



Does more schooling imply improved learning? Evidence from the Kanyashree Prakalpa in India

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ABSTRACT

Studies on Conditional Cash Transfer (CCT) programs have documented positive effects on school enrollment though evidence on learning outcomes is mixed. Using representative data, we evaluate one of the largest CCT programs, Kanyashree Prakalpa (KP), which was implemented in the state of West Bengal, India, in 2013. In particular, we examine the effect on female school enrollment and learning outcomes. Exploiting the timing of the program implementation for identification and applying difference-in-difference regressions, we document a positive effect on enrollment with no discernible impact on secondary and higher secondary school completion. We also observe significant improvements in lower-level learning outcomes but a marked deterioration in higher-level skills like solving simple division problems. Complementary investments like classroom availability and teacher attendance appear to have fallen after the implementation of KP, which explains the decline in learning skills despite higher schooling exposure, thereby underscoring the need for supply-side interventions in school amenities.

1. Introduction

Conditional Cash Transfer (CCT) programs are among the most widely adopted educational interventions to retain adolescent girls in school (World Bank, 2015). In its canonical form, CCT programs involve cash subsidy that is conditional on the school enrolment and continuation of education of eligible girl child. While CCT programs are considered an effective strategy to counter female dropouts to ensure long-term economic independence, does it also result in improved learning outcomes? Although CCT design presumes a positive correlation between time spent at school and human capital acquisition, empirical evidence in this regard is not conclusive. Reviews of CCT interventions have found positive as well as null effects on learning outcomes with significant heterogeneity in language and mathematical proficiency (Garcia & Saavedra, 2022; Millan, Barham, Macours, Maluccio, & Stampini, 2019). In this paper, we speak to this growing body of evidence by analyzing the impact of *Kanyashree Prakalpa* (KP), a CCT program, on the educational outcomes of adolescent females in

West Bengal, an eastern state in India.

KP was introduced in 2013 primarily as a response to high rates of child marriage in WB. To incentivize schooling, KP includes an annual cash transfer to meet schooling expenses of INR 1000 (~\$13) and a lumpsum amount of INR 25,000 after the completion of 18 years of age, provided the girl is unmarried and pursuing general or vocational courses.¹ Besides the prevalence of underage marriage, the focus on the educational outcome of KP is important for three more reasons. First, only 20% of the eligible women in WB are found to have completed secondary schooling which is much lower than in most of the other states. Second, the state has one of the lowest female workforce participation rates in India (25%).² Finally, school education in WB is characterized by a shortage of classrooms and the persistence of teacher absenteeism (Bagchi, 2017). In this context, we examine the effects of the program on school enrollment among females. Further, we also explore the impact on learning outcomes and assess the role of supply-side factors like the school infrastructure and teacher absenteeism as channels.

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¹ For more information on the program, please refer to https://wbkanyashree.gov.in/kp_4.0/index.php (accessed on July 14, 2020)

² Both these information can be retrieved from <http://documents.worldbank.org/curated/en/389611504251389371/West-Bengal-Gender> (accessed on July 29, 2020)

Female enrollment increase in school is a verifiable target and manifests in terms of delaying the age of marriage and relieving the girl child from low-paying informal jobs. The extent of improvement in learning outcomes due to CCT, on the contrary, needs careful measurement and has a long-term impact on female living standards. Existing evidence indicates that higher learning outcomes for females, especially at the secondary level, lead to better job prospects, potentially higher lifetime income, and improved quality of life via enhanced bargaining power (Hanmer & Klugman, 2016; Wodon, Montenegro, Nguyen, & Onagoruwa, 2018).

CCT impacts schooling outcomes by altering the budget constraint of the parent households. The “cash” part of CCT introduces an income effect to overcome the credit constraint, and the conditionality brings in a substitution effect by lowering the opportunity cost of schooling (Fiszbein et al., 2009; Rubio-Codina, 2010; Baird, Ferreira, Özler, & Woolcock, 2013). By reducing the shadow wage in off-school activities, CCT programs encourage school enrolment for girls who might otherwise be engaged in household chores or informal jobs, and studies have well documented this evidence (Bourguignon, Ferreira, & Leite, 2003; Gitter & Barham, 2009; Mo et al., 2013; Garcia & Saavedra, 2017; Parker & Todd, 2017).

However, whether increased schooling through enrollment translates into better learning remains a moot point. It is expected that attending school and taking classes get rendered augmented literacy skills. Test scores might also improve if the income effect from transfers encourages greater parental investments in learning amenities (Baez & Camacho, 2011) and stimulate a more favored outlook for female education (Garcia, Harker, & Cuartas, 2019). On the other hand, in developing countries, the poor state of educational inputs like insufficient classroom and teacher absenteeism often retrograde educational attainment (Chaudhury, Hammer, Kremer, Muralidharan, & Rogers, 2006; Hanushek, Lavy, & Hitomi, 2008; Epstein and Yuthas, 2011). While some studies have documented diminishing returns in school inputs (Heyneman & Loxley, 1983), others show that schools with better physical infrastructure and less teacher absenteeism are more conducive to student learning (Glewwe, Hanushek, Humpage, & Ravina, 2013). Therefore, if commensurate improvements in these inputs do not complement enrolment gains, the learning levels may deteriorate.

In consonance with these facts, studies on the impact of CCT programs are largely unequivocal about positive effects on enrollment but have reported mixed findings regarding learning outcomes (Berhman, Parker, & Todd, 2009; Ponce & Bedi, 2010; Glewwe & Kassouf, 2012; Ganimian & Murnane, 2016). Notably, most of these studies focus on Latin America,³ and it is not clear that the takeaway from programs like *Bolsa Escola* in Brazil or *Oportunidades* in Mexico would translate to a very different regional, cultural and economic context like India. This paper aims to fill this gap by providing evidence of CCT’s impact on female educational outcomes in the Indian context.

