Gender inequalities in Education

A focus on Math and Reading in early school years in the UK

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Abstract

This paper aims at disentangling the determinants of gender inequalities in reading and math in the UK, where gender gaps in these areas of education are persistent. The crucial role of early years of education on the development of cognitive skills justifies a focus on early age school children and on preschool variables. We analyzed the UK Millennium Cohort Studies (MCS), a population-based prospective cohort study that contains information on socioeconomic structure of the household, parent- and teacher-reported information and standardized measures of children's cognitive achievements. Following the capability approach to educational outcomes, standardized test scores, children's enjoyment levels and teachers' assessment were jointly used as measures of skills. Estimation carried out through Structural Equation Modelling shows a deeper gender gap when teachers' opinions about children's attainments are included in the measurement equation. Teacher's perception of parental involvement in the child's education, strongly correlated with family socio-economic level, as well as parental provision of reading or counting activities in earliest years are found to significantly impact children's reading and math abilities at age 7.

Keywords: Economics of education, gender inequality, gender stereotypes

JEL Codes: I24, J16, B54, J71

1.Introduction

Persistence of gender gaps in labor market participation and wages (Olivetti and Petrongolo 2016) requires further investigation on their determinants. Though in most industrialized countries women tend to outperform men in tertiary academic achievement, they are still less present in tertiary education in the fields of Science, Technology, Engineering and Math (STEM), with a negative impact on wages and labor market outcomes (Machin and Puhani 2003; Charles and Bradley 2009; Blau and Kahn 2017). This underrepresentation can in turn be connected to the gender gap in math achievement at school occurring on average in OECD countries (as found in Penner and Paret 2008; Ceci, Williams, and Barnett 2009; Bessudnov and Makarov 2015).

In this work we will seek to detect early determinants of gender gaps in math and reading achievements in the first years of life. The focus that we keep in this study on pre- and early school years is justified by a rich literature highlighting the importance of this moment in the life cycle, especially its influence on later years (Reynolds and Temple 2006; Heckman and Masterov 2007; F. Campbell et al. 2008; Doyle, Harmon, Heckman, and Tremblay 2009; Almlund et al. 2011; Duncan and Magnuson 2011; Moon 2014).

Namely, early life years are considered crucial for the development of cognitive as well as noncognitive skills (Heckman 2008; Heckman and Mosso 2014). Family variables, such as family's socio-economic status (SES) and shared math- and literacy-related activities in the home environment (Melhuish, Phan, Sylva, Sammons, Siraj-Blatchford and Taggart 2008; Skwarchuk, Sowinski and LeFevre 2014) play a major role in affecting the emergence and consolidation of such abilities in this phase (Barnett *et al.* 2004; Heckman 2008; Cunha, Heckman, and Schennach 2010; Heckman and Mosso 2014).

The added value of this research derives from the fact that a consistent, longitudinal analysis on this specific cohort analyzing math and reading capabilities with a particular focus on the interactions between teachers' beliefs, parents' behaviors and gendered outcomes has not been addressed yet.

Moreover, further analysis on later waves of the MCS (namely, MCS5 and MCS6) on children's career aspirations, carried out by Sheldrake (2018) and by Platt and Parsons (2017), demonstrated that career preferences at ages 11 and 14 were already gender-biased and mirrored the present gender gaps in the labor market. Indeed, career preferences seem to be already well established in late adolescence (Correll 2001, Sikora and Pokropek 2011), and choices concerning secondary school are crucial for enrolling in a math-intensive course at university. Consequently, research has shown that earlier phases in life are vital for creating and reinforcing math competencies and interest in STEM careers (Maltese and Tai 2010). It follows that analyzing the processes of emergence and consolidation of skills and interests of children before adolescence can provide a useful tool for policy interventions aimed at tackling educational disparities between genders.

Importantly, a capability approach to educational outcomes was adopted in the present work. The capability approach is centered on the multidimensional concept of well-being (Sen 1985) and education is considered as an essential capability in its own and as a basis for other capabilities (Hart 2014).

The choice of UK as the focus of our analysis is not only connected to the availability of a set of longitudinal data that will allow us to better disentangle different factors potentially related with educational achievement, but also to the persistence in the Country of gender gaps in reading and math that have been confirmed by the OECD 2018 Programme for International Student Assessment (PISA) triennial survey of 15-year-old students. According to OECD 2018 PISA data, the gender gap in math at the disadvantage of girls is 12 score points, well above the OECD average (5 test scores), while the gender gap in reading at the disadvantage of boys is 20 score points and it is lower than OECD average - 30 score points (OECD 2019). UK focus is also connected with being the country interested by important policies that could have a significant impact on educational inequalities. In particular we refer to a specific policy action plan promoted by the Labour Party-led UK Governments between 1997 and 2010. A common objective of these governments was to reduce educational inequalities among the

most disadvantaged social strata, which have been found to be in the UK historically higher than the average measures of equality in other OECD countries (OECD 2017).

2. Literature review

In analysing education achievements in this essay, a capability approach is adopted rather than a neoclassical approach to education. The capability approach is centered on the multidimensional concept of well-being (Sen 1985a) and considers the individual as an end in himself rather than a means to an end (Sen 2009; Bessant 2014).

Key concepts in this approach to the evaluation of well-being are functionings and capabilities. Capabilities entail the ability to lead a life that a person has reasons to value, what people are free to do and to be and functionings: what they do and they are (Sen 1985a).

Converting resources into capabilities and capabilities into functionings is shaped by conversion factors: personal conversion factors, social conversion factors that include social norms, public policies, gender roles, discriminating practices and environmental conversion factors (Robeyns 2005).
Another key concept in the capability approach is agency, the capacity that an individual has to exercise one's free will (Sen 1999), to pursue goals that he or she values and has reason to value (Sen 1985b, Hart 2009).
Education is considered as an essential capability in its own and as a basis for other capabilities (Hart 2014).

Capability approach scholars have analysed how policies and practices could seek to maximize the development of children's freedoms in the education process (Hart and Brando 2018) and analyze to what extent individual, family and social conversion factors could expand or limit children's education capabilities generating also gender gaps in different areas of education (Addabbo, Di Tommaso and Maccagnan 2016, Biggeri 2007, Kellock 2020).

By applying the capability approach to education policies implications have been suggested in the literature as regards the encouragement of a children's proactive behaviour in the decision making processes adopting an inclusionary focus on children (Biggeri and Santi 2012, Biggeri 2014, Bessant 2014, Kellock 2020).

"Applying a CA would require that students be supported to make informed choices. In exercising such freedom, they would learn of the available alternatives, the consequences of each and the paths to achieve them. This would have significant implications for the curriculum, for student learning, teaching practices and school management." (Judith Bessant 2014: 145).

"Through listening to children and understanding their values, practitioners can support children to become fulfilled in their present circumstances as well as having implications for their future well-being" (Anne Kellock 2020: 225).

Therefore gender stereotypes that constrain children even in understanding their own capabilities in certain areas or in the limited access to education paths to develop those capabilities, do limit the education capability development and should be detected and addressed with proper policies.

