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SHORT REPORT

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Gender gaps in cognitive and social-emotional skills in early primary grades: Evidence from rural Indonesia

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Abstract

This paper examines the magnitude and source of gender gaps in cognitive and social-emotional skills in early primary grades in rural Indonesia. Relative to boys, girls score more than 0.17 *SD* higher in tests of language and mathematics (cognitive skills) and between 0.18 and 0.27 *SD* higher in measures of social competence and emotional maturity (social-emotional skills). We use Oaxaca–Blinder decomposition to investigate the extent to which gender differences in early schooling and parenting practices explain these gender gaps in skills. For cognitive skills, differences in early schooling between boys and girls explain between 9% and 11% of the gender gap whereas differences in parenting practices explain merely 3%–5% of the gender gap. This decomposition result is driven largely by children living in villages with high-quality preschools. In contrast, for social-emotional skills, differences in parenting styles toward boys and girls explain between 13% and 17% of the gender gap, while differences in early schooling explain only 0%–6% of the gender gap.

KEYWORDS
cognitive skills, early childhood, economic development, gender, human capital, social-emotional skills

JEL CLASSIFICATION
I24; I25; I26

1 | INTRODUCTION

Research has shown that gender differences in educational achievement emerge in the early years of school (Cobb-Clark & Moschion, 2017) and can persist into adulthood (Anderson, 2008). There is also a growing body of evidence suggesting that social-emotional skills observed in early childhood affect academic performance and labor market outcomes in later years (Cunha & Heckman, 2008; Cunha, Heckman, & Schennach, 2010). As a result, there is considerable interest in understanding the extent to which gender gaps exist in cognitive and social-emotional skills in early years of childhood, and what factors may explain these gender gaps (Garcia, Heckman, & Ziff, 2017).

This paper investigates gender differences in cognitive and social-emotional skills among children in the first few grades of primary school in a developing country. We use cross-sectional, nationally representative data of rural Indonesia to answer two research questions. First, how large are the gender gaps in cognitive and social-emotional skills in the early years? Second, to what extent do gender differences in early schooling and parenting practices explain these gender gaps?

Our paper contributes to developmental science by studying early childhood gender gaps in a developing country setting. To date, research from developing countries on this topic has been sparse (Dickerson, McIntosh, & Valente, 2015; Galasso, Weber, & Fernald, 2017; Glick & Sahn, 2010; World Bank, 2018). A question that arises

from the few existing studies is whether gender gaps in cognitive skills emerge as early as those observed in high-income countries (i.e., the first few years of schooling). For example, a cross-country study from Ethiopia, India, Peru, and Vietnam suggests that there were no gender gaps in cognitive skills at age 4–6 (Cueto, Leon, Guerrero, & Muñoz, 2009) but gender differences grew significantly during middle childhood at age 12, with male advantage in Ethiopia, India, and Peru, and female advantage in Vietnam (Dercon & Singh, 2013).

Another novel feature of this paper is our analysis on early gender gaps in social-emotional skills using data from a developing country. In recent years, studies from developed countries have paid increasing attention to gender gaps in social-emotional skills (Cornwell, Mustard, & Parys, 2013; DiPrete & Jennings, 2012). For example, among kindergarteners in Australia and Canada, girls outperform boys on the Early development instrument (EDI)—a holistic measure of child development that includes measures of social-emotional skills. Gender gaps in the EDI are particularly pronounced in the social competence domain (i.e., children's ability to cooperate with others and follow rules) and the emotional maturity domain (i.e., children's ability to deal with feelings at the age-appropriate level; Australian Government, 2013; Janus & Duku, 2007). To our knowledge, research from developing countries has yet to examine the early emergence of gender gaps in social-emotional skills.

Our paper uses Oaxaca–Blinder decompositions to examine the correlations between gender gaps and potential explanatory variables.[1] We hypothesize that early schooling experiences are likely to play a key role in explaining the gender gaps in the first few years of primary school. Research on the effect of preschool duration suggests that children with longer exposure to preschool have better developmental outcomes relative to children with shorter exposure (Arteaga, Humpage, Reynolds, & Temple, 2014; Domitrovich et al., 2013; Loeb, Bridges, Bassok, Fuller, & Rumberger, 2007; Nores & Barnett, 2010). In addition to duration, the literature points to the importance of quality of early childhood education programs in sustaining impacts on children's cognitive and social-emotional skills (Engle et al., 2011; Garcia et al., 2017). Thus, if girls and boys were exposed to different quantity and quality of preschools, we would expect to see these early schooling factors explain part of the gender gaps observed in the early years of primary school.

In addition to early schooling factors, we hypothesize that children's interactions with parents are likely to play an important role in the emergence of gender gaps in cognitive and social-emotional skills. Boys may react differently than girls to parenting practices and parents may adjust their parenting practices depending on the gender of the child (Owens, 2013). For example, data from the U.S., Canada, and the U.K show that parents spend more time with girls than boys in parental teaching activities such as reading and the use of numbers and letters, and these higher parental inputs for girls explain the gender gap in reading abilities in preschool (Baker & Milligan, 2016). In developing countries, differences in parental expectations toward girls and boys are widely documented (see Bharadwaj, De Giorgi, Hansen, & Neilson, 2015 for a comprehensive review) and as such, gender differences in the quality of parent–child interactions during early childhood are likely to explain part of the gender gaps in children's cognitive and social-emotional skills in the early years.

Research Highlights

- We investigate gender differences in early childhood development in Indonesia using a large dataset that is representative of the country's rural population.
- Girls perform better in tests of language and mathematics (cognitive skills) and demonstrate higher social competence and emotional maturity (social-emotional skills) than boys.
- A combination of early schooling and parenting practices explain the gender gaps in cognitive and social-emotional skills.

2 | COUNTRY CONTEXT

Indonesia has the fourth largest education system in the world with over 50 million students, 2.6 million teachers, and more than 250,000 schools. In 2015, total education spending as a percent of GDP was 3.5%. Net enrollment rates in primary, secondary, and tertiary education are 97%, 66%, and 20%, respectively (Diop & Sander, 2018). There are virtually no differences in primary and secondary education enrollment rates between girls and boys (Diop & Sander, 2018; Suryadarma, 2015).

However, results of educational achievement data during primary and secondary schooling show some evidence of gender gaps. Girls significantly outperform boys in reading in the fourth grade (Mullis, Martin, Foy, & Drucker, 2012) and by age 15, this female advantage is equivalent to approximately 10 additional months of schooling (OECD, 2016). In contrast, results in mathematics are mixed. Longitudinal household surveys from Indonesia show girls score 0.08 standard deviations (*SD*) higher in numeracy tests than boys at age 11 and this gap increases to 0.19 *SD* when the sample of children were 18 years old (Suryadarma, 2015). In contrast, results from PISA show that the difference between boys and girls in mathematics at age 15 is small in magnitude and not statistically significant (OECD, 2016). Thus, the existing evidence from Indonesia shows mixed evidence of gender gaps during late primary and secondary school.

3 | DATA AND MEASURES

This study uses data collected in 2013 from 310 villages that participated in an impact evaluation of the Indonesia Early Childhood Education and Development (ECED) Project. These villages are representative of the rural population in Indonesia (Hasan, Hyson, & Chang, 2013).The Indonesia ECED Project was designed to improve

poor children's school readiness by expanding access to preschool services through community-based early childhood education programs (see Pradhan et al., 2013 for further details of the study protocol). Our sample consists of 10,858 primary school students between 6 and 9 years of age living in these sampled villages.

Below, we briefly summarize the key measures of our study and describe them in more detail in Table 1 and Table A1.