In this paper, we examine the impact of KP on educational indicators that include female enrollment in government schools along with their basic reading and mathematical abilities. We use the district representative data from the Annual Status of Education Report (ASER) from 2010 to 2018 to estimate the impact on enrollment and learning outcomes. Learning outcome is considered in terms of proficiency in vernacular reading and basic mathematical skills. We utilize the exogenous timing of the KP implementation and employ Difference-in-Difference (DID) regression methods to isolate the program effects. The control group of states is chosen from the neighboring and socio-culturally akin states of Assam and Tripura. Here, we compare the female enrollment and learning outcomes in the age cohort of 13–16 with that of the females in a similar age group from the control states.

Our findings suggest that controlling for potential household and individual confounders and village-level infrastructure, KP is found to be

instrumental in increasing female enrollment significantly over the program period. On the educational attainment side, we, however, observe a modest change in learning outcomes, whereby the lower-order ones registered an increase potentially because of higher school exposure. Nonetheless, higher-order skills registered a significant deterioration. In the case of the latter, the decline is more pronounced for mathematics abilities in comparison to that for reading. The estimates are robust to an alternate set of control states. Following Abadie and Gardeazabal (2003), we also use the Synthetic Control Method (SCM) to create a synthetic state that looks similar to WB in terms of the weighted average of the outcome variables before the implementation of KP. We find a discernible post-KP difference in the outcome variables between WB and the synthetic control state, thereby lending credence to our causal inference.

As ASER data does not have information on children above 16 years of age, we also use government administrative data on pass percentages from 2010 to 2020 to examine the program effects on secondary and higher secondary completion rates. This also allows us to evaluate the impact on educational outcomes of the elder cohort of children, who were potential beneficiaries of the program but are not covered in the ASER dataset. Our findings indicate no significant effect of KP on the completion of secondary and higher secondary levels of education for females. The inferences of our paper add further evidence to the existing pool of literature that has often reported a limited or negative influence of CCT on learning outcomes (Baez & Camacho, 2011; Filmer & Schady, 2014).⁴

We also find a significant fall in classroom availability per enrolled child and a lower likelihood of schools having boundary walls after the implementation of KP in addition to an increase in teacher absenteeism from schools. We, therefore, argue that CCTs can even be counter-productive for higher-order learning outcomes if enrolment is not followed by accompanying improvements in school infrastructure. Nonetheless, we provide evidence of significant gains on lower learning level learning outcomes that is potential because of the higher school exposure through enrollment. Therefore, without sufficient advances in school infrastructure and inputs, a program like KP might succeed in increasing enrolment further and improving very basic levels of learning but would be ineffective in enhancing learning outcomes that are skill intensive. These findings have important policy implications regarding the need for public investments in complementary inputs toward realizing fuller CCT benefits. Without improvements in supply-side amenities, the long-run objective of CCT in terms of ensuring financial security among females through greater participation in the labor market and empowerment might be compromised.

The rest of the paper is organized in the following schema: Section 2 describes details about the program, and in Section 3, we discuss the data, variables, and estimation strategy. Section 4 presents the regression estimations, and Section 5 the robustness checks. Section 6 discusses the mechanisms, and Section 7 presents further analyses that include the program effect on lower-level learning outcomes. Section 8 offers the concluding observations.

2. Kanyashree Prakalpa: program description

KP had a universal roll-out in WB in October 2013. The program targets school-going adolescent girls in the age group of 13–18 years and has two components: the first (K1) is a recurrent annual cash transfer that was first fixed at INR 500 (~\$6) and then subsequently raised to INR 700 (\$9) in 2015–16, and it further increased to INR 1000 (~\$13) in 2018–19. The conditional part of the scheme comes with a lumpsum payment of INR 25,000 (~\$334) at the age of 18 (K2) and would accrue only to those “unmarried” girls pursuing general education and

³ Almost 44% of all the CCT’s implemented globally are in Latin America.

⁴ For a detailed review on CCT and learning outcome, see Ganimian & Murnane (2016)

vocational courses. All the cash is transferred directly to the bank account opened in the name of the enrolled student.

All the girls studying in grade 8 or above are eligible for KP but those with a disability level of 40 percent can enroll even if they are studying in a lower grade. Initially, the program had an income ceiling of INR 120,000 (~1605 USD) per annum. The income bar was lifted in August 2018, and females, irrespective of their economic status, can now opt for the transfer. The design basis of the scheme is a single service window where school authorities are responsible for assisting and regulating program enrollment.⁵ Exploration of the sanction records of K1 and K2 from the management information system reveals that the stipend claims have shown a steadily increasing trend over time (See Fig. 1).