The capability approach stresses the importance of integrating multiple indicators, and not limiting to standardized test scores, in evaluating children's cognitive and noncognitive capabilities (Heckman 2008; Cunha, Heckman and Schennach 2010; Sikora and Pokropek 2012; Heckman and Mosso 2014; Addabbo, Di Tommaso and Maccagnan 2014, 2016).

Nussbaum defines 'Senses, imagination and thoughts' as: "Being able to use the senses, to imagine, think, and reason and do these things in a 'truly human' way, informed and cultivated by an adequate education, including but by no means limited to, literacy and basic material skills"

(Martha Nussbaum 2003: 41).

Therefore consistently with this definition:

"Schooling is viewed as a distinct form education itself which may take place in a wide range of settings – for example, in institutions, local communities and virtual environments" (Caroline Sarojini Hart 2014: 24).

Turning to the specific areas of reading and math, the literature shows a wide evidence on the lower achievement by girls in math and by boys in reading (see Hallam 2012; T. Campbell 2014; T. Campbell 2015; Chiu 2016; Klecker 2005; Thorpe 2006; OECD 2015; Whitten, Labby, and Sullivan 2016), the two areas of education we focus on in this research. Thereafter we will review the literature on the impact on these two areas of different sets of conversion factors that will be included in our estimation.

Month of birth has been found to affect educational attainment: older, autumn-born children - September to November - display better educational attainment than younger, summer-born pupils - June to August (Gallop, Anderson, and Bram 2013). Child's temperament and diagnosed learning disabilities are also related to school readiness and subsequent academic achievements (Duncan *et al.* 2007).

Most importantly, family background variables appear to strongly affect educational outcomes (Sirin 2005; Penner and Paret 2008). Household income and Socio-Economic Position (SEP) have been repeatedly identified as determining factors in defining earliest years' cognitive development and, consequently, educational outcomes in earliest school stages by an always growing literature body (Machin and Vignoles 2004; Erikson et al. 2005; Cunha and Heckman 2008; Caro, McDonald, and Willms 2009; Duncan, Ziol-Guest, and Kalil 2010; Waldfogel 2013). With regards to this particular dataset, studies have shown that gaps in cognitive skills are largely explained by poverty and that SEP is positively associated with higher cognitive ability already at age 3 (Dearden, Sibieta, and Sylva 2011; Hernandez-Alava *et al.* 2011). Behavioral issues, as well as cognitive development, are also correlated with income quintiles (Blanden and Machin 2010). Furthermore, Lombardi and Coley

(2017) and Hansen and Hawkes (2009) demonstrated positive correlation between early maternal employment, children's health and human and financial capital. Also childcare arrangements of formal or informal type were found to be positively related with higher number skills at age 5.

With regards to children's cultural capital, research suggests that the presence of role models in the social environment contributes to raise interest in math (Carrington, Tymms, and Merrell 2008; Stout et al. 2011; Sjaastad 2012). Most of all, parents' and teachers' gender-biased beliefs and stereotypes relating to performance in math and reading are found to be significantly relevant in association with children's own ability beliefs (Dompnier, Pansu and Bressoux 2006; Eccles 2007; Tomasetto, Alparone, and Cadinu 2011; Lubienski et al. 2013; Tomasetto, Mirisola, Galdi and Cadinu 2015). Analysis on MCS shows that teachers' evaluations in elementary and middle school affect children's self-concepts even more than the perception of their own cognitive ability does (Chiu 2016). Teacher assessments are, in turn, influenced by cultural and economic possessions of children, gender, ethnicity, Special Educational Needs diagnosis and language spoken in the household (T. Campbell 2014; T. Campbell 2015).

Children typically acquire early literacy and mathematics skills well before entering the formal school system, especially through shared activities with parents that include shared reading, counting, and using verbal and numerical knowledge to accomplish daily activities and routines at home (Blevins-Knabe and Musun-Miller 1996; Le Fevre 2009; Skwarchuk *et al*. 2014). Evidence suggests that home literacy (Van Steensel *et al*. 2011; Mol and Bus 2011) and home math activities (Skwarchuk *et al.* 2014; Susperreguy *et al.* 2020; Soto-Calvo *et al.* 2020) are both significantly associated with the emergence of subsequent academic literacy and math skills, respectively, in later school years.

Although evidence of intergenerational transmission of gender differences in educational preferences and stereotypes has been detected by Humlum *et al.* (2019), support from large-scale population-based datasets is still missing in this area of research. Positive impact of parental involvement in children's schoolwork on educational outcomes occurs (Simpkins, Davis-Kean and Eccles 2005; Bhanot and

Jovanovic 2009). Maternal higher education is also affecting children's achievement in reading and math mediated by home enrichment variables - learning materials, learning stimulation, parental responsiveness, modeling of social maturity, and variety in experience (Zadeh *et al.* 2010). The positive mediating effect of home enrichment variables suggests paying attention in educational policies to early childhood home enrichment, especially in households characterized by lower educated mothers.

3.Methodology and analysis

Data analyzed in this research derives from the Millennium Cohort Study, a United Kingdom longitudinal data set containing information about 18,818 children born between September 2000 and January 2002 in all UK countries (Gray, Gatenby, and Huang 2010). The survey was designed as a multidisciplinary database that gathers information about children's social background, economic and housing situation, childcare services, school choices and health conditions: the available set of variables gives an extended definition of children's cognitive capabilities in different fields and allows to reconstruct parental and teaching settings.

Main goal is to establish whether differences in educational attainment are more influenced by personal capabilities as intended by Nussbaum or if socio-economic factors play a bigger part in shaping it . Focus is the cognitive development in literacy and numeracy capability of children aged 7 during their second year of formal education. Given the longitudinal dimension of data collection, we are also able to control for a variety of individual's characteristics and for his or her social.

Data

The main wave analyzed is sweep 4 of the Millennium Cohort Study. Children were interviewed in 2008 at the age of 7 and a total of 7,641 cohort children compose the final analytic sample achieved for this research. In addition to household interviews, self-reported children's and teachers' questionnaires are available for this sweep as well. Given the necessity of merging various data sets observations missing in one or more of the data sets were dropped, in order to limit missing values to the lowest amount. Moreover, 182 observations relating to twins and triplets were dropped. Missing values for the

final variables of interest - both dependent and independent - account for less than 5% of the cases, therefore correct analysis could be carried out without imputing missing information.

Consistent with the capability approach, math and reading capabilities are analyzed going beyond mere test scores. Indicators pertaining to these capabilities are:

Math test scores: standardized age-adjusted scores based on the national standardization (mean of 100 and standard deviation of 15) of 2004 NFER Number Skills, which is an adapted version of the "NFER Progress in Maths" test, an assessment aimed at 7-year-olds originally developed in UK in 2004 and consequently standardized. Normalized from 0 to 1 for analysis.

Reading test scores: standardized age-adjusted scores of the BAS II Word Reading, which assesses children's reading ability, normalized from 0 to 1 for the scope of this analysis.

Enjoyment and interest in math and reading: expression of interest and enjoyment in math or reading on a 3-point scale, re-coded as to range from 0 "I don't like it" to 1 "I like it a lot".

Teacher's judgment on cohort member[1] math and Literacy performance: teacher's evaluation of CM school performance in math or reading, writing and speaking, measured on a 5-point scale ranging from 1 "Well below average" to 5 "Well above average"; the mean value of the three different abilities' judgements pertaining to the English language was calculated, then normalized from 0 to 1.