3.1 | Outcomes

We administered a test of language (Bahasa Indonesia), mathematics, and abstract reasoning to children in schools. We also collected the EDI from the children's caregivers, which measures five domains: physical health and well-being; social competence; emotional maturity; language and cognitive development; communication skills and general knowledge. The EDI is available for a subset of 8,653 children who were age 8 and below.[2] For the purpose of our analysis, we focus on the tests and the EDI domain of language and cognitive development for measures of cognitive skills, and the EDI domains of social competence and emotional maturity for measures of social-emotional skills.

3.2 | Explanatory variables

We collected educational enrollment histories from children's primary caregivers. We used this information to construct the total months of enrollment in preschool and primary school between 2008 and 2013. We also collected caregiver-reported information on parenting practices, which provide an overall measure of positive parent–child relationships.[3]

3.3 | Controls

We administered a household survey to collect information about mothers' years of education and household assets. Items on assets were used to construct an index of household wealth. We also measured preschool quality using the Early Childhood Environment Rating Scale-Revised (ECERS-R) and defined villages with high-quality preschool as those above the median ECERS-R score observed in our sample.

4 | GENDER GAPS IN OUTCOMES AND EXPLANATORY VARIABLES

Summary statistics of the outcome variables are shown in Table 2. On average, girls score 0.17 *SD* higher than boys on the language and mathematics sections of the test. There is no difference between boys and girls in abstract reasoning. On average, the EDI scores show a female advantage with girls scoring higher than boys in all five domains. In the domains of physical health and well-being, language and cognitive development, and communication skills and general

TABLE 1 Summary of key measures

	Measures	Description/definition
Outcomes	Test scores	Children's primary school test scores in language, math, and abstract reasoning. Paper and pencil test by student. Tests are standardized using the mean and *SD* of children who were age 6
	Early development instrument (EDI)	Children's school readiness in five major developmental domains: physical health and well-being; social competence; emotional maturity; language and cognitive development; communication skills and general knowledge. Reported by parent. Each EDI domain is standardized using the mean and *SD* of children who were age 6
Explanatory variables	Total months enrolled in preschool	Children's enrollment duration in preschool for each academic year between 2008 and 2013. Reported by parent
	Total months enrolled in primary	Children's enrollment duration in primary school for each academic year between 2008 and 2013. Reported by parent
	Parenting practices	Parent–child relationships capturing warmth, consistency, and hostility. Adapted from the Longitudinal Study of Australian Children (Zubrick, Smith, Nicholson, Sanson, & Jackiewicz, 2008). Score ranges from 0 (low quality parenting) to 120 (high-quality parenting. Reported by parent
Controls	Mother's education (years)	Mother's highest level of education in years. Reported by mother
	Household wealth (z-score)	Wealth index based on ownership of various household items. Standardized to have a mean of 0 and *SD* of 1
	High preschool quality (Yes = 1)	Whether the average preschool quality in the village is higher than the median village. Preschool quality was measured using the Early Childhood Environment Rating Scale (ECERS-R; Harms, Clifford, & Cryer, 2005). Each center was scored on a 7-point Likert scale, ranging from inadequate (score of 1) to excellent (score of 7). We then computed village level averages of this ECERS-R score since two preschool services were surveyed (on average) in each village

Notes: See Table A1 for additional details of each measure.

TABLE 2 Summary statistics of outcome variables

	Girls (*N* = 5,380)				Boys (*N* = 5,478)				Gender difference (Girls–Boys)	
	Mean	*SD*	Min	Max	Mean	*SD*	Min	Max	Est.	(*SE*)
Test score (*SD*—all ages)										
Language	0.76	0.97	−1.44	1.95	0.59	1.00	−1.44	1.95	0.17***	(0.02)
Mathematics	0.67	0.94	−1.51	1.70	0.50	0.96	−1.51	1.70	0.17***	(0.02)
Abstract reasoning	0.31	1.04	−1.58	2.88	0.31	1.10	−1.58	2.88	0.00	(0.02)
Early development instrument (EDI, *SD*—only age 8 and younger)										
Physical health & well-being	0.18	0.90	−5.24	0.90	0.13	0.94	−4.56	0.90	0.05**	(0.02)
Social competence	−0.06	0.99	−2.88	1.59	−0.24	0.99	−5.56	1.59	0.18***	(0.02)
Emotional maturity	0.16	0.93	−4.13	2.18	−0.10	0.97	−3.27	2.18	0.27***	(0.02)
Language and cognitive development	0.68	0.45	−2.28	0.87	0.59	0.53	−2.28	0.87	0.09***	(0.01)
Communication skills and general knowledge	−0.37	1.04	−4.04	0.74	−0.44	1.06	−4.04	0.74	0.07***	(0.02)

Notes: Test score and EDI reported in standard deviation units. For EDI, the sample size is reduced to 8,653 children (4,309 girls and 4,344 boys) since 9 years old are not included. Test and EDI scores are standardized using the mean and *SD* of children who were age 6.

*$p < .1$;

**$p < .05$;

***$p < .01$.

knowledge, this advantage is less than 0.10 *SD*. The female advantage is much larger for social-emotional skills with a gender gap of 0.18 *SD* in social competence and 0.27 *SD* in emotional maturity.

Figure 1 shows the gender gaps in test scores and EDI by age. The gender gap in mathematics and language test scores decreases with age. The language gap varies between 0.26 *SD* at age 6 and 0.16 *SD* at age 9. In mathematics, the female advantage is similar in magnitude to language. It ranges from 0.23 *SD* at age 6 to 0.18 *SD* at age 9. There is no statistically significant difference in abstract reasoning at any age.

For social-emotional skills, we see gender gaps widen with age. For social competence, the gender gap ranges from 0.16 *SD* at age 6 to 0.26 *SD* at age 8. Similarly for emotional maturity, the gender gap ranges between 0.27 *SD* at age 6 and 0.31 *SD* at age 8.

The gender gaps in the other domains of the EDI are smaller in magnitude at each age. In language and cognitive development, the gender gap at age 6 is 0.16 *SD* and declines to 0.09 *SD* at age 8. For physical health and well-being, there is no gender difference at age 6 and 7 but there is a small, statistically significant gender gap (0.08 *SD*) at age 8. Similarly, for communication skills and general knowledge, there is a slight gap of 0.075 *SD* overall, which is driven by the gender gap at age 8.

Thus, the results for test scores and EDI suggest the presence of gender gaps in both cognitive and social-emotional skills in the first few years of primary school in rural Indonesia. At age 6, we already observe gender gaps in language and mathematics test scores as well as in children's social competence and emotional maturity. Given the existence of early gender gaps in rural Indonesia, we now examine whether there are gender differences in enrollment patterns and parenting practices to see if early schooling and parenting practices can be analyzed further as explanatory factors of the gender gap.

Table 3 presents descriptive statistics on the explanatory factors and controls used in the analysis. On average, girls enroll for 14.3 months in preschool compared to 13.2 months for boys.[4] The gender difference in primary school enrollment is much smaller than that of preschool, given that primary education is compulsory. On average, girls enrolled in primary schools for a mere 0.5 months more than boys. On average, parents of girls reported slightly higher total parenting practices scores than parents of boys, but the magnitude of this difference is very small (0.91 points out of a possible maximum score of 120 points).

For the controls, there is no significant gender difference in any of the variables. On average, mothers have completed a little over 7 years of education. For both boys and girls, household wealth levels are similar, and they are equally likely to reside in villages with high-quality preschools.

Figure 2 reports the gender gaps at each age for the explanatory variables. At age 2, the earliest age for which we have enrollment histories, there is no gender gap. As shown in Panel A, girls are enrolled for more months in preschool at ages 3, 4, and 5, with the gender gap ranging from 0.37 to 0.68 months. For enrollment in primary school shown in Panel B, girls are enrolled for roughly 0.5 more months at age 6 but by age 7 there is virtually no difference in enrollment duration between boys and girls.