From the initial rapid assessments of the program (available for 2014 and 2015) over a limited number of purposively sampled schools, a consistent increase in enrollment in the pre-program period has been observed.⁶ In keeping with its massive outreach, KP received widespread attention as well as a national and international accolade.⁷ Anecdotal evidence also points out that it has been a game-changer in the field of female education and initiated social mobility for girls in terms of better employment prospects. However, to the best of our knowledge, the potential program benefits are not backed by rigorous assessment in terms of changes in enrolment and associated learning outcomes in the post-KP period.⁸

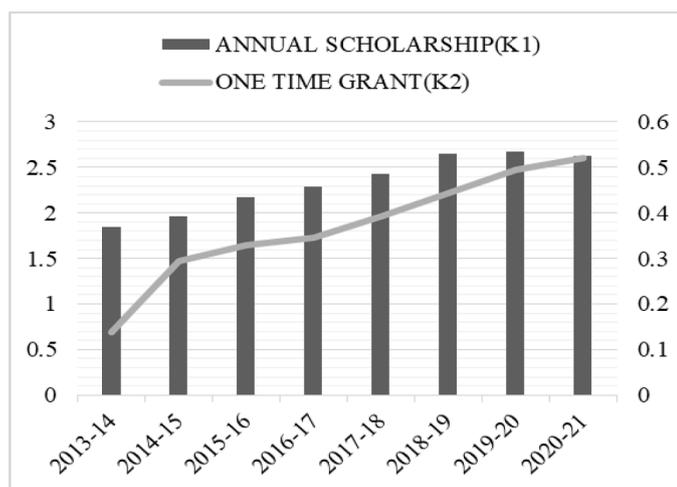


Fig. 1. Number of beneficiaries in the KP (in millions) over the years since its inception.

Source: https://www.wbkanyashree.gov.in/kp_dashboard_report.php (accessed on February 19, 2022). (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article.)

⁵ Application forms for KP are made available to the school and the authorities assist the student in completing the forms as well as connecting the students to the nearby bank for opening up their accounts.

⁶ These rapid assessments can be retrieved from https://wbkanyashree.gov.in/kp_4.0/index.php (accessed on July 29, 2020)

⁷ The scheme has received the United Nation Public Service Award in 2017 among 552 social sector schemes across 62 countries. Please refer <https://www.thehindubusinessline.com/news/national/bengal-govts-kanyashree-scheme-bags-un-award/article9736259.ece> (accessed on July 29, 2020). It also received the National E-governance Award 2014 – 2015 awarded by the Department of Administrative Reforms and Public Grievances, Government of India and cited as best practice models for women empowerment in number of national and international workshops and summits (https://www.wbkanyashree.gov.in/kp_4.0/awards.php accessed on 29 July, 2020)

⁸ We found Sen & Dutta (2018) as the only other study that assessed the impact of KP but did not use over time data or counterfactuals for comparison.

3. Data, estimation strategy, and variables

3.1. Data and variables

Our data on enrollment and learning outcomes come from ASER which is an annual household survey conducted to document the status of education among children in rural India.⁹ Each year's survey is conducted from September to November. It covers a random sample of 20 to 30 households from about 20 to 30 villages in each of the 550 out of 720 districts of India. This totals around 300,000 sampled households that are being surveyed. For our analysis, we consider the data from 2010 to 2018.¹⁰ In each of the surveyed households, all children in the age group 3 to 16 are surveyed, and the learning abilities of children in the age group 5 to 16 are examined along with collecting information on their school enrollment, among others.¹¹ In our study, we code school enrollment as a binary variable that takes the value of "1" if the child is enrolled in a government school and "0" otherwise.

The survey gathered information on basic arithmetic and reading proficiency levels using well-tested rigorous tools.¹² These tools are administered to all children across the districts and states and have been used extensively by other studies (Chakraborty & Jayaraman, 2019; Lahoti & Sahoo, 2020). The reading skill assessment has four ordinal levels: recognition of letters, reading of words, reading a short paragraph (a grade 1 level text), and reading a short story (a grade 2 level text). The arithmetic skill assessment comprises also four levels: recognition of single-digit numbers, recognition of double-digit numbers, subtraction of two-digit numbers with a carry-over, and division of a three-digit by one-digit division. For our analysis, reading and mathematical ability are coded as dichotomous variables: child-level ability to read a story and ability to divide, respectively. In other words, reading ability is taken as "1" if the child can read a story and "0" otherwise, and arithmetic ability is taken as "1" if he/she can do a 3 by 1 division successfully and "0" otherwise.

Apart from the variables on learning, the survey also collects data on the child, household, and village-level information that are used as independent variables in the regressions. These constitute household economic characteristics that include whether the house is cemented or not; whether the household has electricity or not, and possession of a toilet and mobile, along with the total members within the household. Child-level characteristics include his/ her age. The village-level factors include whether the village has a private school; private health clinic; bank; and cemented road.

There are two important issues to note here. Firstly, we did not use class detention or promotion rates as a measure of learning abilities because the standards for promotion depend on the standard of tests conducted at the school level. Therefore, schools with well-performing students may conduct grade promotion tests of a higher standard compared to other schools with supposedly low achievers. Examinations are likely to differ significantly across schools, so they cannot be treated as standardized. Because of this, we use data from the learning skill tests conducted by ASER that are the same across states in India. The advantage of standardized test scores in obviating selection bias has

⁹ The District Information System for Education (DISE) collects information from all primary, upper primary, secondary and higher secondary schools. As cautioned through multiple studies in different settings, there remains a possibility that the figures for enrollment from school records may have been distorted in response to the program (Linden & Shastri, 2012; Muralidharan & Prakash, 2017).

¹⁰ The survey was annual earlier but now it is bi-annual has been conducted in the following years: 2010, 2011, 2012, 2013, 2014, 2016 and 2018.

¹¹ More information on ASER can be obtained from <http://www.asercentre.org/> (accessed on November 21, 2022)

¹² These tools can be accessed from <http://www.asercentre.org/p/141.html> (accessed on November 21, 2022)

been pointed out in the literature on educational research (Anaya, 1999). Secondly, since the KP targets adolescent female children in their secondary education, we consider the highest order learning for reading and mathematics (ability to read a short story and solve a 3 by 1 division problem) because these skills are expected to be acquired in the primary level by grade 4. Hence an adolescent child of 13 years or more is expected to develop these skills because of which we consider the highest-order ability to assess the impact on learning outcomes. Nevertheless, later in the paper (Section 7.1), we examine the impact on lower-order reading and mathematics skills as well.