Amongst the factors affecting the development of children's math and reading capabilities we include indicators of individual, family and earlier children's experience conversion factors, consistently with the results obtained by the literature surveyed in Section 2.

Conversion factors – individual variables

Gender: binary variable that takes value 1 for girls and 0 for boys.

Month of birth: variable ranging from 1 to 12 indicating CM month of birth.

Social Behaviour Questionnaire (SBQ) - Independence/Self-Regulation: the Children's Social Behaviour Questionnaire (CSBQ) is a questionnaire used in psychology to measure particular

[1] Hereby CM.

behaviors and to define pervasive developmental disorders (Hartman *et al.* 2006). The level of independence and self-regulation is measured on a 3-point scale, where 1 refers to the lowest and 3 highest level of independence.

Strengths and Difficulties Questionnaire (SDQ) - Total Difficulties: it derives from a behavioral screening questionnaire developed for children and adolescents (R. Goodman 1997). The items relate to emotional symptoms, conduct problems, hyperactivity/inattention and peer relationship problems. Also parents and teachers were asked to report whether the child had ever been diagnosed with Special Educational Needs or any type of neurological/ psychological deficit. A 4-point scale was created to account for any behavioral or neurological issue, ranging from 0 "No difficulties" (5,245 observations) to 3 "Severe difficulties" (72 observations).

Conversion factors - Family background

Father[2]'s and mother's educational attainment: National Vocational Classification scale that ranges from 1 (lower-level GCSE diploma) to 5 (Master's or doctoral degree); overseas or other types of qualifications were excluded from analysis.

Mother's employment level: NS-SEC classification based on SOC2010 profession codes, ranging from 0 "Never employed" to 7 "High manager/professional".

Household income: OECD income quintiles. The continuous measure was weighed and divided in quintiles as to correspond to UK national standards.

Ethnicity: CM's Ethnic Group - 6 categories derived from Census class.

Conversion factors - Child's experience

School enjoyment Index: this variable is constructed by performing a Principal Component Analysis on the items of the self-completed questionnaire of children about school (see Appendix table A1); All answers were re-coded so that highest values corresponded to positive school experiences. Then,

[2] From now on, we will refer to the main carer as mother, given the fact that in 97.38% of cases it was the natural mother to answer this questionnaire; similarly, the partner figure will be referred to as the father, since in 90.58% of cases it was the natural father who answered, and in 5.74% of cases either the adoptive or step father (thus making for a father figure in 96.32% of cases).

Cronbach's alpha test for reliability was run on the items to verify goodness of the fit (C-α= :70). Lastly, the factor score of the first component of PCA was inserted in the model.

Parents' involvement in children's educational life: Teachers were asked to rate the involvement of parents in their children's school progress; answers were re-coded and summed to obtain the involvement level of both parents.

Parenting style - counting: when children were aged 3, mothers were asked "How often at home does someone try to teach CM counting?", and the answers range from 1 "Occasionally or less than once a week" to 7 "7 times a week, constantly".

Parenting style - reading: when children were aged 3, mothers were asked "How often at home do you read to the child?", and the answers range from 1 "Not at all" to 6 "Everyday".

Private childcare attendance: in MCS2, mothers were asked about the type of childcare arrangement. Then, a binary variable for "Private day nursery creche" was generated, taking value 1 when children attended it and 0 when they did not.

Structural Equation Model – Multiple Indicator Multiple Cause

The estimation technique applied is a Structural Equation Model, largely used in the literature of capability approach (Foster and Basu 1998; Addabbo, Di Tommaso, and Facchinetti 2004; Lanzi 2007; Addabbo, Di Tommaso, and Maccagnan 2014) and also in various research studies on this particular data set (Flouri and Panourgia 2012; Chiu 2016; Dickerson and Popli 2016; Moulton *et al*. 2018).

SEM can be viewed as the analysis of the covariance structure of the variables (Ramlall 2016), because its focus is on the relationship between individual observations.

SEM is usually composed of a measurement model and a proper structural equation.

The first one consists of a Confirmatory Factor Analysis (CFA), in which the relationship between the latent construct and the observed variables is shown.

Subsequently, the structural equation model captures causal relationships between endogenous variables - the indicators chosen to compose the dependent latent construct in the measurement model - and exogenous variables, independent conversion factors inserted in the analysis.

Since the capability approach suggests that skills merely evaluated with tests fail to capture the entirety of the dimensions actually composing the capabilities, SEM allows to build a broader definition of these; furthermore, the measurement model feeds back the goodness of the fit among the indicators and the latent construct itself, by quantifying the amount by which the latter varies given a certain variation in the former ones - represented by the factor loadings.

We apply the Multiple Indicator Multiple Causes model, which is composed of two parts: the measurement model (1) and the structural equation model (2). The former is used to measure latent math and reading capabilities, while the latter quantifies the effect of individual and social factors on the latent constructs.

More specifically, the latent capability (hereby Y*) is defined as an unobserved latent construct. SEM is applied to specify the relationship among the scalar Y*, the set of observable endogenous indicators Y_i - the functionings - and the set of observable exogenous variables X_i, so that the moments of interest to estimate are defined as $E(Y^*|Y_i) = \tau(Y_i, X_i)$; where τ is the one-to-one mapping between the vector of the latent construct and the indicators used to measure it. The measurement model is defined as follows:

$$Y_i = \Lambda^Y Y^* + \varepsilon_i \qquad (1)$$

where $Yi = (Y_1, Y_2, Y_3, \dots Y_m)$ is a $m \times 1$ vector of each indicator of the latent construct Y*, $\Lambda^Y = \{ \Lambda^Y_1, \Lambda^Y_2, \Lambda^Y_3, \dots \Lambda^Y_m\}$ is a $m \times 1$ parameter vector of factor loadings of every indicator, representing the expected change in the respective indicator after a one-unit change in the latent construct and ε_i is a $m \times 1$ vector of measurement errors, with Θ_ε as covariance matrix.

The structural equation is equal to:

$$Y^* = X_i\gamma + \varsigma \qquad (2)$$

where $X_i = (X_1, X_2, X_3, \ldots X_s)$ are the observable exogenous variables, linear determinants of latent capabilities, γ is a $1 \times s$ vector of parameters and ς is a stochastic error.

The model is composed of two parts, since structural parameters γ are not directly estimable, which is due to the fact that Y^* is for definition unobserved. We can formally combine (1) and (2) as follows:

$$Y_i = \pi X_i + v \qquad (3)$$

where $\pi = \Lambda^Y \gamma$ is the $m \times s$ matrix of coefficients and $v = \Lambda^Y \gamma + \varepsilon_i$ is the disturbance, both in reduced form.

FIGURE 1 HERE

4.Discussion of results

Descriptive statistics

TABLE 1 AND 2 HERE

FIGURE 2 HERE

Gender differences at age 7 are of small entity as far as indicators for the latent construct math are concerned. Namely, boys perform on average slightly better in the administered test and their distribution is more heavy-tailed at both sides (see figure 2), whereas girls' is more concentrated in the center. Higher standard deviation values for boys, together with their more frequent presence at the right-end tail of the ability distribution, are in line with literature findings. However, boys and girls seem to enjoy math equally.

