relates to investigating the mechanisms underlying our findings. The literature on teacher-gender match has mainly supported social identity theories suggesting that individuals derive self-esteem and a sense of belonging from group membership. Seeing a teacher who "looks like me" can validate students identity and serve as aspirational role models, especially for historically marginalized groups, reinforcing belief in their own academic potential and career possibilities (Card *et al.*, 2022; Dee, 2004, 2005, 2007). Egalite & Kisida (2018) find that students who share the same gender and/or racial background as their teachers tend to perceive their teachers more positively than their peers who do not share these characteristics. Specifically, they are more likely to feel cared for by their teachers, find their schoolwork more engaging, and report more favorable instructional experiences, particularly in terms of teacher communication and guidance. These students also report exerting greater personal effort in their studies and express higher aspirations for attending college. On the other hand, in the existing literature there is no evidence of (female) teachers inflating grades or of paying more attention to or being more effective at teaching at (female) students (Gershenson *et al.*, 2016; Lavy & Sand, 2018; Lavy & Megalokonomou, 2024; Paredes, 2014; Terrier, 2020). We find some support for the role model hypothesis. First, we find suggestive evidence that male teachers have higher propensity to engage into prosocial behavior, thus representing a role model to male students by exhibiting high prosociality compared to other male role models. Second, we show that male students exposed to male teachers enjoy more the school experience compared to being exposed to female teachers, wile for female students there is no significant effect on school enjoyment.

We further investigate a novel mechanism: whether parents respond to the teacher-student gender in terms of the investment in their children. There is some evidence that mixed gender teacher teams promote active teacher-parent contact, parental supervision with homework, and parental educational expectations (Liang *et al.*, 2024). A small although growing branch of the literature has been examining how parents respond to school characteristics, such as school quality (Greaves *et al.*, 2023), class size (Datar & Mason, 2008; Fredriksson *et al.*, 2016), and school resources (Houtenville & Conway, 2008; Das *et al.*, 2013). We contribute to this literature by investigating, for the first time, whether parental investment in their children is affected by the teacher-student gender match and we find evidence for this: parents of female students significantly invest more in the education of their daughters if they are exposed to a male teacher. The lack of any impact of the student-teacher gender match among students of the opposite gender beyond one outcome could be related to the mediating impact of the diversion of parental resources allocation in response to teachers' gender. While this mechanism does not nullify the role model explanation, it is definitely a channel that should be explored more in future studies investigating the relevance of school characteristics on pupil's skills.

2 Primary School Education System in England

The English system of education is divided into educational levels called "Key Stage" (KS). KS1 corresponds to years 1 and 2 (ages 5-7), KS2 corresponds to years 3 - 6 (ages 7 - 11), KS3 corresponds to years 7 - 9 (ages 11 - 14), KS4 corresponds to years 10 and 11 (ages 14- 16) and KS5 corresponds to years 12 and 13 (ages 16 - 18.) The first four Key Stages (KS1 to KS4) make up the period of compulsory formal education. At the end of Key Stages 2, 4, and 5, students take national assessments, which are externally marked and anonymous. The first two key stages correspond to primary schooling while the remaining three key stages are secondary school. In this paper we focus on primary school which comprises two Key Stages: KS1 which ranges from when students are aged 4 to 7 and KS2 which ranges from 7 to 11 years old.

Primary schools are non-selective and the number of classes per year group varies by school size, with most schools having one to two classes per year group, though larger urban schools can have up to five. Primary schools can be state-funded or private. About 6% of students attend

private schools which charge relevant tuition fees.[4] While both types of schools need to follow the same national curriculum, there are differences between state-funded and private schools on characteristics such as class size and provision of extra-curricular activities.

Parents choose the state-funded primary school that their children go by firstly listing six school choices the academic year before starting school. Based on their choices (and other parents' choices in the area), children are allocated to a school at local authority level. The main criteria used by the local authorities for this placement is the distance between the schools and child's home. Other criteria are: whether the child is in foster care, has special educational needs, siblings attendance of the same school and a certificate of practicing a religion (for religious schools only). However, the schools that the children are allocated to could be outside of the ones listed by parents if the selected schools are over-subscribed. While parents can make strategic choices or move to a different area to be closer to a school, they do not have any control over which teacher their child is exposed to once at school as this is something decided by the school administration.

Each primary school teacher teaches basic mathematics and language skills. In the first two Key Stages, students take their courses with the same teachers throughout each academic year. The teachers might change from one academic year to another due to school policy (they might rotate the teachers that students get exposed to) or for external reasons, for example, teachers changing school or dropping off the profession.

3 Data and Descriptive Statistics

We use data from Millennium Cohort Study (MCS). MCS is a nationally representative cohort study that follows the lives of over 10,000 young people in the UK from their birth until their early adulthood. The study started collecting data when cohort members were 9 months and it follows them and their families at age 3, 5, 7, 11, 14, 17 and 23. Data is collected about cohort members and their parents at each wave with particular focus on child development and the factors that may affect it. We restrict our sample to include only those children attending primary school in England. The main reason for this restriction is that there are some differences

[4]Nowadays it would cost almost three hundred thousand pounds to send a child to a private day school from four to eighteen. Source: https://www.civitas.org.uk/2023/02/24/private-schooling-in-britain-a-snapshot/

in the education system across devolved nations (Scotland, Wales, and Northern Ireland). We also restrict our sample to singletons as having a twin might imply different resource allocation in the family and this might be important for students' socio-emotional development.

In this paper, we use information from the waves 1, 4 and 5, when children are aged 9 months, 7 and 11 years old. The first wave serves to collect information at baseline, such as whether the child was born preterm, their birth weight, etc. At both age 7 and 11 we have (i) information on students' socio-emotional skills and their family characteristics reported by the main parent; (ii) information on children's enjoyment of their school reported by the child in a self-reported questionnaire; and (iii) information about teachers' characteristics such as their gender and academic qualification as well as about the school and classroom they teach reported by the children's teacher in the teacher survey.

In terms of survey timing, at least 50% of the parents and children completed the survey at least 9 months after the school year started, 66% of them completed at least 6 months after the school year started and everyone completed the survey at least 4 months after the school year started. For teacher surveys, 71% of the teachers completed the survey at least 9 months after the school year started and all teachers completed the survey at least 4 months after the school year started. Therefore, there is sufficient time for teachers to impact students' socio-emotional skills and for parents to notice any change in their children's skills. Hence, the survey provides a unique opportunity for us to study the impact of teacher gender on students' socio-emotional skills as both the dependent and independent variables are measured after a sufficient time of exposure.

Measures of socio-emotional skills have been derived using the Strengths and Difficulties Questionnaire (SDQ). SDQ is a widely used behavioral screening tool designed to assess psychological adjustment in children and adolescents across five key dimensions: emotional symptoms, conduct problems, hyperactivity/inattention, peer relationship problems, and prosocial behavior (Goodman, 1997). Each subscale includes five items and the parent/carer rates each item as either: Never = 0, Somewhat True = 1 or Certainly True = 2. The emotional symptoms scale captures internalizing difficulties such as frequent worries, unexplained physical complaints (e.g., headaches or stomach aches), persistent sadness, nervousness in new situations, and the presence of fears or phobias. This dimension reflects early signs of anxiety and depression, as well as difficulties in emotional regulation. The conduct problems

scale focuses on externalizing behaviors including temper tantrums, disobedience, fighting or bullying, lying, and stealing. High scores on this scale may indicate oppositional defiant behavior or emerging conduct disorders, and more broadly reflect challenges related to rule-following, aggression, and empathy. The hyperactivity/inattention dimension assesses difficulties related to attention regulation and activity level. It includes behaviors such as restlessness, constant fidgeting, destructibility, poor concentration, and impulsivity. This scale reflects core characteristics of attention-deficit/hyperactivity disorder (ADHD), encompassing both hyperactive and inattentive traits. The peer relationship problems scale measures difficulties in social integration and relationships with other children. It includes signs of social withdrawal, such as a preference for adult company, experiences of being bullied, challenges in making friends, and broader peer rejection. This dimension may reflect underlying social anxiety or difficulties associated with neurodevelopmental conditions. Finally, the prosocial behavior scale, which is the only positively framed dimension in the SDQ, captures socially desirable traits such as kindness, helpfulness, sharing, and concern for others' feelings. High scores on this scale indicate empathy, social conscience, and the capacity to form positive interpersonal relationships.