The data source that we use to infer the educational attainment of elder children (above 16 years), comes from administrative data on pass percentages in Secondary and Higher Secondary examinations across Indian states.¹³ We examine whether the completion rate of these examinations is influenced by the initiation of KP. This data is provided by the Ministry of Education, Government of India.

3.2. Estimation strategy

The timeline of the ASER survey allows us to look at the outcome indicators before and after the implementation of the KP and compare the same with a set of other control states. For this purpose, we take Assam, and Tripura as the comparison group to WB since there are substantial similarities in terms of social, cultural, and economic conditions between the states. While Assam shares its borders with WB, Tripura has over 65% Bengali-speaking inhabitants as of the 2011 census survey. The social connection between Assam and Bengal arose from their adherence to epics and *puranas*, linguistic proximity to Sanskrit, and adoption of familial norms based on tradition and religious sanction (Gupta, 2009). As is well known, such socio-cultural norms and practices heavily influence the decision to educate a girl child in India, especially in rural areas.¹⁴

To estimate the program effects, we consider girls of age group 13 to 16 years in WB as the treated group and girls of similar age from Assam and Tripura as the control group, who would not be exposed to the KP. Likewise, we make use of the DID regression methodology first to get the Intent-to-Treat (ITT) estimate of the program effects on female enrollment in the age group 13 to 16 years and then estimate the impact on learning outcomes. Here, the main challenge of identification arises from the universal implementation of the program across WB where female enrollment was already increasing monotonically in the pre-KP period.¹⁵ The DID estimate can tease out the secular systematic difference in enrollment rates in the treated state over and above the pre-program increasing trend. Accordingly, we estimate the following model:

$$Y_{idst} = \beta_0 + \beta_1 \cdot WB_{idst} + \beta_2 \cdot Post_{idst} + \beta_3 \cdot (WB_{idst} * Post_{idst}) + \beta_4 C_{idst} + \delta_{ds} + \pi_t + \epsilon_{idst} \tag{1}$$

Here Y_{idst} is the outcome variable (enrollment and learning outcomes in reading and mathematics) for a child, i from the district, d state, s , and time, t . The $Post_{idst}$ dummy takes the value of 1 if the year is 2014, 2016, and 2018 and 0 if the year is before 2014 and WB_{idst} takes the value of 1 if the child resides in WB and 0 otherwise. β_3 is the causal ITT

¹³ The state level data for Secondary and Higher Secondary completion across gender are accessed from <https://www.education.gov.in/en/statistics-new>

¹⁴ As neighboring states, we have left out Bihar, Orissa, Jharkhand and Sikkim being control state of WB. However for robustness exercise, we examine the main results adding different combinations of these states separately in our main specification but the qualitative results did not show any change.

¹⁵ The female to male enrollment in West Bengal ratio was 1.11 in the year before KP and continued to increase reaching 1.21 in 2016-17. This was higher than the national average that was less than 1 in 2012-13 and stood at 1.05 in 2016-17.

estimate of the impact of KP on the outcome variables. The confounding individual, household, and village-level characteristics of the child, which can affect the outcome variables, are controlled by C_i . We also control for district and year-fixed effects (δ_d and π_t respectively) to account for the secular district and year-level changes that can affect the outcome variables.¹⁶ ϵ_{idst} is the error term. Standard errors clustered at the district level are used for estimation. The pre-program estimation of the trends for the three outcomes is shown through an event study analysis.

It must be noted that the eligible beneficiaries, as mentioned earlier are girls in the age cohort 13 to 18 years from households with less than a threshold annual income of Rs. 120,000 (~\$1600). ASER dataset does not carry information on annual income. However, a look into the Indian Human Development Survey (IHDS) conducted in 2011–12 before the implementation of the program indicates that about 90.3% of the rural households from WB have an annual income that is less than the threshold.¹⁷ Hence over 90% of the households having female children in the eligible cohort are eligible.

4. Results

4.1. Findings from the main regressions

We first list and define the variables used in our analysis in Appendix Table T1. We also present the basic descriptive statistics for all the sampled female children in the age cohort 13 to 16 years for WB and the control state in appendix Table T2. As one can observe, there is an increase of 8.9 percentage points in government school enrollment in WB compared to that in the control states after the implementation of KP relative to that before the implementation. While we observe a limited change in reading scores (ability to read a standard 2 text), there is a fall from 9 to 3.8 percentage points for mathematics scores in terms of the ability to do a 3 by 1 division. The year-wise changes in the proportion of females enrolled in government schools and the learning outcomes in the pre-treatment period from 2010 to 13 for West Bengal and control states are shown in Appendix Figure F1.

Before discussing the main regression results, we need to test for the existence of a pre-program systematic trend in the treated state (WB) as against the control ones (parallel trends assumptions). The absence of any such trend potentially ensures that the observed differences post-program implementation can be attributed to the intervention and infer the regression estimates as causal linkage. We show this through an event study analysis where we present the effect on enrollment and learning outcomes for each year starting from 2011 to 2018 with the base year as 2010. The estimations from this event study analysis for enrollment, reading, and mathematics outcomes are given in Fig. 2(a), 2(b), and 2(c) respectively, from which no significant difference in pre-program year-wise effects are observed. This is important as it indicates no significant pre-program changes in the difference between WB and control states. Post-intervention, we observe a significant enrollment gain in government schools from 2014. We also find a decline in learning outcomes during this period, which appears to be more pronounced for mathematics and lesser for reading outcomes.