Figure 2 also shows these patterns of enrollment by the average level of quality of early childhood education services in the village. The figure suggests that the gender gap in enrollment rates

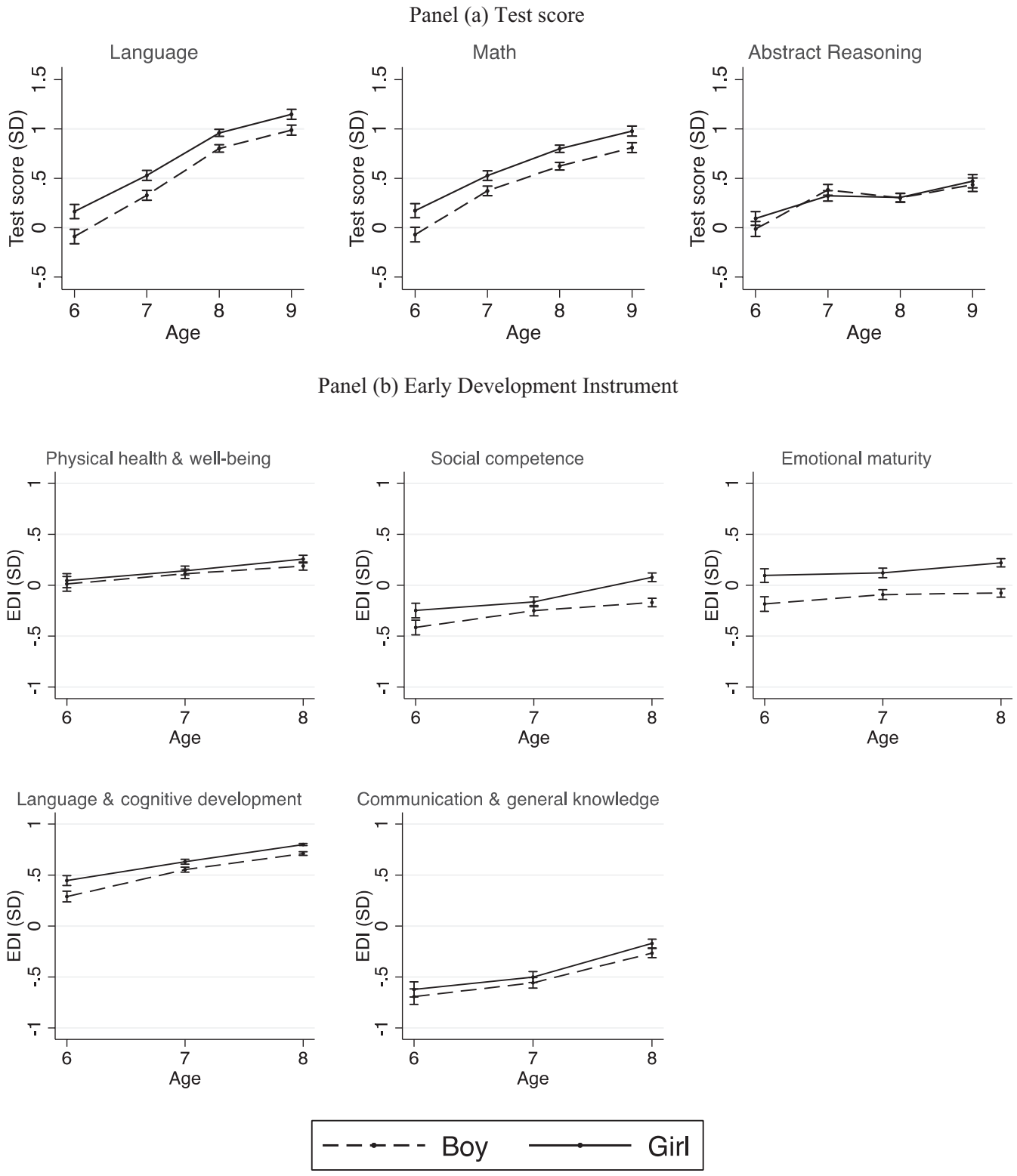

FIGURE 1 Outcomes for girls and boys by age. Panel a: Test score. Panel b: Early Development Instrument. Figures plot the mean values for boys (dash) and girls (solid) with 95% confidence intervals

and duration is more pronounced in the villages that have higher quality preschools. However, the difference in the gender gap across villages is not large, with a difference of less than 1 month at all ages.

The differences in parenting practices between girls and boys are presented in Panel C of Figure 2. As shown, parents of girls seem to exhibit more positive parenting behavior than parents of boys at ages 7, 8, and 9.[5] The fairly consistent gender gaps in parenting

TABLE 3 Summary statistics of explanatory variables and controls

	Girls (*N* = 5,380)				Boys (*N* = 5,478)				Gender difference (Girls–Boys)	
	Mean	*SD*	Min	Max	Mean	*SD*	Min	Max	Est.	*SE*
Explanatory variables										
Total months in preschool ('08-'13)	14.32	9.85	0.00	40.00	13.20	9.86	0.00	40.00	1.11***	(0.19)
Total months in primary ('08-'13)	19.10	9.43	0.00	48.00	18.57	9.19	0.00	48.00	0.53***	(0.18)
Parenting practices score	81.00	7.28	56.00	109.00	80.09	7.41	45.00	103.00	0.91***	(0.14)
Controls										
Mother's education (years)	7.31	3.69	0.00	15.00	7.35	3.64	0.00	15.00	−0.04	(0.07)
Household wealth (*z*-score)	0.08	0.94	−3.57	2.22	0.09	0.94	−3.53	2.25	−0.01	(0.02)
High preschool quality (Yes = 1)	0.50	0.50	0.00	1.00	0.51	0.50	0.00	1.00	−0.01	(0.01)

Notes: All variables measured in 2013. See Table 1 for definition of variables.

*$p < .1$;

**$p < .05$;

***$p < .01$.

practices score in the early years suggest the possibility of different parental expectations and behavior toward daughters and sons in Indonesia. The gender gap in parenting practices does not vary systematically by preschool quality.

Overall, the data reveal that girls are likely to be enrolled in more months of preschool at the appropriate ages—between 3 and 5—relative to boys. Moreover, the gender gap in preschool enrollment is more pronounced in villages that have higher quality preschool services. There is evidence of gender differences in the parenting practices as parents of girls have higher parenting practices scores than parents of boys. Together, these patterns raise the question of whether the gender gaps in child development outcomes can be explained by gender differences in early schooling and parenting practices. In the next section, we explore this question further.

5 | DECOMPOSITION OF GENDER GAPS BY EARLY SCHOOLING AND PARENTING PRACTICES

5.1 | Empirical model

Using an Oaxaca–Blinder decomposition, we investigate how much of the difference in mean outcomes between girls and boys is accounted for by gender differences in preschool enrollment, primary school enrollment, and parenting practices. We distinguish between two types of predictors: explanatory variables and controls. Explanatory variables are factors influencing children's development that are decided by parents and measure parental investments in the human capital of their children. In our analysis, the explanatory variables examined are (a) total months in preschool, (b) total months in primary school, and (c) parenting practices. In contrast, controls are factors influencing children's development that are characteristics of the family and village environment. Controls in our analysis are (a) education of mothers, (b) household wealth, and (c) quality of preschools in the village.