In our analysis, we consider the first four scales (emotional problems, conduct problems, hyperactivity, and peer problems) separately and reverse code them so that higher values mean less issues, as in the last dimension (prosociality). Some earlier papers such as Attanasio *et al.* (2020); Bryant *et al.* (2020); Goodman (1997); Goodman *et al.* (2010) combine the first two measures to depict internalizing skills and the second two measures to depict externalizing skills. However, as some recent literature shows that the impact of each of these measures might be different for later life outcomes (Del Bono *et al.*, 2024), we analyze them separately. In addition to looking at the raw values, we also consider scores that are above the 10th percentile threshold, which psychologists consider as indicative of particular behavioral difficulties, requiring further investigation. These scores correspond to 4 for emotional problems, peer problems, and conduct problems, prosociality and 7 for hyperactivity. A total score between 14 and 17 from the first four scales is typically considered "borderline" in clinical terms. Using these thresholds, we create dummy variables for each subscale, as well as for having a total score in the behavioral difficulty range (17 or above) and for having a score that is either behavioral difficulty or borderline (14 or above).

Panel A of Table 1 reports the summary statistics of students' socio-emotional skills at age

Table 1: Baseline Differences

	(1) Male	(2) Female	(3) p-value	(4) White	(5) Minority	(6) p-value	(7) Low SES	(8) High SES	(9) p-value
Panel A: Outcomes									
Emotional Problems (Reversed)	-0.00	-0.03	0.17	0.02	-0.16	0.00	-0.08	0.16	0.00
	(1.03)	(0.98)		(0.98)	(1.10)		(1.05)	(0.85)	
Behavioral Difficulty	0.08	0.07	0.19	0.07	0.11	0.00	0.09	0.04	0.00
	(0.27)	(0.26)		(0.26)	(0.31)		(0.29)	(0.20)	
Peer Problems (Reversed)	-0.10	0.04	0.00	0.05	-0.34	0.00	-0.11	0.19	0.00
	(1.06)	(0.95)		(0.99)	(1.05)		(1.04)	(0.88)	
Behavioral Difficulty	0.12	0.08	0.00	0.09	0.15	0.00	0.12	0.06	0.00
	(0.32)	(0.27)		(0.28)	(0.36)		(0.32)	(0.24)	
Conduct Problems (Reversed)	-0.09	0.11	0.00	0.01	-0.01	0.56	-0.09	0.25	0.00
	(1.05)	(0.92)		(1.00)	(0.96)		(1.04)	(0.79)	
Behavioral Difficulty	0.12	0.08	0.00	0.10	0.09	0.49	0.12	0.05	0.00
	(0.32)	(0.27)		(0.30)	(0.29)		(0.32)	(0.21)	
Hyperactivity (Reversed)	-0.17	0.16	0.00	0.01	-0.07	0.00	-0.10	0.25	0.00
	(1.01)	(0.94)		(1.00)	(0.96)		(1.00)	(0.91)	
Behavioral Difficulty	0.16	0.09	0.00	0.13	0.13	0.98	0.15	0.08	0.00
	(0.37)	(0.29)		(0.33)	(0.33)		(0.35)	(0.27)	
Prosociality	-0.17	0.17	0.00	0.01	-0.05	0.03	-0.03	0.07	0.00
	(1.08)	(0.88)		(0.99)	(1.05)		(1.03)	(0.94)	
Behavioral Difficulty	0.03	0.01	0.00	0.02	0.02	0.11	0.02	0.01	0.00
	(0.17)	(0.10)		(0.13)	(0.15)		(0.15)	(0.11)	
Panel B: Mechanisms									
Parental Inputs - Educational	0.08	0.11	0.15	0.02	0.35	0.00	0.12	0.02	0.00
	(0.96)	(0.98)		(0.97)	(0.93)		(0.96)	(1.00)	
Parental Inputs - Recreational	-0.07	-0.01	0.01	0.03	-0.26	0.00	-0.05	0.01	0.02
	(1.02)	(0.98)		(0.97)	(1.08)		(1.02)	(0.96)	
Like Courses	-0.08	0.12	0.00	-0.03	0.21	0.00	0.01	0.04	0.31
	(1.04)	(0.92)		(1.00)	(0.90)		(1.01)	(0.91)	
Like School	0.44	0.64	0.00	0.51	0.64	0.00	0.55	0.50	0.00
	(0.50)	(0.48)		(0.50)	(0.48)		(0.50)	(0.50)	

Notes: Source: Millennium Cohort Study, wave 4 (age 7). Outcome variables (except Behavioral Difficulty dummies), Parental Inputs and Like Courses variables are standardized with a mean of 0 and a standard deviation of 1. The first 4 outcomes are reverse coded so a higher value represents less problems and better skills. Behavioral Difficulty variables and Like School variable are dummies. Behavioral Difficulty dummies for emotional problems, peer problems, and conduct problems take the value of 1 if corresponding scores are 4 or above and 0 otherwise. Behavioral Difficulty dummy for hyperactivity takes the value of 1 if the corresponding score is 7 or above and 0 otherwise. Behavioral Difficulty dummy for prosociality takes the value of 1 if the corresponding score is 4 or below. Likes school dummy takes the value of 1 if the student answers how much they like their school question with "like it a lot". Minority refers to racial minority students and is defined for all non-White students. Socio-economic status grouping is based on maternal education and if a student has a mother who has a university diploma or above, they are classified as high SES. p-values columns the p-values from t-test of equality of means for each group (gender, race, and SES).

7 by student gender, race, and socio-economic status (SES), and the p-values of the differences in means for each of the outcomes between relevant groups. The table shows some striking gender differences. Male students always have lower socio-emotional skills across all dimensions and, except for emotional problems, they are more likely to be considered to have behavioral difficulties based on the criteria used by psychologist. There are also racial and SES differences. Low SES students have worse skills and are more likely to be classified to have behavioral difficulties on all dimensions of socio-emotional skills while for racial differences, White students perform better in terms of emotional issues, peer problems, hyperactivity and prosociality while there is no racial difference in conduct problems. Although there are racial differences

in hyperactivity, there is no difference when it comes to being considered to have behavioral difficulties for this dimension which shows that the differences might be due to scores not close to the threshold.

Figure 1 shows the distribution of students' socio-emotional skills at age 7 by both students' and teachers' gender. Overall, male students are worse than female students regardless of their teachers' gender. However, when we look at the figures by teacher gender, we find that when male students are exposed to male teachers, they are less likely to have their scores at the bottom of the distribution. For females, this is the opposite, when they are exposed to male teachers, their scores are less likely to be on the top of the distribution. In conclusion, these graphs show that the impact of male teachers on male students might be concentrated on the students at the bottom while the influence of male teachers on female students might be concentrated on the students at the top. However, as these figures show the scores at age 7 and do not control for any of the teacher or student level characteristics, these remain simple correlations.

4 Empirical Strategy

Our aim is to examine the impact of teacher gender on students' socio-emotional skills; however, analyzing this relationship presents several methodological challenges. Methods like Ordinary Least Squares lead to bias due to unobserved outcomes that impact both the independent variable of interest and the outcome variables. Even with rich data, dealing with unobserved factors is often not possible. Additionally, there is selection issue: If students with certain characteristics are more exposed to male (or female) teachers, then this would impair to detect a "clean" estimation of the effect of teacher gender on students' socio-emotional skills.