It is evident that differences in reading are far more significant already at age 7 than in math. Girls perform better than boys in the separately administered test and also have a narrower standard deviation, meaning that their results are concentrated in the middle and top-performing levels of the

distribution, as it is shown in the graph above. Their scores distribution is also skewed to the left. On the contrary, boys' scores reveal higher standard deviation, as in math, and their graph depicts a more heavy-tailed distribution, while differences in enjoyment levels and teachers' opinion are significant.

Overall, reading gaps are 3 to 14 times greater than the ones observed in math capability indicators, confirming PISA results and the literature that finds reading habits already gendered in early life stages (OECD 2015).

It is noticeable that the variable indicating parents' involvement levels as perceived by teachers is significantly correlated with income. Specifically, while half of the parents belonging to the highest quintiles of the income distribution were given the highest combined rating by teachers, only less than one fifth of the poorer families received this score. Further data can be provided separately to those who wish it.

Measurement model

TABLE 3 HERE

Table 3 reports the estimates of the measurement model for math and reading capabilities. Standardized coefficients, relative significance levels and linearized standard errors are displayed.

Standardized coefficients have been preferred over unstandardized ones due to the easier comparability; namely, they represent the standard deviation change in the latent variable after one standard deviation change of the relative indicator, since variance of the latent construct is set equal to 1.

Coefficients for both math and reading yield no significant difference between genders at age 7. Strikingly, highest standardized coefficients are relative to teacher's opinions, and not to test scores: this means that one standard deviation change in teacher's opinion equals more than a 0.8 standard deviation in latent math and reading capabilities. This is one of the reasons highlighting the importance of using a MIMIC model with different indicators that merge into one latent construct.

Results – math models

TABLE 4 HERE

Estimates show standardized coefficients relating to 3 different models:

– Model 1: left hand side (LHS) of the equation with test scores alone (standard OLS regression)

– Model 2: LHS with test scores and teacher's opinion

– Model 3: LHS with test scores, teacher's opinion and enjoyment levels

The main variable of interest of this work, *gender*, is negatively correlated with math capability and the correlation is statistically significant. Nonetheless, in line with our hypotheses based on previous research (Hallam 2012; T. Campbell 2014; T. Campbell 2015; Chiu 2016), the coefficient is lower when considering test scores alone in comparison to the model also including teacher's judgement, which also displays a higher significance. The same can be noted for the *SDQ – total difficulties* variable, that reports a higher negative coefficient – and relative significance – in teachers' judgements rather than in test scores separately considered; also estimates for *SBQ – Independence* are higher in Model 2. As expected by the low coefficient displayed in table 3, the addition of the variable relating to math enjoyment to Model 3 RHS does not cause any substantial change in the estimation of the exogenous parameters.

Interestingly, the *month of birth* variable lacks any significance and even the sign is reversed when regressing on test scores only. However, the variable becomes significant at the 1% level in the model including teacher's opinion, thus suggesting that children born in the last months of the year (September to November) perform statistically better than summer born ones (May to August).

Overall, socioeconomic background is statistically significant in affecting math capability. Highest coefficients are shown for *mother occupational level NS-SEC* and both parents' *educational levels NVQ*: these are, again, more elevated in teacher's perceptions than in actual test scores. *Household income* coefficients are particularly representative of the effect. Different *ethnic groups* display no

significant difference in test scores, apart from the negative coefficient of Black ethnicity; ethnicity as well can be considered more significant in Model 2.

Similar coefficients are shown by *School enjoyment* and *Parents role judged by teacher*, which display both higher and more significant coefficients when teachers' opinions are considered. Indeed, accessory factors such as behavior in class and parents' role in children's education appear of fundamental importance in capabilities' definition: *parents' role* shows the second highest coefficient in Model 2. This variable may probably capture the effect of *household income,* given the noticeable correlation between them as previously highlighted.

Furthermore, the effect of parents' behavior measured when children were aged 3, such as the variable assessing whether parents were teaching children to *count*, is still positively related to the child's ability at age 7. In addition to that, the attendance of a *private daycare* is still significant at age 7, although both only at the 5 percent level. While these measures are surely related to income levels and educational attainment of parents, even when controlling for them the variables accounting for experiences in early life stages are significantly correlated to children's capabilities.

Overall, Model 2 and 3 have a coefficient of determination equal to 0.356, which can be compared to an R-squared in linear regression models (Bollen 2014): this means that the variance represented by the chosen exogenous variables account for almost 40 percent of the variation in math capability.

Results – reading models

TABLE 5 HERE

As for math, the *gender* coefficient in the Structural Equation Model for reading is slightly related to test scores, although here it displays a positive sign, meaning that girls perform statistically better in reading activities, as hypothesized. Again, the measure is more elevated when adding teacher's opinion to the LHS of the equation (Model 2), similarly to *SDQ – Total Difficulties* and *SBQ – Independence*.

Curiously, the *month of birth* coefficient is slightly negatively correlated with test scores (even though significant only at the 5 percent level and with a very low absolute value) whereas in teacher's perception it remains significant and positively correlated, as for math.

Variables relating to family background are more significant in Model 2 as for math capability. *Household income* remains significant even after controlling for parents' educational and occupational levels, in Model 1 and 2 alike; the exogenous factor is more significant than for math capability, when considering tests alone as well as when adding teacher's judgement to the LHS.

As far as *ethnic groups* are concerned, more difficult to interpret is the positive and significant coefficient of *Pakistani/Bangladeshi* ethnicity in Model 1. *Pakistani and Bangladeshi* children appear to perform statistically better in the separately administered test when controlling for parental socio-economic status; yet the positive correlation does not remain significant when considering teacher's opinion as well. This may imply a lack of robustness in the result displayed in the first model; nonetheless, it is striking to notice that estimations differ from evidence related to the same data set (Hallam 2012). Also *Indian* and *Black* children seem to achieve better scores in the test, but correlation loses significance as for the *Pakistani/Bangladeshi* ethnic group in Model 2.

Moving on, teachers' perceptions of parental approach to children's education plays the most important role in affecting their ability in Model 2. *School enjoyment* is again significant for reading capability, with a higher coefficient in Model 2 and 3: this suggests that children who comply well with institutionalization mechanisms, such as showing self-confidence and independence in tasks assigned, who are well-fitted in the school environment and have parents with a correct stance – in teacher's opinion – towards the schooling system are statistically more likely to achieve better scores in 'objective' tests and in teachers' judgements above all else.

The positive effect of parenting styles in earliest life stages is also highlighted in the estimates: indeed, regularly *reading* to the child aged 3 yields statistically significant results in reading capability when children are aged 7. Also the effect of quality *childcare* – although significant only at the 10 percent

level – is stable across the 3 models estimated and accounts for the importance of this life stage in defining future outcomes.

Overall, we see that the coefficient of determination for reading capability is comparable to the one displayed in table 4 for math, with chosen exogenous variables explaining roughly 36 percent of the variation in the capability analyzed.