The regression results from the DID regression to gauge the impact on school enrollment and learning outcomes are shown in Table 1. We use three specifications: the first with only the main variables of interest, the second one includes the child and household level characteristics as

¹⁶ In our analysis, there are 47 districts from these three states in our analysis. Additional districts have been carved out from the existing districts over time in each of these three states. For these additional districts that have been carved out in the analysis period, we have used the corresponding original districts from which they have been carved.

¹⁷ More information on IHDS can be obtained from <https://ihds.umd.edu/> (accessed on February 21, 2022)

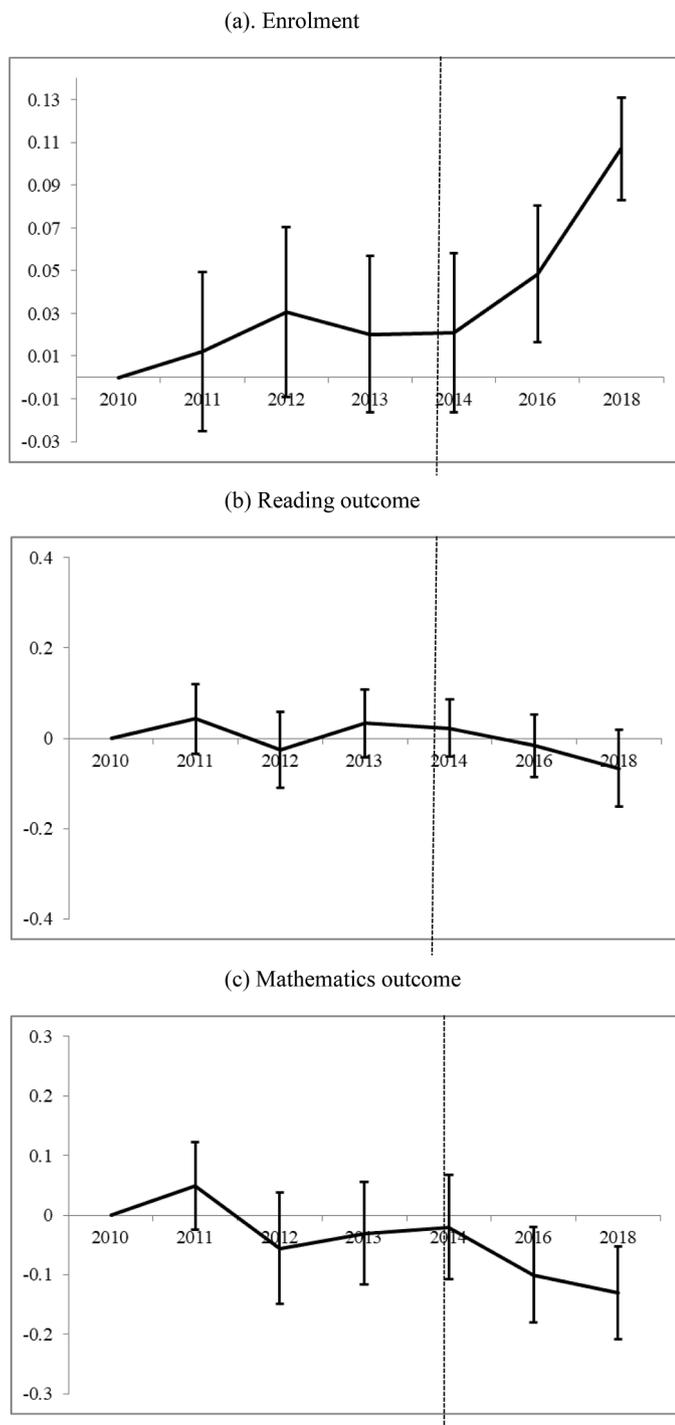


Fig. 2. Event study analysis. Marginal effects from probit regression from the command “margins” in STATA are presented along with 95% confidence interval calculated from standard errors which are clustered at the district level. The regressions controls for household, child and village level characteristics apart from district, and year fixed effects. Household and child level controls include whether the house is cemented or not, whether the household has electricity connection, toilet and mobile phones, household size and age of the child. Village level controls include whether there is a private school, private health clinic, bank and cemented road. Control states include Assam, and Tripura. This regression is run only for girls in the age group 13 to 16 years. The dotted vertical line indicates the time of implementation of KP. (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article.)

controls, and then in the third, we include the village level characteristics. The third specification with all the control variables is our final preferred specification. The findings indicate considerable enrollment gains for females (at 1% level) by about 7 percentage points that can be attributed to the program. Nevertheless, we observe a deterioration in learning outcomes, which is statistically significant for mathematics outcomes. In terms of the effect size, the probability of a female child being able to perform a 3 by 1 division is found to reduce by close to 8 percentage points.

Instead of considering the learning outcomes in reading and mathematics as binary variables (ability to read a standard 2 text and ability to do a 3 by 1 division, respectively), we also allow the outcome variables to be continuous. Therefore, reading skill levels are coded as the following: 1 = could not read anything; 2 = can identify letters; 3 = can read words; 4 = read a standard. 1 level text; 5 = can read a standard. 2 level text. On similar lines, the arithmetic skill levels are given the following scores: 1: could not do any arithmetic; 2 = can recognize numbers 1–9; 3 = can recognize numbers 11–99; 4 = can do two digit subtractions; 5 = can do division (3-by-1 form). We standardize these reading and mathematics scores and estimate an Ordinary Least Squares (OLS) regression with the same specification as elucidated in Eq. (1). The results from the regression, given in Appendix T4 indicate qualitatively similar findings. While no deterioration in reading outcomes after implementation of KP is observed, we find a statistically significant fall in mathematics scores.