In order to understand whether students with certain characteristics are exposed to male teachers and whether this constitutes a potential bias issue, we regress student characteristics against a male teacher dummy variable. We do this separately for a vast range of children, family, and household characteristics which are important for students' skills. We present the results separately for having a male teacher at age 7 and at age 11 in Figure 2. The figure shows that except for father's neuroticism which correlates to having a male teachers at age 11, none of the mother, father, household or child level characteristics can explain exposure to male teachers. This provides some empirical evidence that the selection on observable characteristics

Figure 1: Socio-Emotional Skills at Baseline

Figure 1.1A: Emotional Problems (Reversed) – Male Students

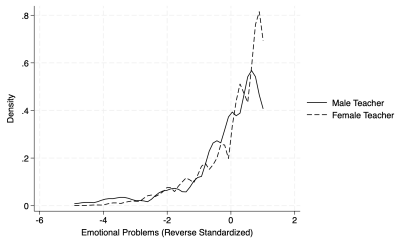


Figure 1.1B: Emotional Problems (Reversed) – Female Students

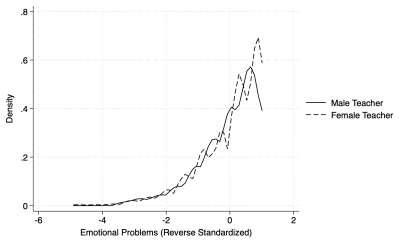


Figure 1.2A: Peer Problems (Reversed) – Male Students

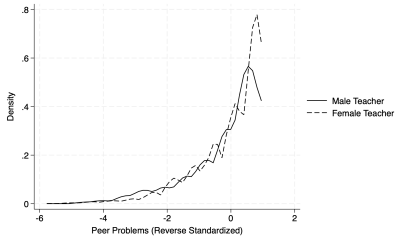


Figure 1.2B: Peer Problems (Reversed) – Female Students

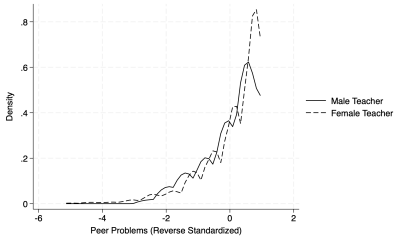


Figure 1.3A: Conduct Problems (Reversed) – Male Students

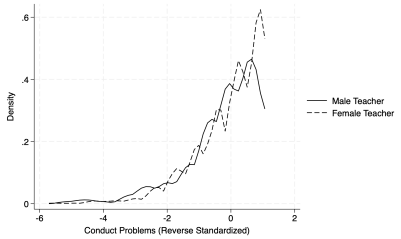


Figure 1.3B: Conduct Problems (Reversed) – Female Students

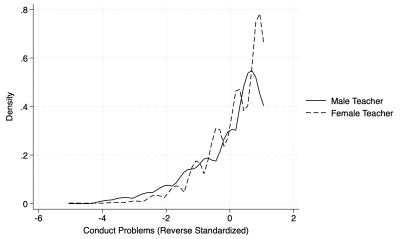


Figure 1.4A: Hyperactivity (Reversed) – Male Students

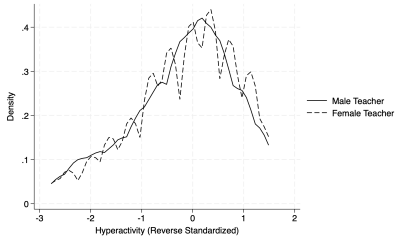


Figure 1.4B: Hyperactivity (Reversed) – Female Students

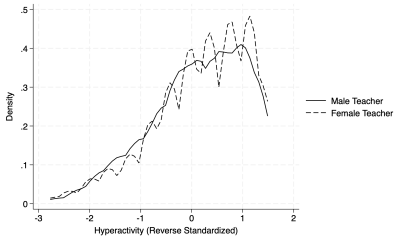


Figure 1.5A: Prosociality – Male Students

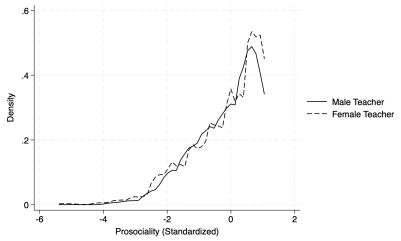
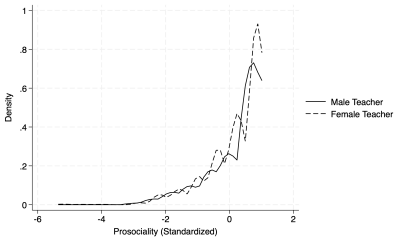


Figure 1.5B: Prosociality – Female Students



Notes: Source: Millennium Cohort Study, wave 4 (age 7). All variables are standardized with a mean of 0 and a standard deviation of 1. Variables in the first 4 panels are reverse-coded, meaning higher scores indicate fewer problems. The figures display the Kernel density graphs for each variable, split by male and female students. Within the figures, the density lines are shown separately for those taught by male versus female teachers.

is not an issue for our setting.

While we find no evidence on selection on observables, there might be other unobservable characteristics that are correlated with the teacher gender and with children's skills. Not accounting for these unobservable characteristics can still lead to bias in our results. To deal with this endogeneity issue, we make use of the longitudinal feature of our dataset and implement a within-student fixed effects as in Fairlie *et al.* (2014) and Cattan *et al.* (2023). This method controls for individual fixed effects, effectively accounting for any time-invariant characteristics at the child and family level, such as innate ability or genetic factors, that could influence the outcomes of interest. In doing so we exploit the variation in teacher gender across two points in primary school, at age 7 and 11, and estimate the below empirical specification:

$$y_{it} = \beta TGender_{it} + \alpha_i + \gamma_{ct} + \omega_{st} + u_{it} \tag{1}$$

where subscript i stands for each cohort member and t denotes their age, either 7 or 11. y_{it} is one of the five socio-emotional skill dimensions, $TGender$ is a dummy that takes the value of 1 if the teacher is a male and 0 if is a female. This is our main variable of interest. γ_{ct} represents a rich set of classroom level characteristics such as class size, whether the classroom is mixed in terms of years, total number of special education needs students, of excluded students, of English as a second language students and of disruptive peers. Controlling for classroom characteristics improves precision in estimating the impact of teacher's gender as students are exposed to their teacher within the classroom environment. Furthermore, ω_{st} indicates whether the school is single- or mixed-sex, and u_{it} is the error term unknown to the econometrician. α_i represents unobserved heterogeneity, hence characteristics such as innate ability and household resources which are constant across the period observed. This means that we can net out of the equation all those unobservable characteristics of the child and her family that are fixed in the period 7 to 11 years old. Thus, our main identifying assumption here is that the child's unobservable factors that affect their socio-emotional skills development will stay constant between age 7 and 11 and the change in TGender is not a function of the socio-emotional skill development of the student.

A crucial requirement for applying an individual fixed-effects model is having sufficient variation in the independent variable of interest, in this case, teacher gender. This is particularly relevant in our context, as the teaching workforce in the UK is predominantly female, with only