The Oaxaca–Blinder decomposition is based on a linear regression model $Y = X'\beta + \varepsilon$ for girls and boys where Y is the outcome variable and X is a vector containing the explanatory variables, controls, and a constant. β contains the slope and intercept parameters, and ε is the error term with $E(\varepsilon) = 0$. The standard terminology in the Oaxaca–Blinder decomposition makes reference to "effect" but the model captures only correlations between potential explanatory variables and gender gaps, not causal relationships.[6]

The mean outcome difference between girls and boys can be written as the difference in the linear prediction at the group-specific means of the explanatory variables as follows:

$$E(Y_{\text{girls}}) - E(Y_{\text{boys}}) = E(X_{\text{girls}})' \beta_{\text{girls}} - E(X_{\text{boys}})' \beta_{\text{boys}}, \quad (1)$$

because $E(\varepsilon_{\text{girls}}) = 0$ and $E(\varepsilon_{\text{boys}}) = 0$. By rearranging this equation, we can identify the contribution of group differences in the explanatory variables to the overall outcome difference:

$$E(X_{\text{girls}})' \beta_{\text{girls}} - E(X_{\text{boys}})' \beta_{\text{boys}} = \{E(X_{\text{girls}}) - E(X_{\text{boys}})\}' \beta_{\text{all}} + \{E(X_{\text{girls}})' (\beta_{\text{girls}} - \beta_{\text{all}}) + E(X_{\text{boys}})' (\beta_{\text{all}} - \beta_{\text{boys}})\}. \quad (2)$$

where β_{all} is a vector of parameters from $Y_{\text{all}} = X'_{\text{all}} \beta_{\text{all}} + M\delta + \varepsilon$. M is an indicator variable equal to 1 for boys and 0 for girls.

Thus, the mean outcome difference between girls and boys has two components.[7] The first component $\{E(X_{\text{girls}}) - E(X_{\text{boys}})\}' \beta_{\text{all}}$ is the part of the outcome difference between girls and boys explained by group differences in the explanatory variables. This first component is sometimes referred to as the "endowment effect." The

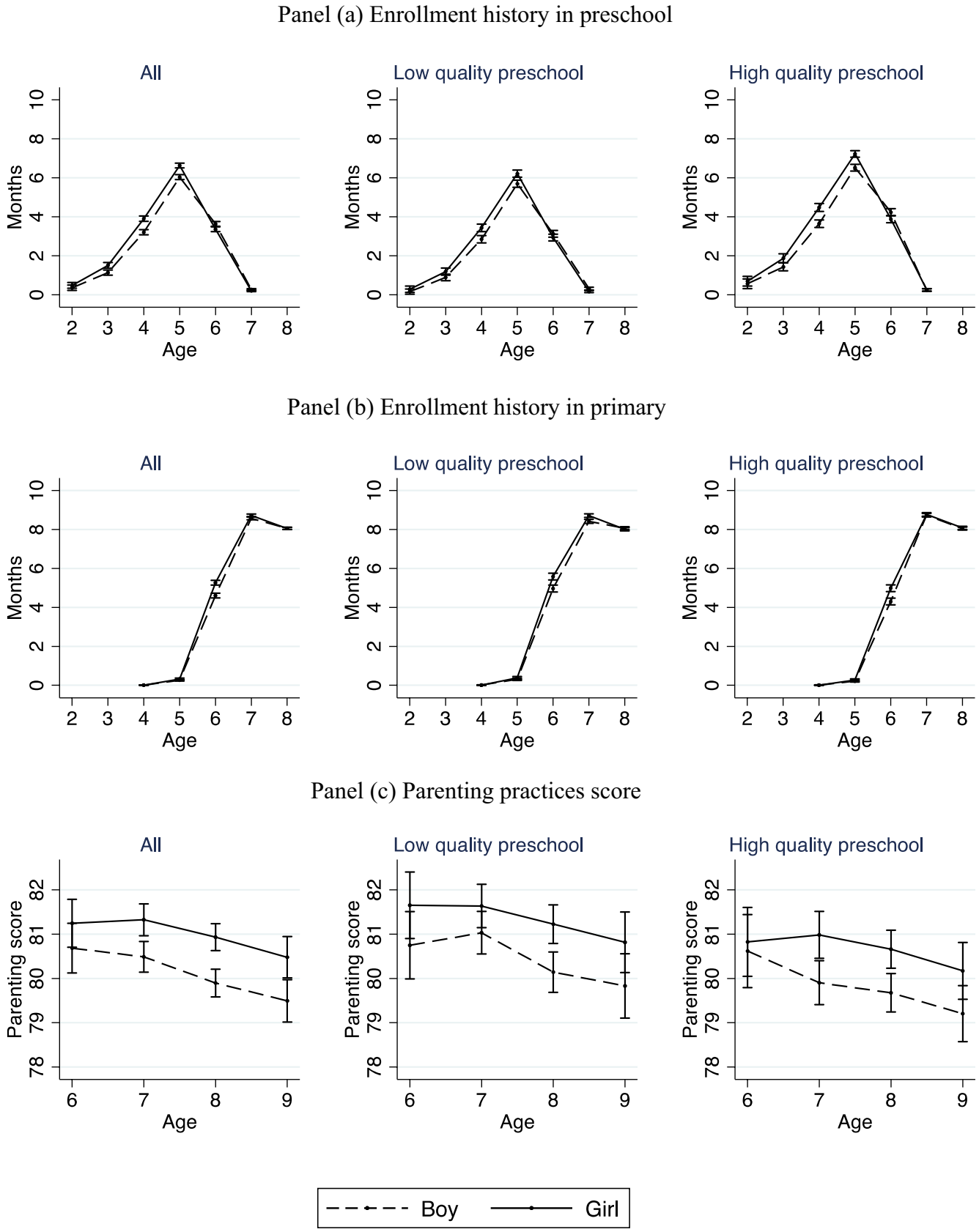

FIGURE 2 Explanatory variables for girls and boys by age. Panel a: Enrollment history in preschool. Panel b: Enrollment history in primary. Panel c: Parenting practices score. Figures plot the mean values for boys (dash) and girls (solid) with 95% confidence intervals

second component $\left\{E\left(X_{\text{girls}}\right)'\left(\beta_{\text{girls}}-\beta_{\text{all}}\right)+E\left(X_{\text{boys}}\right)'\left(\beta_{\text{all}}-\beta_{\text{boys}}\right)\right\}$ is the "unexplained" part that captures all of the potential effects of differences in other observed and unobserved characteristics between girls and boys. Our focus is on the endowment effect of the explanatory variables. The fraction of the gender gap that is explained by the endowments can be expressed as $\frac{\{E(X_{\text{girls}})-E(X_{\text{boys}})\}'\beta_{\text{all}}}{E(Y_{\text{girls}})-E(Y_{\text{boys}})}$. This allows us to understand how much of the mean outcome difference is accounted for by group differences in months of enrollment in preschool and primary school as well as by parenting practices.

Our decomposition model makes some strong assumptions. First, the model assumes equal returns to endowments (β_{all}) for boys and girls. We confirm that this assumption is reasonable in Table A2 by showing the correlations between the outcomes and explanatory variables for boys (β_{boys}) and for girls (β_{girls}). For most outcomes, we do not observe significant differences between β_{boys} and β_{girls}. However, for the language and cognitive development domain of the EDI and the language test, we observe larger returns for boys in the explanatory variables. For this reason, we conduct a robustness check for these two outcomes by setting $\beta_{\text{all}}=\beta_{\text{boys}}$, which are presented in Table A4 in the appendix.[8] Our results are very similar, irrespective of the assumption made about β_{all}.

Another key assumption of the Oaxaca–Blinder decomposition is that it follows a standard partial equilibrium approach and does not make general equilibrium considerations. The decomposition implicitly assumes that the observed outcomes for girls can be used to construct various counterfactual scenarios for boys (i.e., what would happen to boys' cognitive skills if boys had enrolled in preschools for as long as girls?). Our model does not consider the possibility that say, enrolling boys and girls equally in preschool may affect the overall enrollment levels itself.[9]

5.2 | Results

The results of the decomposition analyses are presented in Table 4.[10] Each row shows the mean difference in standardized test scores or EDI scores between girls and boys. This gender gap is decomposed into proportions explained by total months in preschool, total months in primary school, and parenting practices. The rest is unexplained and not reported. We test the equality of coefficients for each pair of explanatory variables and report its *p*-value.