Importantly, one can observe from Fig. 2 that the program effects (both positive and negative) increase over time as the duration of the program increases since its implementation. Three years after KP was implemented, in 2016, we find a statistically significant effect. We could have possibly observed a significant effect in 2015 as well, but ASER did not collect data in 2015 and 2017. Because of this, we are unable to provide the estimates for these years. Notably, the impact on enrolment and mathematics outcomes in 2018 is found to be higher than in the preceding years. The delayed effect on enrolment might have resulted due to the time taken for institutional adjustment for program implementation. From the point of beneficiaries, fulfilling program conditionality like opening bank accounts in the name of the girl child could involve significant transaction costs in places like West Bengal with a large unbanked population (Banerjee & Gupta, 2019). Notably, Fig. 1 shows that the uptake of the program was relatively lower in 2013–14 when the program was implemented but increased steadily thereafter. Existing evidence suggests the response of learning outcomes to increased enrolment would likely depend on the school inputs. School inputs that involve physical resources like classrooms and buildings might take time to adjust to the increased level of students. However, higher teacher availability could potentially offset the falling returns from hard infrastructures. Contrarily, if teaching inputs also decline, the fall in learning attainments could accelerate over time. Our findings, a thorough examination of which is presented in Section 6, indicate a significant fall in physical inputs like classroom availability per enrolled students after KP was implemented in the state. This is also accompanied by a substantial rise in teacher absenteeism, which potentially explains the drastic fall in mathematics learning outcomes that demands higher cognitive skills. Nevertheless, this warrants the necessity for further research.

The control variables have their expected sign (Appendix table T3). Females from economically better-off households have higher chances of being enrolled in school and also performing better in terms of learning outcomes. This is clear as we find females from households with electricity connections or possessing a toilet/ mobile phone are more likely to be enrolled in school and score better as well. Expectedly, similar results are also found for females from villages having banks or cemented roads.

It must be noted that female children with disability can avail benefits from KP even if she studies in lower grades. The ASER dataset that we use does not provide information on disability, so we are not able to

Table 1
Estimates of the impact on enrollment and learning outcomes.

	Enrolled in government school			Ability to read a story			Ability to solve a 3 by 1 division		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
West Bengal*Post KP dummy	0.075*** (0.012)	0.069*** (0.012)	0.069*** (0.012)	-0.005 (0.023)	-0.033 (0.023)	-0.033 (0.023)	-0.048* (0.028)	-0.079*** (0.027)	-0.079*** (0.027)
Post KP dummy	-0.088*** (0.011)	-0.121*** (0.010)	-0.119*** (0.010)	-0.011 (0.025)	-0.061** (0.025)	-0.059** (0.024)	0.012 (0.029)	-0.021 (0.028)	-0.021 (0.027)
West Bengal dummy	-0.098*** (0.035)	-0.104*** (0.007)	-0.099*** (0.008)	-0.009 (0.038)	0.027** (0.013)	0.034** (0.014)	0.005 (0.049)	-0.019 (0.013)	-0.016 (0.014)
Household and child level controls	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Village controls	No	No	Yes	No	No	Yes	No	No	Yes
District fixed effects	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Year fixed effects	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Observations	32,045	30,588	30,588	30,225	28,862	28,862	30,144	28,783	28,783

Notes: The outcome variable in column (1), (2) and (3) is whether the child is enrolled in government school or not, that in column (4), (5) and (6) is whether the child can read a second standard story book and that in column (7) (8) and (9) is whether the child can solve a 3 by 1 division. Marginal effects from probit regression are presented with standard errors which are clustered at the district level given in parenthesis. Household and child level controls include whether the house is cemented or not, whether the household has electricity connection, toilet and mobile phones, household size and age of the child. Village level controls include whether there is a private school, private health clinic, bank and cemented road. Post KP dummy indicates whether the corresponding year is after the implementation of KP, which is the year 2013. Control states include Assam and Tripura. This regression is run only for girls in the age group 13 to 16 years. For results on all the other control variables, refer Online Appendix Table T3.

* 10% level of significance.
** 5% level of significance.
*** 1% level of significance.

accommodate this criterion in our analysis. Nevertheless, we looked into the data provided by the Periodic Labor Force Survey (PLFS) conducted by the Ministry of Statistics and Programme Implementation (MoSPI), Government of India in 2019.¹⁸ Only about 0.35% of the sampled female children from West Bengal in the age cohort 13–18 years reported their inability to do any work within the household or outside (which includes studying) because of disability. We further used the Indian Human Development Survey (IHDS) conducted in 2011–12.¹⁹ We found that 98.9% of the women from West Bengal in the same age cohort are able to do all the following activities without difficulty: walking one kilometer, going to the toilet without help, dressing without help, hearing normal conversations, speaking normally, seeing distant things (with glasses), seeing near objects such as reading and sewing (with glasses). This makes us confident that the inferences would not change significantly even if we account for the disability criterion.

5. Robustness checks

5.1. Placebo tests

To further establish the parallel trend assumption, in two set of regressions, we specify placebo groups, who are potentially unexposed to the program. In the first set of regression, we use data before implementation of KP (from 2010 to 2013) and assign 2011 as pseudo year of implementation of KP. In the second set of regression, we assign 2012 as a pseudo year of implementation of KP and then examine the impact of this placebo treatment.

We expect null results: since females were not potentially exposed to KP in 2011 or 2012, the impact on enrollment and learning outcomes should be statistically indistinguishable from zero. This is confirmed by the results which indicate the impact estimate is insignificant at 5 or 10% level of significance.²⁰ Based on this placebo test and the event study analysis, we are unable to reject the null hypothesis of no significant pre-treatment trends, thus adding credence to our causal inference.