Figure 2: Selection on Observables

Figure 2.1: Selection into Male Teachers at Age 7

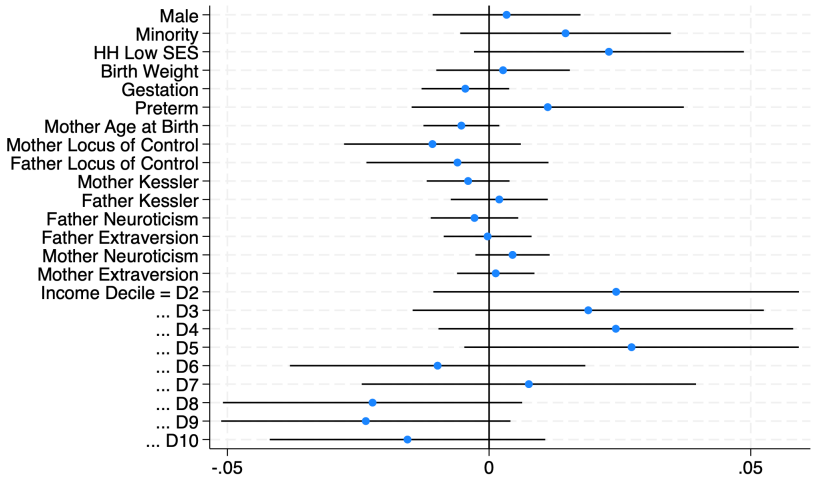
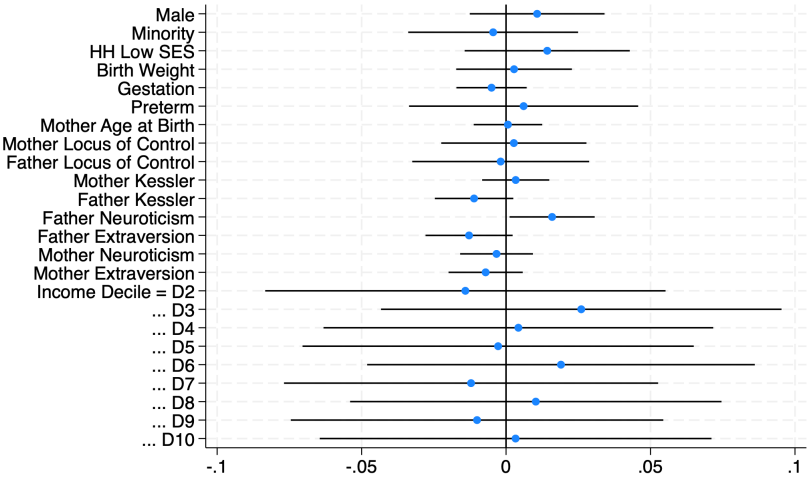


Figure 2.2: Selection into Male Teachers at Age 11



Notes: Source: Millennium Cohort Study, waves 4 and 5 (age 7 and 11). The figures display the coefficients and confidence intervals from OLS regressions. Each variable listed on the y-axis is regressed separately on a male teacher dummy variable. For income deciles, they are treated as a categorical variable, with the first decile being as the base level. Mother and Father Locus of Control were measured when the child was 9 months old, while the Kessler psychological distress scale, Neuroticism, and Extraversion were assessed when the child was 7 years old.

about 25% of teachers being male. If a student's teacher's gender does not change between ages 7 and 11, the fixed-effects model cannot estimate the impact of teacher gender, since it relies on within-individual variation over time. In our data 28% of students experience a change in teacher gender during this period. Appendix Table A1 shows that most of these transitions are from female to male teachers, though there are also instances where students move from having a male teacher at age 7 to a female teacher at age 11. This allows us have enough variation in the change in the teacher gender to estimate the impact of teacher gender on students' socio-emotional skills.

Finally, the estimation of equation (1) might not give us the pure impact of teacher gender on students' socio-emotional skills if some of the teacher or class characteristics that are correlated with teacher gender and might impact socio-emotional skills are not controlled for. To understand which teacher characteristics are correlated with teacher gender, we regress a large range of teacher and class characteristics against teacher gender at age 7 and 11 in Appendix Table A2. We show that some of the teacher and class characteristics are correlated with the teacher gender such as teacher experience and number of disturbing peers in class. Given the importance of these variables in the outcomes of the students, we control for these and also all the variables listed in Appendix Table A2 in our empirical specification to net out the impact of teacher gender on students' outcomes.

5 Results

5.1 The Effect of Teacher Gender on Socio-Emotional Skills

Our main aim is to estimate the impact of teacher gender on students' socio-emotional skills. To do so, we focus on five domains of the measures derived from Strengths and Difficulties Questionnaire: i) emotional problems ii) peer problems, iii) conduct problems, iv) hyperactivity, and v) prosociality. As the first four measures are problems, we reverse code them so that the outcomes refer to less problems (or higher skills).

Our main findings are presented in Table 2. The table reports results for the full sample of students, as well as separately by student gender. We find that being taught by a male teacher has no significant effect on internalizing or externalizing behaviors among male students. However, for female students, having a male teacher is associated with a 11.9% of a standard

Table 2: Socio-Emotional Skills

Panel A: Internalizing Skills

	Emotional Problems (Reversed)			Peer Problems (Reversed)		
	(1) All	(2) Male	(3) Female	(4) All	(5) Male	(6) Female
Male Teacher	-0.007	0.005	-0.017	-0.043	0.026	-0.119**
	(0.042)	(0.056)	(0.063)	(0.043)	(0.064)	(0.059)
Observations	8,549	4,222	4,327	8,550	4,222	4,328
Controls	Yes	Yes	Yes	Yes	Yes	Yes

Panel B: Externalizing Skills

	Conduct Problems (Reversed)			Hyperactivity (Reversed)		
	(1) All	(2) Male	(3) Female	(4) All	(5) Male	(6) Female
Male Teacher	0.005	0.013	-0.017	0.031	0.081	-0.019
	(0.040)	(0.065)	(0.050)	(0.033)	(0.052)	(0.043)
Observations	8,556	4,226	4,330	8,528	4,213	4,315
Controls	Yes	Yes	Yes	Yes	Yes	Yes

Panel C: Prosociality

	All	Male	Female
	(1)	(2)	(3)
Male Teacher	0.111**	0.143**	0.073
	(0.045)	(0.066)	(0.061)
Observations	8,563	4,230	4,333
Controls	Yes	Yes	Yes

Notes: Source: Millennium Cohort Study, waves 4 and 5 (age 7 and 11). All the outcome variables are standardized with a mean of 0 and a standard deviation of 1. The outcomes in the first two panels are reversed so that a higher scores indicates less problems and better skills. In the last panel, the outcome is a a positive measures so a higher score means better skills. All the regressions include controls. These are teacher experience, teacher experience in the same school, teacher education, class size, whether the class is a mixed-year class, total number of special education needs students in the class, total number of students in the class who have been excluded, total number of English as a second language (ESL) students in the class, a dummy for having a disruptive student(s) in the class and a dummy variable for whether a school is a mixed-sex or single-sex school. Results from the fixed effects regressions. Standard errors are clustered at individual level. Standard errors are in parentheses. * p <0.1, ** p <0.05, *** p <0.01.

deviation increase in peer problems. More broadly, across all other measures of internalizing and externalizing behaviors, the coefficients for female students are consistently negative, indicating more behavioral issues, while those for male students are consistently positive, suggesting fewer problems. This pattern may not be surprising, as these measures capture behavioral and emotional difficulties, and students may feel less comfortable confiding in a teacher of the opposite sex. Notably, the effects on internalizing behaviors are larger than those on externalizing behaviors, suggesting that emotional and relational difficulties which are often shaped by how students feel rather than how they act are more sensitive to teacher-student gender mismatch. This supports the idea that students may receive less emotional support or guidance when their teacher is not of the same gender.

Panel C of Table 2 presents the results for prosociality. Prosociality reflects a positive social skills such as the ability to understand others, offer help, and show kindness. In that sense, it closely resembles empathy. We find that exposure to male teachers is associated with an average increase of 11.1% of a standard deviations in students' prosocial behavior. When we break this down by student gender, the effect is primarily driven by male students, for whom prosociality statistically significantly increases by 14.3% of a standard deviations. For female students, the estimated effect is smaller at 7.3% of a standard deviation and is not statistically significant.

One common use of the Strengths and Difficulties Questionnaire (SDQ) is to help identify children who may need support from counselors or behavioral therapists. Psychologists often rely on subscale scores from the SDQ to assess whether a child's behavioral difficulties warrant further intervention. We present the results of this analysis in Appendix Table A3. First, our findings confirm that defining behavioral difficulty cases as those in the top 10% of the score distribution is appropriate for our data. For internalizing problems, approximately 10% of the sample is classified to have behavioral difficulties, while for externalizing problems, the corresponding figures are 9% and 11% for the two subcategories. This suggests that our sample is broadly representative and not unusually high- or low-risk.