For cognitive skills, preschool enrolment explains between 9% and 11% of the gender gap. This is shown in the language and cognitive development domain of the EDI (0.112.), language test (0.095), and math test (0.090). Primary school enrollment also explains between 10% and 13% of the gender gap for these cognitive skills.[11] In contrast to preschool and primary school enrollment, parenting practices explain significantly less of the gender gap in cognitive skills, with only 3%–5% explained.

We find opposite patterns for social-emotional skills, as shown in the social competence and emotional maturity domains of the EDI.

TABLE 4 Oaxaca–Blinder decomposition results

			Proportion of gender gap explained by:							*p*-value Equality of coef.		
	Gender gap (Girls–Boys)		Total months in preschool (1)		Total months in primary (2)		Parenting practices (3)		Obs.	(1 = 2)	(1 = 3)	(2 = 3)
Physical health and well-being	0.059***	(0.021)	0.033	(0.027)	0.077*	(0.039)	0.291***	(0.110)	7,982	*0.253*	*0.000*	*0.001*
Social competence	0.179***	(0.022)	0.061***	(0.014)	0.053***	(0.020)	0.167***	(0.033)	7,982	*0.749*	*0.002*	*0.003*
Emotional maturity	0.271***	(0.021)	−0.002	(0.005)	0.013**	(0.005)	0.127***	(0.024)	7,982	*0.035*	*0.000*	*0.000*
Language and cognitive development	0.095***	(0.011)	0.112***	(0.022)	0.112***	(0.039)	0.047***	(0.012)	7,981	*0.993*	*0.005*	*0.132*
Communication skills and general knowledge	0.075***	(0.023)	0.187***	(0.067)	0.177**	(0.078)	0.145***	(0.054)	7,982	*0.909*	*0.395*	*0.659*
Language	0.175***	(0.020)	0.095***	(0.020)	0.126***	(0.045)	0.030***	(0.008)	9,966	*0.578*	*0.001*	*0.049*
Mathematics	0.172***	(0.019)	0.090***	(0.019)	0.099***	(0.036)	0.026***	(0.008)	9,966	*0.849*	*0.001*	*0.062*
Abstract reasoning	0.004	(0.021)	2.025	(11.78)	2.452	(14.19)	0.923	(5.382)	9,966	*0.708*	*0.077*	*0.136*

Note: Each row is the result of a separate decomposition, which includes the following controls: mother's years of education, household wealth, and preschool quality in the village. Coefficients in columns (1), (2), and (3) report the proportion of the gender gap explained. Italics denote the *p*-value of tests of equality of coefficients (i.e., Null hypotheses that column (1) = column (2), column (1) = column (3), and column (2) = column (3)).

*$p < .1$;

**$p < .05$;

***$p < .01$.

Preschool enrollment and primary school enrollment explain none or very little of the gender gap (between 0% and 6%) while parenting practices explain more of the gender gap (at 13% and 17%). The proportion of the gender gap explained by parenting is significantly more than that explained by early schooling, as shown by the small *p*-values in the tests of equality of coefficients.

For physical health and well-being, we find that parenting explains nearly 30% of the gender gap and early schooling explains significantly less, at 0% for preschool enrollment and 8% for primary enrollment. For the communication and general knowledge domain, which captures a combination of cognitive and social-emotional skills, we find that early schooling and parenting practices explain similar proportions (between 15% and 19%) of the gender gap.[12]

Given that improving preschool quality is particularly amenable to policy intervention, we now turn to examining how preschool quality moderates the relationship between outcomes and explanatory variables in explaining the gender gap.[13] In our study setting, quality is a village-level characteristic, given that there are only a few services available in any given village.[14] As such, parents typically cannot select preschools based on quality and have to take preschool quality as a given.

Table 5 present the decomposition results separately for children living in villages with high- and low-quality preschool services. We report the p-value from tests for the equality of coefficients between children living in villages with high-quality preschool and those living in villages with low-quality preschools.

The decomposition results by preschool quality show two key results. First, across all outcomes, the magnitude of the gender gap is larger in villages where preschool quality is lower. Second, for cognitive skills, preschool enrollment explains between 7% and 15% of the gender gap for children in villages with low-quality

TABLE 5 Oaxaca–Blinder decomposition results by preschool quality

				Proportion of gender gap explained by:						
	Preschool quality	Gender gap (Girls–Boys)		Total months in preschool (1)		Total months in primary (2)		Parenting practices (3)		Obs.
Physical health and well-being	High (H)	0.012	(0.025)	0.391	(0.832)	0.434	(0.914)	1.205	(2.491)	4,148
	Low (L)	0.115***	(0.033)	0.008	(0.017)	0.034	(0.023)	0.170***	(0.063)	3,834
	p-value for H = L			*0.646*		*0.662*		*0.678*		
Social competence	High (H)	0.160***	(0.031)	0.077***	(0.025)	0.055*	(0.029)	0.226***	(0.062)	4,148
	Low (L)	0.198***	(0.032)	0.045***	(0.017)	0.050*	(0.028)	0.113***	(0.033)	3,834
	p-value for H = L			*0.273*		*0.903*		*0.111*		
Emotional maturity	High (H)	0.268***	(0.030)	−0.006	(0.009)	0.015*	(0.008)	0.122***	(0.033)	4,148
	Low (L)	0.280***	(0.030)	0.009	(0.007)	0.012	(0.007)	0.126***	(0.033)	3,834
	p-value for H = L			*0.185*		*0.705*		*0.939*		
Language and cognitive development	High (H)	0.073***	(0.014)	0.179***	(0.048)	0.138**	(0.065)	0.063***	(0.022)	4,147
	Low (L)	0.120***	(0.017)	0.073***	(0.023)	0.093*	(0.049)	0.036***	(0.013)	3,834
	p-value for H = L			*0.045*		*0.577*		*0.298*		
Communication skills and general knowledge	High (H)	0.063*	(0.032)	0.280*	(0.153)	0.213	(0.138)	0.250*	(0.138)	4,148
	Low (L)	0.089**	(0.035)	0.120**	(0.060)	0.148	(0.092)	0.058	(0.035)	3,834
	p-value for H = L			*0.330*		*0.695*		*0.177*		
Language	High (H)	0.142***	(0.028)	0.203***	(0.054)	0.136*	(0.080)	0.037**	(0.015)	5,232
	Low (L)	0.215***	(0.028)	0.030***	(0.011)	0.116**	(0.050)	0.021**	(0.009)	4,734
	p-value for H = L			*0.002*		*0.832*		*0.336*		
Math	High (H)	0.155***	(0.027)	0.164***	(0.041)	0.094*	(0.057)	0.039***	(0.014)	5,232
	Low (L)	0.193***	(0.027)	0.034***	(0.013)	0.101**	(0.045)	0.013	(0.008)	4,734
	p-value for H = L			*0.003*		*0.913*		*0.116*		
Abstract reasoning	High (H)	−0.004	(0.030)	−3.506	(25.94)	−1.953	(14.60)	−0.639	(4.739)	5,232
	Low (L)	0.016	(0.031)	0.140	(0.297)	0.659	(1.276)	0.232	(0.467)	4,734
	p-value for H = L			*0.889*		*0.859*		*0.856*		

Note: Each row is the result of a separate decomposition, which includes the following controls: mother's years of education, household wealth, and preschool quality in the village. Coefficients in columns (1), (2), and (3) report the proportion of the gender gap explained. Italics denote the *p*-value of tests of equality of coefficients across children in villages with high-quality preschool and children in villages with low-quality preschool.

*$p < .1$;

**$p < .05$;

***$p < .01$.

preschool, whereas preschool enrollment explains significantly more (at 12% and 22%) for those in villages with higher quality preschool.[15] These large differences in the magnitude of the decomposition between high- and low-quality preschool are consistent with our descriptive findings from Figure 2, which showed that preschool enrollment gaps were larger in villages with higher quality education than those in villages with lower quality education.