¹⁸ More information on the survey can be obtained from <https://mospi.gov.in/web/plfs> (accessed on November 20, 2022)

¹⁹ More information on the survey can be obtained from <https://ihds.umd.edu/> (accessed on November 20, 2022)

²⁰ The regression results are given in Appendix table T5.

5.2. Missing values

As observed from Table 1, for a substantial proportion of children, the relevant data on both indicators of learning outcomes is missing. In our sample of female children in the age cohort 13 to 16 years from WB and the control states, data on enrollment is provided for 32,045 entities. However, data on reading and mathematics ability is there only for 30,225 and 30,144 children, respectively. An obvious related concern here might be that on endogeneity where children who did not take the tests can systematically come from WB post KP, which can confound our estimates. To ensure that the results are not biased by the missing observations, we create a missing dummy variable of reading and mathematics which takes a value of 1 for all those children who did not take the reading and mathematics tests respectively, and 0 otherwise. We then use these two as the outcome variables and examine if the coefficient associated with $WB_i^*Post_t$ is statistically significant when we run the regression elucidated in Eq. (1). We estimate the regressions with and without the standard errors clustered at the district level. The coefficient is found to be insignificant in all four models indicating that the chances of missing values confounding the estimates are negligible (Table 2). Importantly, we also run regressions to assess the program effects on government school enrollment only for those children who took the reading and mathematics tests. The results, also given in Table 2, indicate highly significant program gains in enrollment in government schools among females.

5.3. Alternate set of control states

In our analysis, we consider Assam and Tripura as the control states. As a robustness check, we expand this set by taking up additional states like Orissa (a state that shares linguistic proximity and cultural norms), Bihar (a border state that was a part of West Bengal and seceded in 1936) and Jharkhand (sharing maximum border with West Bengal). The estimates for enrollment and learning outcome effects from these eight different combinations of states are shown in Fig. 3(a) to 3(c). We find that our results largely remain robust to these different groups of states: significant gains in enrollment in government schools with a decline in reading and mathematics skill levels.

Table 2
Checking for missing values.

	Missing reading scores		Missing mathematics scores		Enrolled in government school	
	Without clustering (1)	With clustering (2)	Without clustering (3)	With clustering (4)	Excluding missing reading scores (5)	Excluding missing mathematics scores (6)
West Bengal*Post KP dummy	0.001 (0.020)	0.001 (0.008)	0.000 (0.020)	0.000 (0.008)	0.064*** (0.011)	0.063*** (0.011)
Post KP dummy	0.040* (0.022)	0.040*** (0.008)	0.041* (0.022)	0.041*** (0.008)	-0.125*** (0.010)	-0.125*** (0.010)
West Bengal dummy	0.180*** (0.011)	0.180*** (0.022)	0.181*** (0.011)	0.181*** (0.022)	-0.080*** (0.007)	-0.078*** (0.007)
Household and child level controls	Yes	Yes	Yes	Yes	Yes	Yes
Village controls	Yes	Yes	Yes	Yes	Yes	Yes
District fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	33,785	33,785	33,785	33,785	26,029	25,950

Notes: The outcome variable in columns (1) and (2) is whether the child did not take reading test or not, that in columns (3) and (4) is whether the child did not take mathematics test or not and that in column (5) and (6) is whether the child is enrolled in government school or not. Marginal effects from probit regression are presented with standard errors which are clustered at the district level given in parenthesis of columns (2) (4), (5) and (6). Robust standard errors are given in column (1) and (3). Household and child level controls include whether the house is cemented or not, whether the household has electricity connection, toilet and mobile phones, household size and age of the child. Village level controls include whether there is a private school, private health clinic, bank and cemented road. Post KP dummy indicates whether the corresponding year is after the implementation of KP, which is the year 2013. Control states include Assam and Tripura. This regression is run only for girls in the age group 13 to 16 years.

** 5% level of significance.
* 10% level of significance.
*** 1% level of significance.

5.4. Synthetic control method

One limitation of our analysis is that the control states which have been considered because of cultural and socioeconomic similarities may not be apt. Hence, one may argue that the choice is arbitrary and ad hoc. To address the concern regarding the choice of comparison units, we use Synthetic Control Method (SCM) that constructs aggregate time series comparison for a single treated unit (in our case WB) (Abadie & Gardeazabal, 2003; Peri & Yesenov, 2019). More specifically, we create a synthetic optimal control group, which minimizes the pre-KP difference with WB for a given set of relevant characteristics that determine educational outcomes. The synthetic state here reduces the ad hoc nature of the choice of control states which were otherwise chosen by applying the SCM methodology.

For this, we make use of the ASER database from 2008 till 2018. We calculate the state-level year-wise estimates of enrollment and learning outcomes among females in age cohort 13 to 16 years. The predictors used in predicting the enrollment and learning outcomes for the synthetic control are: state wise proportion of mothers who have gone to school at some point in time; proportion of households that are fully cemented along with the proportion of households with television and electricity, and villages with cemented roads, banks, post offices, primary, middle and secondary schools. The outcome variables for 2008–13 are also used as predictors. We find the trends of female enrollment (age 13 to 16 years) for the synthetic control is similar to that for WB as presented in Fig. 1) in the pre-intervention period. Post-2013, we observe a higher enrollment in WB in comparison to the synthetic control state and this difference is close to 6–7 percentage points (Fig. 4a).