Second, the results in Panel A show that having a male teacher has no significant effect on being classified as high-risk based on students' overall SDQ scores, indicating no general benefit or harm. However, when we examine the subscales, we find that the previously observed increase in peer problems among female students (Panel A of Table 2) leads to a 5.1ppt increase in the likelihood of these students being classified as having behavioral difficulty in peer-related

behavior. The size of this effect suggests that it disproportionately affects students who are near the threshold. In terms of being classified as high-risk based on prosociality scale, there is no impact of having a male teacher. There is an interesting finding on hyperactivity: Although Panel B of Table 2 shows no significant change in the continuous hyperactivity scores, Appendix Table A3 reveals that male students are 4.5ppt less likely to be classified as having behavioral difficulty with hyperactivity. This implies that the statistically insignificant reduction in the hyperactivity score of 8.1% of a standard deviation observed in Panel B, may be enough to shift some students to below the cutoff, reducing their classification to have behavioral difficulty in this specific dimension.

6 Potential Mechanisms

In this section, we explore possible mechanisms that may explain our main finding: male teachers have a positive and statistically significant effect on the prosocial skills of male students, and a negative effect on the peer relationships of female students. We begin by examining two channels related to the role model mechanism. Specifically, we assess whether male teachers are particularly prosocial and whether students' enjoyment of school differs depending on the gender of the teacher. Additionally, we introduce a novel mechanism concerning how parents may adjust their educational investments based on teacher-student gender match, providing new evidence on the intersection of school and family influences in children's development.

6.1 Are Male Teachers Particularly Prosocial?

Various different factors can influence prosocial behavior and the importance of these factors might differ for males and females (Espinosa & Kovářík, 2015). Although our dataset does not include direct measures of teachers' socio-emotional skills or any other non-cognitive skills that might serve as a proxy for their socio-emotional skills or their prosociality, we study how teachers, and specifically male teachers differ in their prosociality compared to the rest of the population.

To do so, we make use of a nationally representative dataset, the UK Household Longitudinal Study. This study follows households over time and has extensive information about its members as well as households. Specifically, we use data from 2017-2019. and focus on individuals'

Table 3: Teacher Prosociality

Panel A: Ever Donated in the Past 12 Months

	All		Male	Female
	(1)	(2)	(3)	(4)
Teacher	0.133***		0.119***	0.121***
	(0.013)		(0.026)	(0.015)
Male		-0.067***		
		(0.005)		
Observations	17818	33338	8204	9614

Panel B: Donation Frequency

	Donates Monthly				Donates Weekly			
	(1) All	(2) All	(3) Male	(4) Female	(5) All	(6) All	(7) Male	(8) Female
Teacher	0.073***		0.088***	0.071***	0.017*		0.040*	0.014
	(0.018)		(0.034)	(0.021)	(0.010)		(0.022)	(0.011)
Male		0.005				0.018***		
		(0.007)				(0.004)		
Observations	11875	21430	5146	6729	11875	21430	5146	6729

Notes: Source: UK Household Longitudinal Survey, wave 10 (2017-2019). Outcome variables are dummy variables for ever donating in the previous 12 months (Panel A), donating weekly or more often (Panel B), and donating monthly or more often (Panel C). Donations include both monetary and time donations.Robust standard errors are in parentheses. * p <0.1, ** p <0.05, *** p <0.01.

prosociality. As in the case of Millennium Cohort Study, we do not have direct measures of prosociality. However, we have information about donations to charity and the frequency of it. As prosociality includes empathy and helping others, this measure of donations serves as a valid proxy for individuals' prosociality.

In Table 3, we study differences in donations by gender and occupation (teacher vs not teacher). Panel A provides the analysis on whether the individual ever donated in the past 12 months and Panel B provides the analysis on frequency of donating, either monthly or weekly. Here, donations include not only monetary donations but also time donations so if someone is volunteering for a charity, they are also considered donating. The results on the gender differences and by occupation are in line with the findings of the literature: Teachers donate more both in terms of ever donating in the past 12 months (1.33ppt) and also in terms of the frequency of donation (7.3ppt for monthly and 1.7ppt for weekly donations) compared to non-teachers while men donate less (6.7ppt in ever donation) compared to women.

When we focus on the teacher vs non-teacher differences by gender in columns 3, 4 of Panel

A and 3, 4, 7 and 8 of Panel B, we find that teachers are more likely to ever donate in the past 12 months (11.9ppt for males and 12.1ppt for females) and to donate monthly (8.88ppt for males and 7.1ppt for females). When we examine weekly donations, we see that male teachers are 4ppt more likely to donate weekly than male non-teachers while for the females the coefficient is much smaller and is not statistically significant.

Overall, our results show that teachers are more prosocial than non-teachers and there is a gender difference, even among teachers when it comes to more frequent prosocial behavior. This might be one of the mechanisms of the increase in students' prosociality scores as for male students prosociality scores improve much more than those of female student when they have a male teacher. Combined with broader gender differences in prosociality in the general population, it is possible that male students who may lack a highly prosocial role model at home benefit more from having such a role model at school.

6.2 Enjoyment of School

One of the common arguments for the positive effects of teacher-student gender match in the literature is that students have a more positive school experience via relational and motivational dynamics (Egalite & Kisida, 2018). While the literature often highlights the benefits of female role models for girls, especially in male-dominated fields (Card *et al.*, 2022), it is plausible that boys similarly benefit from male role models in educational settings. Given concerns about boys' lower engagement and higher school dissatisfaction, male teachers may offer a relatable reference point that fosters stronger identification with school, greater motivation, and higher enjoyment. Crucially, this mechanism does not rely on biased grading or differential teaching effectiveness. In fact, existing studies find no evidence that female teachers systematically favor female students (Gershenson *et al.*, 2016; Lavy & Sand, 2018; Lavy & Megalokonomou, 2024; Paredes, 2014; Terrier, 2020).

We test whether students' enjoyment of school varies by teacher gender. Using cohort member survey data, we construct two outcome measures: one for general school enjoyment, based on a single categorical item converted into a binary indicator for "liking school a lot," and another index for course enjoyment (in English, Mathematics, and Science). We construct this index using the method proposed by Anderson (2008) which allocates lower weights to the variables that are highly correlated with each other.

Table 4: Mechanism

Panel A: Enjoyment of School and Courses

	Enjoyment of School			Enjoyment of Courses		
	(1) All	(2) Male	(3) Female	(4) All	(5) Male	(6) Female
Male Teacher	0.076***	0.084**	0.062	0.151***	0.149*	0.121
	(0.028)	(0.039)	(0.041)	(0.054)	(0.079)	(0.074)
Observations	8,453	4,130	4,323	8,387	4,109	4,278
Controls	Yes	Yes	Yes	Yes	Yes	Yes

Panel B: Parental Inputs - Educational and Recreational Investments

	Educational Investments			Recreational Investments		
	(1) All	(2) Male	(3) Female	(4) All	(5) Male	(6) Female
Male Teacher	0.057	-0.058	0.158**	-0.007	0.070	-0.101
	(0.055)	(0.077)	(0.079)	(0.051)	(0.074)	(0.072)
Observations	8,751	4,318	4,433	8,510	4,194	4,316
Controls	Yes	Yes	Yes	Yes	Yes	Yes

Notes: All outcome variables except Likes School are standardized with mean 0 and standard deviation 1. Likes School is a dummy variable that takes the value of 1 if the student likes the school "a lot" and 0 otherwise. All regressions include controls. These are teacher experience, teacher experience in the same school, teacher education, class size, whether the class is a mixed-year class, total number of special education needs students in the class, total number of students in the class who have been excluded, total number of English as a second language (ESL) students in the class, a dummy for having a disruptive student(s) in the class and a dummy variable for whether a school is a mixed-sex or single-sex school. Results from the fixed effects regressions. Standard errors are clustered at individual level. Standard errors are in parentheses. * p <0.1, ** p <0.05, *** p <0.01.