Results – gender comparison

TABLE 6 HERE

The first thing to highlight is that there are no significant differences in coefficients separately estimated by gender. Namely, reported difficulties in the Strengths & Difficulties Questionnaire are found to be more important for boys than for girls. Among family background conversion factors, *father's educational level NVQ* is more significant for boys than for girls: this may imply a possible role model effect of the father perceived by sons, even though *mother's NVQ* is also more significant for sons than for daughters.

Gender differences among *ethnic groups*, which are nonetheless not significant overall, are not to be seen: coefficients covariate among *ethnic groups* without differences between genders.

It is striking to see that *household income*, while being almost non-significant for math capability, is indeed significant for what concerns reading skills, and far more so for girls than for boys (0.0963 against 0.0586). Moving on to child experience conversion factors, *parents' role* perceived by teachers is more significant at defining the relative capability for girls than for boys, and the same can be noted for *school enjoyment* levels.

Interestingly, parental behaviors displayed in the earliest life stages are overall more significant for girls, with higher associated coefficients. While *reading* to the child is shown as significant for both genders, teaching the child to *count* is significant only for girls. The positive effects on girls of teaching activities such as counting is of fundamental importance: it seems that girls who are taught early on

number work achieve better results in the first stages of schooling, even after controlling for income and parental socio-economic level.

Lastly, although not significant at the 5 percent level, a high-quality *nursery school* seems to be positively correlated with both math and reading capabilities. This fact, along with parenting styles measured when children are aged 3, captures the importance of early years in defining future educational outcomes, as evidenced in previous research (Machin and Vignoles 2004; Blanden and Machin 2010).

5.Conclusions

The most important aspects that surface from this analysis relate to the influence of parental background and teachers' beliefs in the earliest period of formal schooling on the skills' formation processes that children undergo.

This finding deserves attention in terms of educational policies contrasting gender stereotypes.

Firstly, the variation in the gender coefficient when inserting in the Measurement Model teachers' opinions is particularly informative about the perception of gender gaps in children abilities. Even though a light correlation effect connected to gender is indeed found when analyzing regression results of the separately administered tests, it remains less significant than socio-economic elements or child experience factors for both capabilities. Significance is acquired when teachers' opinions are included in the equations for math as well as for reading. Therefore, not only gender stereotypes in disfavor of girls' mathematics capability emerge here, but also a bias in relation to boys' reading attainment levels is revealed. Indeed, the difference of gender coefficients between Model 1 and 2 in the complete Structural Equation Model can be almost viewed as the mathematical expression of the prejudice shown in relation to gendered abilities of children by teachers.

Secondly, children's opinion in this early life stage is found not significant in determining educational-related outcomes. It appears that there is no gender-specific intrinsic inclination in enjoyment in math or reading and that preferences shown in primary school are still to be set.

If such findings were to be further demonstrated, they may suggest that career choices and interest in math-intensive courses are more of a social product, generated by the environment children and adolescents find themselves in, rather than psychological constructs already present in children's attitudes. Furthermore, policy interventions aimed at tackling gender disparities in education may be more proficient if they could focus on the creation of a strong set of basic competences in primary school for boys and girls alike, and in a second moment develop girls' interest in math-intensive careers – as well as boys' interest for humanities and social sciences – since interest without the skills needed to succeed would be pointless.

Moreover, the most interesting variable that lacked – to the extent of our knowledge – in previous analysis on early schooling[3] is teacher's perception of parental involvement in educational life of the child. This can be considered a good proxy for parents' human capital, although mediated by teacher's biased perception, because it refers to the level of investment – as Becker had it – in their sons' and daughters' educational life. In a way, it captures the significance not only of income, but also parents' educational attainment, ethnicity and, overall, socio-economic status of the child's family. The fact that this variable acquires more significance when taking teachers' opinions in consideration is the key finding of this research project. While much has been done on a political level to erase the negative effects generated by the 'accident of birth', by persistent poverty status and disadvantaged social contexts, we can see how an almost equal effort must be carried out in order to remove not only objective, but also subjective obstacles preventing disadvantaged children to achieve their goals.

[3] A bias in teacher's perception of parental involvement in educational life of their children at grade 10th has been found by linking teacher and parent surveys from the 2002 Education Longitudinal Study by Ho and Cherng (2018) showing also a high impact of teacher perceptions of parental involvement on student academic outcomes.

Lastly, positive effects of early life experiences are shown in complete models' regression results for both math and reading capabilities. The most significant effect is provided by positive parenting behaviors, in particular the frequency with which the mother read to the child when it was aged 3, which is significant and yields consistent, positive coefficients throughout all the Models considered. Conversely, the amount of time in which the child was taught to count is meaningful in both complete models, but it loses significance for boys when grouping results by gender. This could be related to a role-model effect on girls of mothers that attribute importance to developing number skills, thus communicating the importance of learning such ability also in a later stage. Reading activities, however, may be more connected with mother's level of education – even though bivariate correlation was minimal – thus limiting in a way direct interpretation of the variable, it being an indirect measure of another factor.

Moreover, high-quality childcare, although significant only in math complete model, shows positive correlation between proper preschool activity and future educational outcomes, both in relation to teachers' perceptions as well as with regards to the separately administered tests.

Future research may concentrate on the importance of such factors in educational outcomes displayed in subsequent MCS waves; on the analysis of these trends and career aspirations of children, which are available for every collected sweep; and also parental perception of children's ability and its relation with educational outcomes may be an interesting topic to develop.

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Tables

Table 1. Descriptive statistics of capabilities indicators by gender

	M		F		M - F
	Mean	**St. Dev.**	**Mean**	**St. Dev.**	**Gender gap**
Math test score	0.45	0.24	0.44	0.22	0.01
Math enjoyment	0.7	0.38	0.71	0.35	-0.01
Math teacher's opinion	0.58	0.24	0.56	0.22	0.02
Math factor score	0.36	0.14	0.35	0.13	0.01
Reading test score	0.62	0.21	0.66	0.18	-0.04
Reading enjoyment	0.66	0.37	0.80	0.30	-0.14
Reading teacher's opinion	0.53	0.23	0.6	0.21	-0.07
Reading factor score	0.36	0.15	0.41	0.13	-0.05
SDQ – total difficulties	0.44	0.69	0.28	0.52	0.16
SBQ – independence	2.48	0.37	2.57	0.34	-0.09
Parents role (teacher)	5.93	2.18	5.86	2.24	0.07
School enjoyment index	77.40	11.95	82.14	10.76	-4.74
Early childhood – counting	5.17	2.15	5.17	2.15	0
Early childhood – reading	5.24	1.16	5.33	1.09	-0.09
Private childcare	0.08	0.26	0.08	0.27	0
N	3,848		3,793		