6 | DISCUSSION AND CONCLUSION

Using data from rural Indonesia, we documented the early emergence of gender gaps and showed that a combination of early schooling and parenting practices explain the observed difference between girls and boys. We found large gender gaps in cognitive skills, with girls outperforming boys by more than 0.17 *SD* in both language and math. Our findings for language development were consistent with previous results from the U.S. that showed girls scored 0.16 *SD* higher in language performance than boys in kindergarten (Cornwell et al., 2013; DiPrete & Jennings, 2012). However, our results diverged from earlier studies that found girls losing ground to boys in mathematics during primary school, both in high-income countries (Fryer & Levitt, 2010) and in lower- and middle-income countries (Bharadwaj et al., 2015; Dickerson et al., 2015). Instead, we found a female advantage in mathematics during the first few years of schooling—consistent with an earlier study from Indonesia showing female advantage in mathematics at age 11 (Suryadarma, 2015).

In addition, we found substantial gender gaps in social-emotional skills. In the EDI domains of social competence and emotional maturity, girls scored 0.18–0.27 *SD* higher than boys. This result was similar to previous studies of the EDI in higher income contexts, which found that girls scored significantly higher than boys in both of these domains (Australian Government, 2013; Janus & Duku, 2007).

In our decomposition analysis, we explored the extent to which gender gaps in cognitive and social-emotional skills are explained by gender differences in early schooling and parenting practices. Gender gaps in cognitive skills were mostly explained by the duration of enrollment in preschool and primary school; we found little explanatory role for parenting practices for these outcomes. In particular, our decomposition results for cognitive skills were concentrated among children living in villages with high preschool quality. In contrast, for social-emotional skills, parenting practices contributed more to explaining the gender gaps than enrollment in preschool and primary school.

Our results contribute to the emerging literature on gender gaps in early childhood development in developing countries. From a policy standpoint, these early-emerging gender differences in rural Indonesia highlight the important role that both schools and families play in the early years to equally support the needs of girls and boys.

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CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

DATA AVAILABILITY STATEMENT

The raw data used in this paper are available for download via the World Bank's microdata library under the terms of use for a licensed file at the following URL: https://microdata.worldbank.org/index.php/catalog/3536. The terms of use are described at the following URL: http://microdata.worldbank.org/index.php/terms-of-use. The working dataset and programs we used to calculate the final results can be downloaded at the following URL starting in January 2020: https://nozominakajima.github.io/

ENDNOTES

[1] School and family factors have been widely explored as important contributors of the gender gap (Autor et al., 2016; Bertrand & Pan, 2013; Conti, Heckman, & Pinto, 2016). In addition, a range of other explanatory factors has been explored in the gender gaps literature. For example, Goldin (2006) shows that macro-level social and economic changes are a key explanation for the gender gap in educational attainment, while Bertrand and Pan (2013) provide an overview of how psychological and socio-psychological factors explain gender differences in educational and labor market outcomes.

[2] EDI data were not collected for 9 years old due to ceiling effects (i.e., there was very little variation at age 9 with almost all children scoring at the maximum end of the EDI scales).

[3] As we rely on parents' accurate recall of their children's enrollment in preschool and primary school, our measure of enrollment may suffer from recall bias.

[4] Given the academic calendar in Indonesia, duration does not exceed 10 months in a given year.

[5] The data do not allow us to look at siblings.

[6] We chose to include control variables in our model as it reduces omitted variable bias for the decomposition estimates on months of preschool enrollment, primary school enrollment, and parenting practices. We realize that including the controls does not eliminate omitted variable bias entirely and our estimates are not causal.

[7] This is a modification of the original Oaxaca–Blinder decomposition, which has three components. See Jann (2008) for details.

[8] This specification yields an upper bound estimate of the proportions that can be explained by differences in preschools enrollment, primary school enrollment, and parenting practice since we assume β_{all} to have the significantly higher β (i.e., boys).

[9] In our study, the difference in preschool enrollment between boys and girls is 1.1 month, which is about 7.7% of the months of preschool enrollment of girls (see Table 3). Considering that the magnitude of the gender difference in enrollment is quite small, we would not expect there to be general equilibrium effects equalizing enrollment in preschool between boys and girls.

[10] The decomposition results by age are shown in Table A3.

[11] The large coefficient on primary school is remarkable considering that the gender differences in primary school enrollment is less than half of that of preschool enrolment (as shown in Table 3). This points to higher returns for primary school enrolment than preschool enrollment in cognitive skill development in the early years.

[12] The decomposition results for abstract reasoning are not meaningful since there is no gender gap to be decomposed. Thus, we present the results in Table 4 but do not interpret them in the text.

[13] Evidence on the life-cycle impacts of an early childhood education program suggests that boys benefit relatively more than girls from attending high-quality programs compared to low-quality programs (Garcia et al., 2017).

[14] See Hasan, Hyson and Chang (2013). Moreover, Table A2 shows that the association between skills and preschool quality is similar across boys and girls, with the exception of the language and cognitive development domain of the EDI (p = .06) and the language test in primary school (p = .02). For these two outcomes, boys are more responsive than girls to high-quality preschools.

[15] Using the highly conservative Bonferroni correction to account for multiple hypotheses, our results for cognitive skills in language and math are still significant at the 5% and 10% level, respectively. Thus, our main findings still hold after adjusting for multiple hypotheses.

[16] An analysis of the test items using item response theory (IRT) shows similar levels of item difficulty for boys and girls. This analysis is available upon request.

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APPENDIX

TABLE A1 Details of measures

	Instrument	Details
Outcomes	Test scores	The test items for language and mathematics are from a battery of questions that align with the national curriculum for lower primary school grades and the test items for abstract reasoning are based on the Raven's Colored Progressive Matrices. Two versions of the test were administered: an easier test for 6 and 7 years old and a more difficult test for 8 and 9 years old. There were 39 common items across the two versions of the test, which we use in our analysis.We standardize the test scores using the mean and standard deviation of children who were age 6 since the *SD* of the raw test scores are similar from age 6–9
	Early development instrument	The Early Development Instrument (EDI), which has been demonstrated as a valid and reliable measure of child development (Forget-Dubois et al., 2007; Janus & Offord, 2007). The EDI was adapted and translated for use in the Indonesia ECED Project by the authors and members of the research team (Brinkman et al., 2017). There are five domains in the EDI: physical health and well-being, social competence, emotional maturity, language and cognitive development, and communication skills and general knowledge. Each domain is scored from 1 (low) to 10 (high).We standardize the EDI domains using the mean and standard deviation of children who were age 6 since the *SD* of the raw EDI scores are similar from age 6 to 8
Explanatory variables	Months enrolled in preschool Months enrolled in primary	Information on enrollment history in preschool and primary school for each academic year between 2008 and 2013 was collected from the mother or main caregiver of the 10,858 children in our sample. For each academic year, we asked how many months a child was enrolled. The response ranges from 0 to 10 months. The maximum number of months is 10 since we follow the Indonesian academic calendar. Preschool is defined as enrollment in kindergarten and playgroups, which are the two most common types of center-based services for young children before primary school in Indonesia
	Parenting practices	The primary caregivers of the children in our sample (usually mothers) were asked to answer a series of questions about their parenting practices. These practices were measured using 24 items describing parent–child relationships adapted from the Longitudinal Study of Australian Children (Zubrick et al., 2008). The questions covered a range of possible practices that reflect three domains: parental warmth, consistency, and hostility. Caregivers were asked how often they used each of a number of different parenting practices. A total positive parenting practices score was given to each child's caregiver by adding together scores for each of the three parenting dimensions (with the negative items reversed).The total possible points range from 0 to 120. The higher the score, the more likely it is that parents have high levels of warmth and consistency, and low levels of hostility toward their children
Controls	Preschool quality	The quality of preschool services in this paper is measured using the Early Childhood Environment Rating Scale (ECERS-R; Harms et al., 2005). Two raters assessed each center at the same time. Both raters were present in the room with the class they were observing for 3 hr and followed this group if they left the room for outdoor play. Raters did not interact with staff or students during their observation. The two raters scored each center on a 7-point Likert scale, which ranged from inadequate (score of 1) to excellent (score of 7). For each center, rater one and rater two's scores are averaged to construct a mean ECERS-R score. These assessments focused on the seven subscales of the ECERS-R: Space and Furnishings, Personal Care Routines, Language-Reasoning, Activities, Interaction, Program Structure, and Parents and Staff. All averages were done first by sub-scale and then overall to construct each center's ECERS-R score. We then computed village level averages of this ECERS-R score since two preschool services were surveyed (on average) in each village. In our analysis we divide the 310 villages in our sample into high and low quality (above and below the mean) based on their average ECERS-R score
	Mother's education	Mother's reported the years of education they completed
	Household wealth	Households were asked if they owned any of the following: radio, television, refrigerator, bicycle, motor cycle, car, boat, mobile phone, livestock including chickens, pigs, cows, and goats. They were also asked about the materials used in the construction of the roof, walls, and floor of their homes, whether or not they had access to electricity in the home, and whether or not they had received social assistance (in cash or in kind). Responses were combined into a single index using principal components analysis. The score of the first principal is then standardized with the resulting variable having a mean of zero and a *SD* of one. Respondent is adult member of household