We present the results of this analysis in Panel A of Table 4[5]. The table shows that having a male teacher increases both school and course enjoyment for male and female students, though the effects are statistically significant only for males. Male students with a male teacher are 8.4ppt more likely to report high school enjoyment, and their course enjoyment increases by 15% of a standard deviation. These findings align with the role model hypothesis, suggesting that male students, as an underrepresented group in terms of engagement and emotional connectedness with school, benefit particularly from male teacher representation. This result is important as it may have long-term implications: improved enjoyment could lead to greater effort and, ultimately, higher human capital accumulation (Gneezy *et al.*, 2019).

[5]We present enjoyment for specific courses in Appendix Table A8

6.3 Parental Investments

School, family, and teachers are the primary influences on children's skill development, each playing a distinct role while also shaping outcomes through their interactions with one another. Building on the literature on whether parental and school inputs act as complements or substitutes (Becker & Tomes, 1976; Todd & Wolpin, 2007), recent work explores parental responses to school features such as school quality (Greaves *et al.*, 2023), class size (Datar & Mason, 2008; Fredriksson *et al.*, 2016), and school resources (Das *et al.*, 2013; Houtenville & Conway, 2008).

If parents perceive teacher-student gender match as an important element in their children's skills development and believe that their child will receive more attention or is better understood by a teacher of the same gender, they may adjust their investments when their child has a teacher of opposite gender. Our data includes rich information on parental investments. We divide parental investments into educational and recreational investments (see Appendix Table B1 for the more details). The reason for this division is motivated by the finding of Bono *et al.* (2016) who show that different investments by parents result in improvements in different skills. As in the enjoyment of course variables, we use the method proposed by Anderson (2008) to create two parental investment indexes, one related to educational investments and another for recreational investments.

We present the results of this analysis in Panel B of Table 4. We find that that parents increase their educational investment when their daughter has a male teacher by 15.8% of a standard deviation which is significant at 5% level while they reduce their recreational investments by a smaller but still large amount (10%) although this reduction is not significant. For male students, having a male teacher is associated with a decrease in educational investment (5.8%) and an increase in recreational investment (7%), though neither effect is statistically significant.

These findings suggest that parents may adjust their behavior in response to teacher-student gender mismatch by reallocating their investments from recreational activities to educational activities. In particular, parents of girls may increase their educational input to compensate for what they perceive as a suboptimal teacher match, possibly due to concerns about male teachers' suitability for their daughters' education. Although we cannot fully disentangle the motivations behind these parental responses, our results highlight the importance of considering how family and school inputs interact. This may help explain the absence of any effects of gender match

for students in the non-underrepresented group, as shown in earlier studies (Gershenson *et al.*, 2016; Lavy & Sand, 2018; Lavy & Megalokonomou, 2024; Paredes, 2014; Terrier, 2020).

7 Further Analysis

7.1 Heterogeneity

Given the gender and socio-economic differences observed in Table 1, we further explore how the impact of teacher gender varies by students' socio-economic status (SES), as initial levels of socio-emotional skill development may influence how students respond to teacher characteristics. These heterogeneous effects are presented separately for male and female students in Appendix Table A4.

Our results show that the increase in peer problems among female students is entirely driven by those from high-SES backgrounds. In contrast, the rise in prosocial behavior among male students is exclusively driven by those from low-SES backgrounds. These findings suggest that socio-economic status plays an important role in shaping the effects of the teacher-student gender match, influencing how teacher gender impacts students' outcomes. The patterns observed in Table 1 help explain why these effects are concentrated among specific groups. Low-SES male students exhibit the lowest prosociality scores in the sample, while high-SES female students show the strongest peer relationship skills (i.e., the fewest peer problems). Since these groups have more scope for change in these outcomes, it is not surprising that they are the most affected by exposure to male teachers.

7.2 Robustness Checks

Teacher and School Controls

Since we aim to estimate the impact of the gender of the teacher on students' socio-emotional skills and we have shown that the gender of the teacher is correlated with certain characteristic of the teachers themselves and of the classroom, in our baseline specification we control for these characteristics. To asses the importance of the inclusion of these controls for influencing the impact of the teacher gender of students' skills, we examine the differences in results in three version of our fixed effects model: (i) with both teacher-level and class/school-level controls (our

main specification), (ii) without any teacher/class/school controls, (iii) only with teacher-level controls. We group class and school characteristics together because our school-level data are limited to whether the school is mixed-sex or single-sex, a factor that directly affects classroom composition as well. We present the results of this analysis in Appendix Table A5.

The results in Appendix Table A5 highlight the importance of including teacher and class/school-level controls in our analysis. For instance, the coefficient on prosociality for all students increases from 0.058 to 0.111 when these controls are added. Similarly, for female students, the coefficient on prosociality not only doubles in magnitude but also reverses direction. Although the differences between our main specification and the specification that includes only teacher-level controls are smaller, they are still meaningful. Overall, these findings show the importance of incorporating additional contextual controls in our fixed-effects framework to better isolate the impact of teacher gender.

Mundlak Test

To test the validity of our within-individual fixed-effects model we implement a Mundlak test, a more robust alternative to the traditional Hausman test. The Mundlak test helps determine whether the fixed-effects specification is preferred over random effects or pooled OLS by assessing the correlation between individual-specific effects and the regressors. We apply this test to each of the five socio-emotional skill outcomes, and the results are reported in Appendix Table A6.

All outcomes, except one, pass the test with p-values below 0.05, supporting the use of the fixed-effects model. The only exception is the emotional problems outcome, which fails to meet the test threshold. For this outcome, we also estimate pooled OLS, random effects, and correlated random effects models. However, none of these alternative specifications produce qualitatively different results compared to those in Table 2: the estimated effects of teacher gender on emotional problems are consistently insignificant.

Changes in Teacher Gender

Next, we look at how changes in teacher gender impacts students' socio-emotional skills while also controlling for students' lagged socio-emotional skills and a large set of individual and household level controls. This is a value added model similar to those that have been implemented in the child skills development literature (Bono *et al.*, 2016; Morando & Sen, 2025). We present

the result of this analysis in Appendix Table A7. The alternative model gives similar results. However, it highlights the importance of further investigating the relevance of the direction of the transition in the gender of the teacher (from male to female or vice versa) for explaining the main results on peer relationships for female students and of the continuous exposure to male teachers across time for conduct and hyperactivity problems. Due to data limitation we cannot draw too many conclusions from our analysis but this is a promising area of research for future studies.

8 Conclusion

There are consistent gender gaps found in the literature when it comes to students' young and adult academic, cognitive and non-cognitive outcomes. These gender gaps, which usually favors females, received attention from researchers in economics, education, and psychology. One of the hypotheses that has been studied widely in the literature is representation. Previous studies show that when students are taught by teachers or instructors who share their same demographic characteristics, such as gender or ethnicity, they perform better in their courses (Dee, 2004). These effects also persist over time, so that teachers affect students' later life outcomes (Gershenson *et al.*, 2022). The findings of the literature goes beyond the academic outcomes such as labor market outcomes (Holford & Sen, 2024). Yet the effect of teachers on students' non-cognitive skills are hardly studied, possibly due to lack of data.

The representation hypothesis provides a possible reason why girls outperform boys across several outcomes. Most of the teachers are females. If female students see their teachers as their role models and this improves their outcomes, then it is expected that girls outperform boys. This is especially important in the UK where the teaching workforce consists of 75.5% female teachers.

We fill this gap in the literature by using longitudinal data and exploiting the panel data structure of Millennium Cohort Study, a nationally representative cohort study from the UK. We show that teacher gender is important for students' socio-emotional skills development, especially for their prosocial skills. Our results show that male teachers improve students' prosocial skills and this effect is entirely driven by male students which provides evidence for the widely studied representation in the classroom hypothesis. Additionally, we find negative effects on girls: When

they have a male teacher, they are more likely to have peer problems. Our further analysis shows that teacher prosociality, enjoyment of school and classes, and parental responses to teacher gender can explain their impacts.