Source: MCS4 - own elaboration

Table 2. Frequency table of variables of interest

	M			F			M - F
	Freq.	**%**	**Cum.**	**Freq.**	**%**	**Cum.**	**Gender gap %**
Father's NVQ highest level (all sweeps)							
NVQ level 1	170	6.42	6.42	151	5.84	5.84	0.58
NVQ level 2	771	29.14	35.56	724	28.00	33.84	1.14
NVQ level 3	472	17.84	53.40	428	16.55	50.39	1.29
NVQ level 4	921	34.81	88.21	956	36.97	87.35	-2.16
NVQ level 5	312	11.79	100	327	12.65	100	-0.86
Mother's NVQ highest level (all sweeps)							
NVQ level 1	267	7.78	7.78	232	6.89	6.89	0.89
NVQ level 2	994	28.95	36.72	1,013	30.08	36.97	-1.13
NVQ level 3	588	17.12	53.84	594	17.64	54.60	-0.52
NVQ level 4	1,309	38.12	91.96	1,244	36.94	91.54	1.88
NVQ level 5	276	8.04	100	285	8.46	100	-0.42
Mother's last known job – NS-SEC							
Never employed/unknown	230	5.98	5.98	253	6.67	6.67	-0.69
Routine	440	11.43	17.41	378	9.97	16.64	1.46
Semi routine	771	20.04	37.45	801	21.12	37.75	-1.08
Low supervisor/technician	155	4.03	41.48	162	4.27	42.02	-0.24
Small employee/self-employed	294	7.64	49.12	306	8.07	50.09	-0.43
Intermediate	740	19.23	68.35	717	18.90	69.00	0.33
Low manager/professional	963	25.03	93.37	896	23.62	92.62	1.41
High manager/professional	255	6.63	100	280	7.38	100	-0.75
OECD equivalized income quintiles							
Lowest quintile	617	16.03	16.03	645	17.02	17.02	-0.99
Second quintile	715	18.58	34.62	698	18.42	35.44	0.16
Third quintile	839	21.80	56.42	778	20.53	55.96	1.27
Fourth quintile	823	21.39	77.81	838	22.11	78.07	-0.72
Highest quintile	854	22.19	100	831	21.93	100	0.26

Ethnic group – 6 categories census							
White	3,381	87.86	87.86	3,337	88.00	88.00	-0.14
Pakistani/Bangladeshi	90	2.34	90.20	83	2.19	90.19	0.15
Black or Black British	86	2.23	92.44	75	1.98	92.17	0.25
Indian	154	4.00	96.44	173	4.56	96.73	-0.56
Other ethnic group	92	2.39	98.83	77	2.03	98.76	0.36
Mixed	45	1.17	100	47	1.24	100	-0.07
N	3,848			3,793			

Source: MCS4 – own elaboration

Table 3. Measurement equation results of the MIMIC Model

Standardized coefficients	**M+F**	**M**	**F**
Math capability			
Test score	0.714***	0.741***	0.691***
	(0.035)	(0.036)	(0.033)
Math enjoyment	0.195***	0.203***	0.183***
	(0.016)	(0.017)	(0.015)
Teacher's opinion	0.740***	0.746***	0.716***
	(0.036)	(0.036)	(0.036)
Coefficient of determination	0.696	0.698	
Reading capability			
Test score	0.916***	0.862***	0.852***
	(0.021)	(0.008)	(0.009)
Reading enjoyment	0.268***	0.278***	0.285***
	(0.015)	(0.015)	(0.015)
Teacher's opinion	0.770***	0.845***	0.774***
	(0.017)	(0.007)	(0.010)
Coefficient of determination	0.871	0.857	
N	7,641		

Source: MCS4 - own elaboration
linearized standard errors in brackets
* p < 0.05, ** p < 0.01, *** p < 0.001

Table 4. Structural equation model – math capability

	Model 1			Model 2			Model 3		
	Std. Coeff.	p values	95% Conf. intervals	Std. Coeff.	p values	95% Conf. intervals	Std. Coeff.	p values	95% Conf. intervals
Individual factors									
Gender	-0.085	0.000	-0.112,-0.058	-0.122	0.000	-0.152,-0.092	-0.128	0.000	-0.158,-0.097
	(0.014)			(0.015)			(0.015)		
Month of birth	-0.016	0.188	-0.039,0.008	0.049	0.001	0.018,0.079	0.046	0.002	0.016,0.076
	(0.012)			(0.015)			(0.015)		
SDQ – total difficulties	-0.084	0.000	-0.116,-0.052	-0.159	0.000	-0.197,-0.121	-0.154	0.000	-0.191,-0.117
	(0.016)			(0.019)			(0.019)		
SBQ - independence	0.170	0.000	0.141,0.199	0.232	0.000	0.198,0.265	0.232	0.000	0.199,0.266
	(0.015)			(0.017)			(0.017)		
Family background									
Father NVQ	0.087	0.000	0.049,0.126	0.105	0.000	0.065,0.146	0.104	0.000	0.064,0.145
	(0.020)			(0.020)			(0.020)		
Mother NVQ	0.068	0.000	0.034,0.102	0.088	0.000	0.50,0.127	0.087	0.000	0.049,0.126
	(0.017)			(0.020)			(0.020)		
Mother NS-SEC	0.099	0.000	0.064,0.133	0.106	0.000	0.065,0.146	0.104	0.000	0.067,0.142
	(0.018)			(0.019)			(0.019)		
Household income	0.038	0.026	0.004,0.071	0.046	0.012	0.011,0.082	0.043	0.018	0.008,0.079
	(0.017)			(0.018)			(0.018)		
Ethnicity – Pakistani/bangladeshi	-0.046	0.001	-0.079,-0.014	-0.041	0.012	-0.072,-0.009	-0.041	0.004	-0.072,-0.010
	(0.016)			(0.016)			(0.016)		
Ethnicity – Indian	0.018	0.340	-0.019,0.055	0.013	0.502	-0.025,0.050	0.013	0.507	-0.025,0.050
	(0.019)			(0.019)			(0.019)		
Ethnicity - Black	-0.044	0.002	-0.073,-0.014	-0.055	0.000	-0.084,-0.027	-0.056	0.000	-0.085,-0.028
	(0.043)			(0.015)			(0.014)		
Child experience									
Parents' role (teacher)	0.086	0.000	0.057,0.115	0.186	0.000	0.153,0.219	0.181	0.000	0.149,0.213
	(0.015)			(0.017)			(0.016)		
PCA school enjoyment	0.085	0.000	0.056,0.114	0.142	0.000	0.108,0.176	0.177	0.000	0.140,0.214
	(0.015)			(0.017)			(0.018)		
Early childhood – counting	0.028	0.024	0.003,0.053	0.045	0.001	0.019,0.071	0.045	0.001	0.019,0.071
	(0.012)			(0.013)			(0.013)		
Private daycare	0.019	0.081	-0.002,0.040	0.026	0.037	0.002,0.050	0.027	0.026	0.004,0.051
	(0.010)			(0.012)			(0.012)		
Constant term	-0.024	0.851	-0.277,0.229	-	-	-	-	-	-
	(0.129)			-			-		
Coeff. of determination	0.167			0.356			0.365		
N	7,641								