TABLE A2 Gender differences in explanatory factors and controls

	Total months in preschool	Total months in primary	Parenting practices	Mother's education (years)	Household wealth (z-score)	Preschool quality
Physical health and well-being						
All	0.001	0.010***	0.020***	0.006*	−0.018	0.158***
	(0.001)	(0.001)	(0.001)	(0.003)	(0.013)	(0.012)
Girls (G)	0.003*	0.011***	0.021***	0.006	−0.008	0.137***
	(0.001)	(0.002)	(0.002)	(0.004)	(0.018)	(0.017)
Boys (B)	0.000	0.009***	0.019***	0.006	−0.029	0.177***
	(0.002)	(0.002)	(0.002)	(0.005)	(0.019)	(0.018)
p-value for B = G	*0.23*	*0.48*	*0.62*	*0.95*	*0.41*	*0.11*
Social competence						
All	0.008***	0.020***	0.035***	0.019***	0.135***	−0.049***
	(0.001)	(0.001)	(0.001)	(0.003)	(0.013)	(0.012)
Girls (G)	0.008***	0.022***	0.035***	0.026***	0.125***	−0.053***
	(0.002)	(0.002)	(0.002)	(0.005)	(0.018)	(0.018)
Boys (B)	0.009***	0.019***	0.035***	0.012**	0.144***	−0.046***
	(0.002)	(0.002)	(0.002)	(0.005)	(0.018)	(0.018)
p-value for B = G	*0.51*	*0.25*	*0.91*	*0.04*	*0.46*	*0.76*
Emotional maturity						
All	−0.000	0.008***	0.040***	−0.006*	−0.027**	0.195***
	(0.001)	(0.001)	(0.001)	(0.003)	(0.013)	(0.013)
Girls (G)	0.000	0.007***	0.039***	0.003	−0.031*	0.192***
	(0.002)	(0.002)	(0.002)	(0.005)	(0.018)	(0.017)
Boys (B)	−0.001	0.008***	0.042***	−0.015***	−0.021	0.197***
	(0.002)	(0.002)	(0.002)	(0.005)	(0.019)	(0.019)
p-value for B = G	*0.53*	*0.68*	*0.32*	*0.01*	*0.67*	*0.83*
Language and cognitive development						
All	0.008***	0.023***	0.005***	0.010***	0.059***	0.021***
	(0.001)	(0.001)	(0.001)	(0.002)	(0.006)	(0.006)
Girls (G)	0.007***	0.020***	0.004***	0.011***	0.052***	0.010
	(0.001)	(0.001)	(0.001)	(0.002)	(0.008)	(0.008)
Boys (B)	0.009***	0.026***	0.007***	0.008***	0.068***	0.033***
	(0.001)	(0.001)	(0.001)	(0.002)	(0.010)	(0.009)
p-value for B = G	*0.05*	*0.00*	*0.06*	*0.44*	*0.22*	*0.06*
Communication skills and general knowledge						
All	0.011***	0.029***	0.013***	0.016***	0.053***	−0.001
	(0.001)	(0.001)	(0.002)	(0.004)	(0.014)	(0.014)
Girls (G)	0.010***	0.030***	0.013***	0.015***	0.053***	−0.003
	(0.002)	(0.002)	(0.002)	(0.005)	(0.020)	(0.019)
Boys (B)	0.011***	0.027***	0.012***	0.016***	0.052***	0.002
	(0.002)	(0.002)	(0.002)	(0.005)	(0.020)	(0.020)
p-value for B = G	*0.81*	*0.23*	*0.74*	*0.83*	*0.99*	*0.84*
Language						
All	0.015***	0.045***	0.006***	0.037***	0.170***	0.044***
	(0.001)	(0.001)	(0.001)	(0.003)	(0.011)	(0.011)

(Continues)

TABLE A2 (Continued)

	Total months in preschool	Total months in primary	Parenting practices	Mother's education (years)	Household wealth (z-score)	Preschool quality
Girls (G)	0.012***	0.043***	0.006***	0.038***	0.204***	0.019
	(0.001)	(0.001)	(0.002)	(0.004)	(0.015)	(0.015)
Boys (B)	0.017***	0.048***	0.006***	0.037***	0.138***	0.070***
	(0.001)	(0.001)	(0.002)	(0.004)	(0.015)	(0.015)
p-value for B = G	*0.01*	*0.01*	*0.87*	*0.90*	*0.00*	*0.02*
Mathematics						
All	0.014***	0.035***	0.005***	0.036***	0.166***	0.029***
	(0.001)	(0.001)	(0.001)	(0.003)	(0.011)	(0.011)
Girls (G)	0.012***	0.034***	0.005***	0.035***	0.194***	0.018
	(0.001)	(0.001)	(0.002)	(0.004)	(0.015)	(0.015)
Boys (B)	0.015***	0.036***	0.005***	0.038***	0.139***	0.040***
	(0.001)	(0.001)	(0.002)	(0.004)	(0.015)	(0.015)
p-value for B = G	*0.10*	*0.27*	*0.93*	*0.57*	*0.01*	*0.30*
Abstract reasoning						
All	0.007***	0.019***	0.004***	0.034***	0.168***	0.086***
	(0.001)	(0.001)	(0.001)	(0.003)	(0.013)	(0.013)
Girls (G)	0.006***	0.019***	0.002	0.036***	0.175***	0.084***
	(0.002)	(0.002)	(0.002)	(0.004)	(0.017)	(0.017)
Boys (B)	0.008***	0.018***	0.005***	0.031***	0.162***	0.088***
	(0.002)	(0.002)	(0.002)	(0.005)	(0.018)	(0.018)
p-value for B = G	*0.34*	*0.75*	*0.27*	*0.45*	*0.61*	*0.86*

Note: "All," "Boys," and "Girls" are the results of separate regressions, each regressing the outcome on total months in preschool, total months in primary, parenting practices, mother's education, household wealth, and preschool quality. Italics denote the *p*-value of the test of equality of coefficients across the "Boys" and "Girls" results.