Our results provide some important policy suggestions. There is an ongoing debate across the world about teacher supply. There is a high turnover in the teaching profession, possibly due to low wages for the high effort that the profession requires. There are specific efforts by several governments to improve the ethnic and gender diversity of the profession. For example, in the UK over 75.5% and 85.1% of the teaching workforce are female and White even though the population statistics shows that 50.1% and 78.8% of the population is female and White. This shows that the teaching profession has a diversity problem. Due to these statistics, the government is actively trying to recruit male and minority individuals into the teaching force. Yet, the current evidence on the effect of representation in the classroom does not go beyond academic and some other outcomes related to the achievements of the students such as labor market outcomes.

Our results show that the effect of the representation is far beyond the classroom and labor market. We show that representation also has an effect on the students' socio-emotional skills. Considering that socio-emotional skills affect several early and later life outcomes, including academic achievement and labor market success, having a more representative teacher category might mitigate socio-demographic inequalities in several lifetime aspects.

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Appendix A: Additional Analysis

Table A1: Teacher Gender Variation

	Age 11		
	Male	Female	Total
Age 7 Male	45	125	170
	(1.55%)	(4.29%)	
Age 7 Female	701	2040	2741
	(24.08%)	(70.08%)	
Total	746	2165	2911

Notes: Source: Millennium Cohort Study, waves 4 and 5. The table shows the changes in teacher gender for students between age 7 and 11. Numbers in the first rows show the total number of students who have experienced a change or had with a teacher of same gender again while the second row shows the percentages of the numbers relative to the total.

Table A2: Teacher Gender and Characteristics by Wave

	(1) Year 7	(2) Year 11
Teacher Experience	-0.000	0.002*
	(0.001)	(0.001)
Teacher Experience - Same School	-0.002***	-0.005***
	(0.001)	(0.001)
Postgraduate Degree	0.024	-0.012
	(0.015)	(0.016)
Undergraduate Degree	-0.019	-0.041**
	(0.013)	(0.020)
Other	-0.066***	0.012
	(0.007)	(0.156)
Class Size	0.001	0.001
	(0.001)	(0.001)
Mixed Year	0.017*	0.017
	(0.010)	(0.015)
Total SEN	0.002	0.011***
	(0.002)	(0.003)
Total Excluded	0.009	0.010
	(0.014)	(0.009)
Total ESL	0.000	-0.000
	(0.001)	(0.001)
Disturbing Peer	0.019**	0.033**
	(0.009)	(0.013)
Mixed School	0.001	0.029
	(0.032)	(0.049)
Constant	0.037	0.132**
	(0.034)	(0.061)
Observations	3730	5031

Notes: Source: Millennium Cohort Study, waves 4 and 5. Outcome variable is a dummy for male teacher. The table shows the difference between male and female teachers for both waves of Millennium Cohort Study.Total SEN is the number of students in the class who are classified as a special education needs, Total Excluded is the number of students in the class who have been excluded from the school before, Total ESL is the number of students in the class who are classified as a English as a Second Language student. Mixed school is a dummy that takes the value of 1 if the school accepts both boys and girls and 0 otherwise. Robust standard errors are in parentheses. * p <0.1, ** p <0.05, *** p <0.01.

Table A3: Socio-Emotional Skills – Scores Defined as Behavioral Problem

Panel A: Totals

	Total Problems			Total Problem or Borderline		
	(1) All	(2) Male	(3) Female	(4) All	(5) Male	(6) Female
Male Teacher	0.006	0.004	0.006	-0.001	-0.024	0.022
	(0.013)	(0.020)	(0.016)	(0.015)	(0.020)	(0.022)
Observations	8,511	4,205	4,306	8,511	4,205	4,306
Mean	0.08	0.08	0.08	0.14	0.14	0.14
Controls	Yes	Yes	Yes	Yes	Yes	Yes

Panel B: Internalizing Problems

	Emotional Problems			Peer Problems		
	(1) All	(2) Male	(3) Female	(4) All	(5) Male	(6) Female
Male Teacher	0.007	0.001	0.019	0.024	0.002	0.051**
	(0.014)	(0.018)	(0.022)	(0.015)	(0.022)	(0.021)
Observations	8,549	4,222	4,327	8,550	4,222	4,328
Mean	0.10	0.10	0.10	0.10	0.10	0.10
Controls	Yes	Yes	Yes	Yes	Yes	Yes

Panel C: Externalizing Problems

	Conduct Problems			Hyperactivity		
	(1) All	(2) Male	(3) Female	(4) All	(5) Male	(6) Female
Male Teacher	0.006	0.006	0.008	-0.021	-0.045*	0.003
	(0.014)	(0.023)	(0.015)	(0.014)	(0.023)	(0.016)
Observations	8,556	4,226	4,330	8,528	4,213	4,315
Mean	0.09	0.09	0.09	0.11	0.11	0.11
Controls	Yes	Yes	Yes	Yes	Yes	Yes

Panel D: Prosociality

	All	Male	Female
	(1)	(2)	(3)
Male Teacher	-0.008	-0.013	-0.001
	(0.008)	(0.012)	(0.009)
Observations	8,563	4,230	4,333
Mean	0.02	0.02	0.02
Controls	Yes	Yes	Yes

Notes: Source: Millennium Cohort Study, waves 4 and 5 (age 7 and 11). All the outcome variables are dummies. The total problems dummy takes the value of 1 if the scores obtained from emotional problems, peer problems, conduct problems, and hyperactivity is 17 or above, and 0 otherwise. Total Problem or Borderline dummy is equal to 1 if the total score is 17 or above. Behavioral Difficulty dummies for emotional problems, peer problems, and conduct problems take the value of 1 if corresponding scores are 4 or above and 0 otherwise. Behavioral Difficulty dummy for hyperactivity takes the value of 1 if the corresponding score is 7 or above and 0 otherwise. Behavioral Difficulty dummy for prosociality takes the value of 1 if the corresponding score is 4 or below. All regressions include controls. These are teacher experience, teacher experience in the same school, teacher education, class size, whether the class is a mixed-year class, total number of special education needs students in the class, total number of students in the class who have been excluded, total number of English as a second language (ESL) students in the class, a dummy for having a disruptive student(s) in the class and a dummy variable for whether a school is a mixed-sex or single-sex school. Results from the fixed effects regressions. Standard errors are clustered at individual level. Standard errors are in parentheses. * p <0.1, ** p <0.05, *** p <0.01.

Table A4: Heterogeneity of the Impacts

	(1) Males	(2) Low SES Males	(3) High SES Males	(4) Females	(5) Low SES Females	(6) High SES Females
Emotional Problems (Reversed)	0.005	0.040	-0.052	-0.017	0.005	-0.057
	(0.056)	(0.070)	(0.095)	(0.062)	(0.077)	(0.103)
N	4222	2961	1258	4327	3061	1266
Peer Problems (Reversed)	0.026	0.085	-0.088	-0.119**	-0.086	-0.182*
	(0.061)	(0.076)	(0.101)	(0.059)	(0.071)	(0.108)
N	4222	2961	1258	4328	3061	1267
Conduct Problems (Reversed)	0.013	0.050	-0.078	-0.017	0.012	-0.057
	(0.057)	(0.077)	(0.076)	(0.052)	(0.064)	(0.089)
N	4226	2965	1258	4330	3064	1266
Hyperactivity (Reversed)	0.081*	0.079	0.085	-0.019	0.005	-0.065
	(0.048)	(0.064)	(0.073)	(0.047)	(0.059)	(0.077)
N	4213	2952	1258	4315	3049	1266
Prosociality	0.143**	0.157*	0.121	0.073	0.084	0.046
	(0.065)	(0.085)	(0.095)	(0.056)	(0.069)	(0.101)
N	4230	2969	1258	4333	3066	1267

Notes: Source: Millennium Cohort Study, wave 4 and 5 (age 7 and 11). The table shows the coefficient and standard errors of male teacher dummy from separate regressions for each sub-groups. Outcome variables are standardized with a mean of 0 and standard deviation of 1. The first 4 variables are reversed so a higher score means less problem and better skills. Results from the fixed effects regressions. Standard errors are clustered at student level. Standard errors are in parentheses. * p <0.1, ** p <0.05, *** p <0.01.