Source: MCS4 - own elaboration
linearized standard errors in brackets

Table 5. Structural equation model – reading capability

	Model 1			Model 2			Model 3		
	Std. Coeff.	**p values**	**95% Conf. intervals**	**Std. Coeff.**	**p values**	**95% Conf. intervals**	**Std. Coeff.**	**p values**	**95% Conf. intervals**
Individual factors									
Gender	0.030	0.011	0.007,0.053	0.085	0.000	0.060,0.109	0.086	0.000	0.062,0.110
	(0.012)			(0.012)			(0.012)		
Month of birth	-0.020	0.066	-0.042,0.001	0.052	0.000	0.028,0.076	0.045	0.000	0.021,0.069
	(0.011)			(0.012)			(0.013)		
SDQ – total difficulties	-0.093	0.000	-0.122,-0.063	-0.141	0.000	-0.171,-0.110	-0.140	0.000	-0.170,-0.109
	(0.015)			(0.016)			(0.016)		
SBQ - independence	0.153	0.000	0.127,0.180	0.179	0.000	0.153,0.205	0.184	0.000	0.158,0.210
	(0.014)			(0.013)			(0.013)		
Family background									
Father NVQ	0.092	0.000	0.058,0.125	0.094	0.000	0.061,0.125	0.098	0.000	0.065,0.130
	(0.017)			(0.016)			(0.017)		
Mother NVQ	0.047	0.003	0.016,0.079	0.063	0.000	0.032,0.095	0.065	0.000	0.033,0.097
	(0.016)			(0.016)			(0.016)		
Mother NS-SEC	0.087	0.000	0.055,0.118	0.086	0.000	0.055,0.117	0.088	0.000	0.057,0.120
	(0.016)			(0.016)			(0.016)		
Household income	0.081	0.000	0.051,0.111	0.074	0.000	0.046,0.102	0.077	0.000	0.048,0.105
	(0.015)			(0.014)			(0.014)		
Ethnicity – Pakistani/bangladeshi	0.075	0.000	0.049,0.101	0.008	0.465	-0.013,0.030	0.019	0.083	-0.002,0.040
	(0.013)			(0.016)			(0.011)		
Ethnicity – Indian	0.035	0.007	0.009,0.060	0.013	0.398	-0.017,0.042	0.017	0.261	-0.013,0.047
	(0.013)			(0.015)			(0.015)		
Ethnicity - Black	0.033	0.019	0.004,0.061	-0.008	0.601	-0.038,0.022	-0.002	0.900	-0.032,0.029
	(0.015)			(0.015)			(0.015)		
Child experience									
Parents' role (teacher)	0.120	0.000	0.092,0.148	0.199	0.000	0.171,0.226	0.197	0.000	0.168,0.225
	(0.014)			(0.014)			(0.014)		
PCA school enjoyment	0.100	0.000	0.071,0.128	0.140	0.000	0.110,0.169	0.156	0.000	0.125,0.187
	(0.015)			(0.015)			(0.016)		
Early childhood – reading	0.072	0.000	0.042,0.101	0.086	0.000	0.058,0.115	0.090	0.000	0.060,0.120
	(0.015)			(0.014)			(0.015)		
Private daycare	0.010	0.289	-0.009,0.030	0.016	0.131	-0.004,0.036	0.016	0.111	-0.004,0.036
	(0.120)			(0.010)			(0.010)		
Constant term	0.928	0.000	0.692,1.164	-	-	-	-	-	-
	(0.023)			-			-		
Coeff. of determination	0.205			0.341			0.359		
N	7,641								

Source: MCS4 - own elaboration
linearized standard errors in brackets

Table 6. Structural equation model – gender comparison

	math						read					
	M			F			M			F		
	Std. coeff.	p values	95% conf. interval	Std. coeff.	p values	95% conf. interval	Std. coeff.	p values	95% conf. interval	Std. coeff.	p values	95% conf. interval
Individual factors												
Month of birth	0.048	0.007	0.013,0.083	0.045	0.050	-0.001,0.090	0.035	0.029	0.003,0.066	0.056	0.003	0.019,0.093
	(0.018)			(0.023)			(0.016)			(0.019)		
SDQ – total difficulties	-0.175	0.000	-0.223,-0.127	-0.117	0.000	-0.163,-0.071	-0.170	0.000	-0.211,-0.128	-0.106	0.000	-0.143,-0.069
	(0.024)			(0.023)			(0.021)			(0.019)		
SBQ – independence	0.232	0.000	0.194,0.269	0.226	0.000	0.185,0.266	0.170	0.000	0.139,0.201	0.196	0.000	0.164,0.227
	(0.019)			(0.020)			(0.016)			(0.016)		
Family background												
Father NVQ	0.116	0.000	0.064,0.168	0.094	0.003	0.032,0.0156	0.112	0.000	0.063,0.0162	0.089	0.000	0.042,0.137
	(0.026)			(0.032)			(0.025)			(0.024)		
Mother NVQ	0.098	0.000	0.045,0.151	0.071	0.011	0.016,0.125	0.071	0.005	0.022,0.120	0.056	0.025	0.007,0.106
	(0.027)			(0.028)			(0.025)			(0.025)		
Mother NS-SEC	0.089	0.001	0.037,0.140	0.125	0.000	0.073,0.0176	0.072	0.001	0.029,0.115	0.109	0.000	0.061,0.156
	(0.026)			(0.026)			(0.022)			(0.024)		
Household income	0.050	0.048	0.001,0.099	0.037	0.150	-0.013,0.087	0.059	0.006	0.018,0.101	0.095	0.000	0.055,0.136
	(0.025)			(0.026)			(0.021)			(0.021)		
Ethnicity – Pakistani/Bangladeshi	-0.043	0.011	-0.080,-0.006	-0.039	0.076	-0.083,0.005	0.017	0.306	-0.015,0.049	0.023	0.254	-0.017,0.064
	(0.019)			(0.022)			(0.016)			(0.021)		
Ethnicity – Indian	0.038	0.064	-0.005,0.082	-0.018	0.537	-0.075,0.039	0.031	0.048	0.001,0.064	0.006	0.810	-0.042,0.053
	(0.022)			(0.029)			(0.017)			(0.024)		
Ethnicity – Black	-0.054	0.000	-0.086,-0.023	-0.057	0.014	-0.102,-0.012	0.004	0.870	-0.046,0.055	-0.011	0.528	-0.044,0.022
	(0.016)			(0.023)			(0.026)			(0.017)		
Child experience												
Parents' role (teacher)	0.156	0.000	0.112,0.200	0.210	0.000	0.165,0.256	0.193	0.000	0.155,0.231	0.203	0.000	0.164,0.243
	(0.022)			(0.023)			(0.019)			(0.020)		
PCA school enjoyment	0.155	0.000	0.112,0.200	0.202	0.000	0.156,0.249	0.139	0.000	0.099,0.178	0.177	0.000	0.138,0.216
	(0.022)			(0.024)			(0.020)			(0.020)		
Early childhood – counting/reading	0.033	0.070	-0.003,0.068	0.058	0.002	0.021,0.096	0.077	0.000	0.037,0.116	0.104	0.000	0.066,0.142
	(0.018)			(0.019)			(0.020)			(0.019)		
Private daycare	0.022	0.231	-0.014,0.057	0.033	0.081	-0.004,0.070	0.015	0.300	-0.013,0.043	0.021	0.184	-0.010,0.052
	(0.018)			(0.019)			(0.014)			(0.016)		
Coeff. of determination	0.366						0.335					
N	3,848			3,793			3,848			3,793		