*$p < .1$;

**$p < .05$;

***$p < .01$.

TABLE A3 Details of Oaxaca–Blinder decomposition results

	Age	Gender gap (Girls–Boys)		Proportion of gender gap explained by: Total months in preschool (1)		Total months in primary (2)		Parenting practices (3)		Obs.	*p*-value Equality of coef. (1 = 2)	(1 = 3)	(2 = 3)
EDI													
Physical health and well-being	All	0.059***	(0.021)	0.033	(0.027)	0.077*	(0.039)	0.291***	(0.110)	7,982	*0.253*	*0.000*	*0.001*
	6	0.035	(0.054)	−0.107	(0.212)	0.030	(0.097)	0.315	(0.514)	1,321	*0.378*	*0.134*	*0.260*
	7	0.042	(0.034)	0.011	(0.078)	0.032	(0.040)	0.399	(0.329)	2,860	*0.792*	*0.018*	*0.013*
	8	0.083***	(0.030)	0.026	(0.020)	0.072*	(0.041)	0.227**	(0.092)	3,801	*0.205*	*0.001*	*0.022*
Social competence	All	0.179***	(0.022)	0.061***	(0.014)	0.053***	(0.020)	0.167***	(0.033)	7,982	*0.749*	*0.002*	*0.003*
	6	0.155***	(0.054)	0.101*	(0.052)	0.004	(0.011)	0.130	(0.094)	1,321	*0.033*	*0.788*	*0.199*
	7	0.089**	(0.037)	0.220**	(0.102)	0.077	(0.057)	0.287**	(0.134)	2,860	*0.077*	*0.559*	*0.068*
	8	0.260***	(0.032)	0.015*	(0.009)	0.055***	(0.016)	0.141***	(0.033)	3,801	*0.023*	*0.000*	*0.021*
Emotional maturity	All	0.271***	(0.021)	−0.002	(0.005)	0.013**	(0.005)	0.127***	(0.024)	7,982	*0.035*	*0.000*	*0.000*
	6	0.272***	(0.052)	−0.013	(0.016)	0.003	(0.009)	0.079	(0.057)	1,321	*0.372*	*0.141*	*0.204*
	7	0.227***	(0.036)	−0.029*	(0.017)	0.004	(0.005)	0.134***	(0.046)	2,860	*0.043*	*0.001*	*0.006*
	8	0.306***	(0.031)	0.006	(0.005)	0.026***	(0.010)	0.135***	(0.031)	3,801	*0.050*	*0.000*	*0.001*
Language and cognitive development	All	0.095***	(0.011)	0.112***	(0.022)	0.112***	(0.039)	0.047***	(0.012)	7,981	*0.993*	*0.005*	*0.132*
	6	0.161***	(0.037)	0.132***	(0.049)	0.010	(0.028)	0.045	(0.034)	1,321	*0.038*	*0.125*	*0.411*
	7	0.082***	(0.019)	0.204***	(0.059)	0.105	(0.065)	0.039**	(0.019)	2,859	*0.251*	*0.001*	*0.345*
	8	0.089***	(0.011)	0.034*	(0.018)	0.167***	(0.037)	0.040***	(0.013)	3,801	*0.003*	*0.774*	*0.002*
Communication skills and general knowledge	All	0.075***	(0.023)	0.187***	(0.067)	0.177**	(0.078)	0.145***	(0.054)	7,982	*0.909*	*0.395*	*0.659*
	6	0.058	(0.056)	0.353	(0.354)	0.003	(0.013)	0.119	(0.141)	1,321	*0.017*	*0.169*	*0.231*
	7	0.044	(0.039)	0.475	(0.427)	0.157	(0.167)	0.186	(0.178)	2,860	*0.068*	*0.055*	*0.828*
	8	0.111***	(0.033)	0.053*	(0.031)	0.196***	(0.072)	0.135**	(0.052)	3,801	*0.015*	*0.073*	*0.319*
Test score													
Language	All	0.175***	(0.020)	0.095***	(0.020)	0.126***	(0.045)	0.030***	(0.008)	9,966	*0.578*	*0.001*	*0.049*
	6	0.262***	(0.054)	0.133***	(0.049)	−0.001	(0.026)	0.025	(0.019)	1,323	*0.022*	*0.032*	*0.417*
	7	0.200***	(0.038)	0.137***	(0.037)	0.065	(0.044)	0.027*	(0.014)	2,869	*0.217*	*0.001*	*0.419*
	8	0.161***	(0.028)	0.049**	(0.022)	0.178***	(0.047)	0.024*	(0.013)	3,936	*0.012*	*0.322*	*0.001*
	9	0.157***	(0.038)	−0.005	(0.029)	0.291***	(0.087)	0.038*	(0.022)	1,838	*0.000*	*0.215*	*0.001*
Mathematics	All	0.172***	(0.019)	0.090***	(0.019)	0.099***	(0.036)	0.026***	(0.008)	9,966	*0.849*	*0.001*	*0.062*
	6	0.234***	(0.054)	0.147***	(0.055)	0.000	(0.015)	0.018	(0.015)	1,323	*0.010*	*0.017*	*0.393*
	7	0.157***	(0.036)	0.143***	(0.045)	0.066	(0.046)	0.033*	(0.018)	2,869	*0.209*	*0.005*	*0.508*
	8	0.178***	(0.028)	0.045**	(0.021)	0.126***	(0.034)	0.022*	(0.012)	3,936	*0.042*	*0.311*	*0.002*
	9	0.179***	(0.038)	−0.004	(0.025)	0.195***	(0.059)	0.027	(0.017)	1,838	*0.001*	*0.285*	*0.002*
Abstract reasoning	All	0.004	(0.021)	2.025	(11.78)	2.452	(14.193)	0.923	(5.382)	9,966	*0.708*	*0.077*	*0.136*
	6	0.097*	(0.055)	0.189	(0.124)	−0.001	(0.037)	0.004	(0.022)	1,323	*0.041*	*0.029*	*0.909*
	7	−0.060	(0.041)	−0.226	(0.177)	−0.146	(0.151)	0.006	(0.035)	2,869	*0.550*	*0.008*	*0.160*
	8	0.006	(0.034)	0.640	(3.554)	3.480	(19.260)	0.824	(4.581)	3,936	*0.004*	*0.730*	*0.006*
	9	0.047	(0.051)	−0.007	(0.044)	0.646	(0.704)	0.197	(0.227)	1,838	*0.001*	*0.049*	*0.033*

Note: Each row is the result of a separate decomposition, which includes the following controls: mother's years of education, household wealth, and preschool quality in the village. Coefficients in columns (1), (2), and (3) report the proportion of the gender gap explained. Italics denote the *p*-value of tests of equality of coefficients (i.e., Null hypotheses that column (1) = column (2), column (1) = column (3), and column (2) = column (3)).

*$p < .1$;

**$p < .05$;

***$p < .01$.

TABLE A4 Sensitivity analysis of Oaxaca–Blinder decomposition

				Proportion of gender gap explained by:							*p*-value Equality of coef.		
	Specification	Gender gap (Girls–Boys)		Total months in preschool (1)		Total months in primary (2)		Parenting practices (3)		Obs.	1 = 2	1 = 3	2 = 3
Language and cognitive development	β_{all}	0.095***	(0.011)	0.112***	(0.022)	0.112***	(0.039)	0.047***	(0.012)	7,981	*0.993*	*0.005*	*0.132*
	$\beta_{all} = \beta_{boys}$	0.095***	(0.011)	0.124***	(0.025)	0.134***	(0.044)	0.062***	(0.016)	7,981	*0.866*	*0.026*	*0.154*
Language	β_{all}	0.175***	(0.020)	0.095***	(0.020)	0.126***	(0.045)	0.030***	(0.008)	9,966	*0.578*	*0.001*	*0.049*
	$\beta_{all} = \beta_{boys}$	0.175***	(0.020)	0.110***	(0.023)	0.132***	(0.047)	0.031***	(0.010)	9,966	*0.701*	*0.001*	*0.050*

Note: Each row is the result of a separate decomposition, which includes the following controls: mother's years of education, household wealth, and preschool quality in the village. Coefficients in columns (1), (2), and (3) report the proportion of the gender gap explained. Italics denote the *p*-value of tests of equality of coefficients (i.e., Null hypotheses that column (1) = column (2), column (1) = column (3), and column (2) = column (3)).

*$p < .1$;

**$p < .05$;

***$p < .01$.