Table A5: Fixed Effects Model Specifications with Added Controls

	(1) Main Specification	(2) No Controls	(3) +Teacher Controls
Emotional Problems (Reversed)			
For All Students	-0.007	-0.004	-0.015
	(0.042)	(0.034)	(0.037)
N	8549	9521	9108
For Male Students	0.005	-0.003	-0.007
	(0.056)	(0.046)	(0.048)
N	4222	4720	4503
For Female Students	-0.017	-0.005	-0.024
	(0.063)	(0.052)	(0.055)
N	4327	4801	4605
Peer Problems (Reversed)			
For All Students	-0.043	-0.052	-0.047
	(0.043)	(0.035)	(0.038)
N	8550	9526	9111
For Male Students	0.026	0.014	0.023
	(0.064)	(0.052)	(0.055)
N	4222	4723	4505
For Female Students	-0.119**	-0.122**	-0.131**
	(0.059)	(0.048)	(0.052)
N	4328	4803	4606
Conduct Problems (Reversed)			
For All Students	0.005	-0.013	-0.023
	(0.040)	(0.032)	(0.034)
N	8556	9533	9118
For Male Students	0.013	0.028	0.001
	(0.065)	(0.049)	(0.053)
N	4226	4727	4509
For Female Students	-0.017	-0.057	-0.053
	(0.050)	(0.041)	(0.043)
N	4330	4806	4609
Hyperactivity (Reversed)			
For All Students	0.031	0.028	0.027
	(0.033)	(0.027)	(0.029)
N	8528	9503	9088
For Male Students	0.081	0.059	0.048
	(0.052)	(0.042)	(0.043)
N	4213	4714	4496
For Female Students	-0.019	-0.004	0.006
	(0.043)	(0.035)	(0.038)
N	4315	4789	4592
Prosociality			
For All Students	0.111**	0.058	0.086**
	(0.045)	(0.037)	(0.038)
N	8563	9538	9123
For Male Students	0.143**	0.143***	0.160***
	(0.066)	(0.053)	(0.055)
N	4230	4730	4512
For Female Students	0.073	-0.032	0.004
	(0.061)	(0.052)	(0.053)
N	4333	4808	4611

Notes: Source: Millennium Cohort Study, wave 4 and 5 (age 7 and 11). The table shows the coefficient and standard errors of male teacher dummy from separate regressions for each regression method: i) with no controls, ii) with teacher level controls, iii) with teacher and class level controls)the main specification). Outcome variables are standardized with a mean of 0 and standard deviation of 1. The first 4 variables are reversed so a higher score means less problem and better skills. Results from the fixed effects regressions. Standard errors are clustered at student level. Standard errors are in parentheses. * p <0.1, ** p <0.05, *** p <0.01.

Table A6: Mundlak P-values

Outcomes	p-value
Emotional Problems	0.5557
Conduct Problems	0.0475
Hyperactivity	0.0139
Peer Problems	0.0078
Prosociality	0.0028

Notes: The table presents the p-values for the Mundlak p-values. To compute Mundlak values, we run within individual fixed effects estimation as in the main tables. Then, we specify the inclusion of the Mundlak p-values computation with the estimation. P-values lower than 0.05 means that the use of within individual fixed effects model is not valid.

Table A7: Changes in Teacher Gender and Impacts on Socio-Emotional Skills using VA Model

Panel A: Internalizing Skills

	Emotional Problems (Reversed)			Peer Problems (Reversed)		
	(1) All	(2) Male	(3) Female	(4) All	(5) Male	(6) Female
Male to Female	0.159	0.131	0.149	-0.124	0.106	-0.322**
	(0.223)	(0.294)	(0.349)	(0.184)	(0.312)	(0.157)
Female to Male	-0.088	-0.055	-0.158	-0.120	-0.178	-0.054
	(0.092)	(0.120)	(0.142)	(0.082)	(0.109)	(0.124)
Male to Male	0.165	-0.352	0.361	-0.149	-0.444	0.029
	(0.501)	(0.425)	(0.647)	(0.260)	(0.365)	(0.292)
Observations	1353	670	683	1356	671	685

Panel B: Externalizing Skills

	Conduct Problems (Reversed)			Hyperactivity (Reversed)		
	(1) All	(2) Male	(3) Female	(4) All	(5) Male	(6) Female
Male to Female	-0.066	-0.017	-0.108	0.246	0.488	0.003
	(0.147)	(0.207)	(0.212)	(0.241)	(0.354)	(0.326)
Female to Male	0.033	0.076	-0.031	-0.023	-0.069	0.058
	(0.067)	(0.089)	(0.100)	(0.108)	(0.161)	(0.144)
Male to Male	0.374	-0.560	0.715*	1.065***	1.162**	1.012***
	(0.331)	(0.487)	(0.383)	(0.287)	(0.469)	(0.359)
Observations	1356	671	685	1356	671	685

Panel C: Prosociality

	All	Male	Female
	(1)	(2)	(3)
Male to Female	-0.055	0.102	-0.263
	(0.215)	(0.250)	(0.356)
Female to Male	0.180**	0.265**	0.103
	(0.074)	(0.105)	(0.104)
Male to Male	-0.533	-0.660	-0.563
	(0.436)	(1.316)	(0.432)
Observations	1356	671	685

Notes: Source: Millennium Cohort Study, waves 4 and 5 (age 7 and 11). All the outcome variables are standardized with a mean of 0 and a standard deviation of 1. The outcomes in the first two panels are reversed so that a higher scores indicates less problems and better skills. In the last panel, the outcome is a a positive measures so a higher score means better skills. Baseline category is Female to Female teacher. All the regressions include controls. These are teacher experience, teacher experience in the same school, teacher education, class size, whether the class is a mixed-year class, total number of special education needs students in the class, total number of students in the class who have been excluded, total number of English as a second language (ESL) students in the class, a dummy for having a disruptive student(s) in the class and a dummy variable for whether a school is a mixed-sex or single-sex school. Results from the fixed effects regressions. Standard errors are clustered at individual level. Standard errors are in parentheses. * p <0.1, ** p <0.05, *** p <0.01.

Table A8: Enjoyment from Courses - by Separate Courses

	English			Math			Science		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	All	Male	Female	All	Male	Female	All	Male	Female
Male Teacher	0.050	0.088	0.002	0.074*	0.072	0.047	0.086**	0.043	0.116*
	(0.039)	(0.059)	(0.052)	(0.039)	(0.056)	(0.054)	(0.042)	(0.060)	(0.059)
Observations	8455	4137	4318	8456	4132	4324	8417	4124	4293

Notes: Source: Millennium Cohort Study. Outcome variables are dummies for liking the respective courses. All the regressions include controls. These are teacher experience, teacher experience in the same school, teacher education, class size, whether the class is a mixed-year class, total number of special education needs students in the class, total number of students in the class who have been excluded, total number of English as a second language (ESL) students in the class, a dummy for having a disruptive student(s) in the class and a dummy variable for whether a school is a mixed-sex or single-sex school. Results from the fixed effects regressions. Standard errors are clustered at individual level. Standard errors are in parentheses. * p <0.1, ** p <0.05, *** p <0.01.

Appendix B: Parental Investment Variables

Table B1: Parental Investments

		Activity Types	
		Educational	Recreational
Age 7	Freq CM receives help with reading?	x	
	Freq CM helped with writing	x	
	Freq CM helped with maths	x	
	Freq tells stories to CM		x
	Freq musical activities with CM		x
	Freq CM paint/draw at home		x
	Freq you play physically active games with CM		x
	Freq play indoor games with child		x
	Freq take child to park or playground		x
	Freq you read to CM		x
Age 11	Freq talks to CM about things important to them	x	
	Freq anyone at home help with CM's homework	x	
	Freq anyone at home make sure CMs HW is complete	x	
	Anyone has attended parent evening at CM school	x	
	Freq you play physically active games with CM		x
	Freq play INDOOR games with child		x