Source: MCS4 - own elaboration
linearized standard errors in brackets

Figures

Figure 1: Path diagram of the MIMIC model

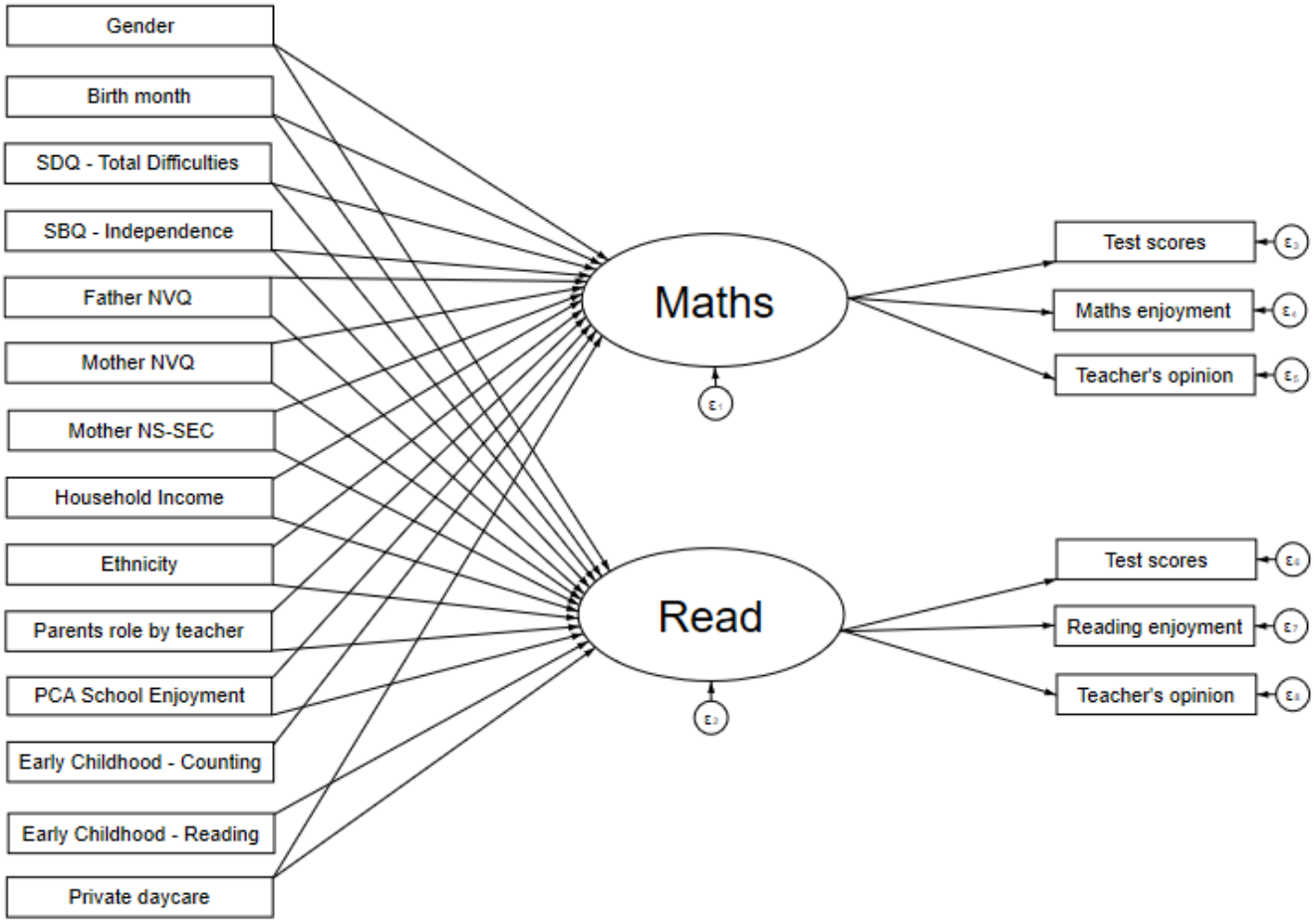
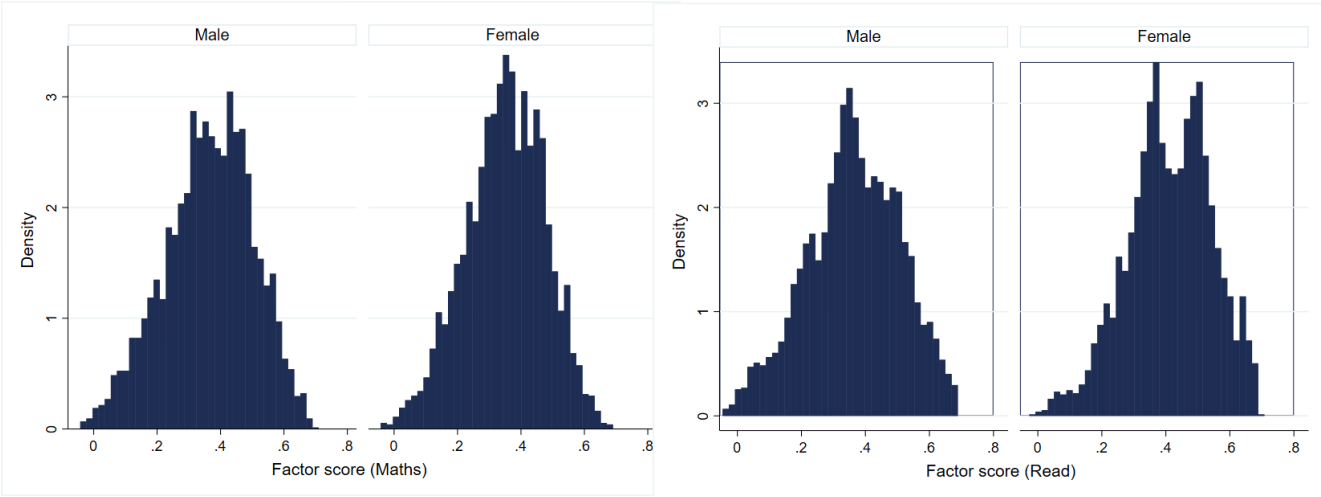


Figure 2: Factor scores for latent variables math and reading by gender measured at age 7



Appendix

Table A1. Items of school enjoyment index

Item	Scale
from CM's Self Completion Questionnaire:	
How much do you like school?	1 “I don't like it" to 3 “I like it a lot"
How much do you like answering questions in class?	1 “I don't like it" to 3 “I like it a lot"
How often do you try to do your best at school?	1 “Never" to 3 “All of the time"
How often does your teacher think you are clever?	1 “Never" to 3 “All of the time"
How often is school interesting?	1 “Never" to 3 “All of the time"
How often do you feel unhappy at school?	1 “All of the time" to 3 “Never"
How often do you get tired at school?	1 “All of the time" to 3 “Never"
How often do you get fed up at school?	1 “All of the time" to 3 “Never"
from mother's interview:	
Whether CM enjoys school?	1 “Not at all" to 4 “Always"
How often CM talks about school?	1 “Not at all" to 6 “Every day"
How often is CM reluctant to go to school?	1 “Every day" to 6 “Not at all"
Has CM been bullied at school?	1 “Many times" to 4 “Never"
How much are you satisfied with education at current school?	1 “Very dissatisfied" to 5 “Very satisfied"
N	7,641

Source: MCS4 - own elaboration