We also examine the effect on learning outcomes similarly. Fig. 4b and 4c present the trends for the proportion of females in the age cohort 13 to 16 years who can read a simple story and those who can perform a simple division, respectively. As one can observe, we find a decline in learning outcomes (more pronounced for mathematics learning) post the implementation of KP in WB in comparison to the synthetic state.

5.5. Effect on adolescent females and those enrolled in government schools

Since the KP is specially designed to provide cash transfers to adolescent female children enrolled in secondary grades, we further examine the effect on learning outcomes for this group, particularly those enrolled in grade 8 or above. The results from the DID regression estimations for this sub-group of female children indicate qualitatively similar results whereby learning abilities are found to deteriorate.²¹

Further, we examine the learning outcomes among those enrolled in government schools only. As mentioned earlier, the KP was designed such that the benefits are accrued to females studying in government schools. The findings, shown in appendix table T6 indicate a significant decline in learning outcomes post-KP implementation among this set of female students. However, because we find KP to have substantially increased government school enrollment, these estimates are subject to selection bias. Nevertheless, the noticeable decline in learning outcomes indicates that our inferences are qualitatively robust.

5.6. Longer pre-treatment time-period

In our analysis, we utilized data from 2010. The primary reason for this is the implementation of the Right to Education Act (RTE) in August 2009, which empowers every child to get free and compulsory education till the age of 14 years, making it a fundamental right.²² Arguably, this has been among the major education policy in India that could influence the state of school inputs and subsequent educational outcomes, because of which we only restricted our analysis using data starting from 2010. Nonetheless, the ASER dataset allows us to use data from earlier years as well. As a robustness check, we use data from 2008 onwards and run the same regressions to estimate the program effects on enrollment and learning outcomes. The results remain qualitatively similar- a significant positive impact on school enrollment but a negative effect on learning outcomes (Appendix table T7). We also did an event study analysis as

²¹ The regression results are given in Appendix table T6.
²² Please visit <https://righttoeducation.in/> (accessed on November 7, 2022) for more information

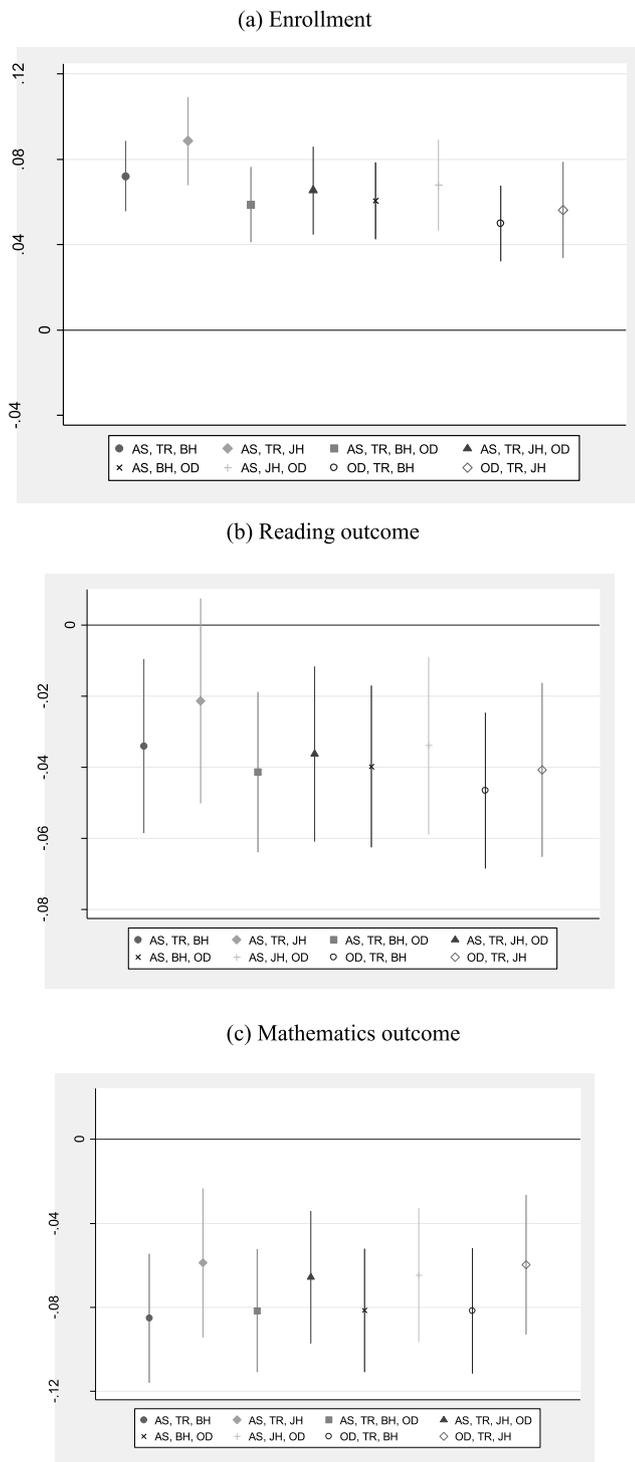


Fig. 3. Robustness check with different sets of control states. Marginal effects from probit regression from the command “margins” in STATA are presented along with 95% confidence interval calculated from standard errors which are clustered at the district level. The regressions controls for household, child and village level characteristics apart from district, and year fixed effects. Household and child level controls include whether the house is cemented or not, whether the household has electricity connection, toilet and mobile phones, household size and age of the child. Village level controls include whether there is a private school, private health clinic, bank and cemented road. The regressions are run using different set of control states abbreviated as AS: Assam; TR: Tripura; BH: Bihar; JH: Jharkhand; OD: Odisha. The regressions are run only for girls in the age group 13 to 16 years. (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article.)

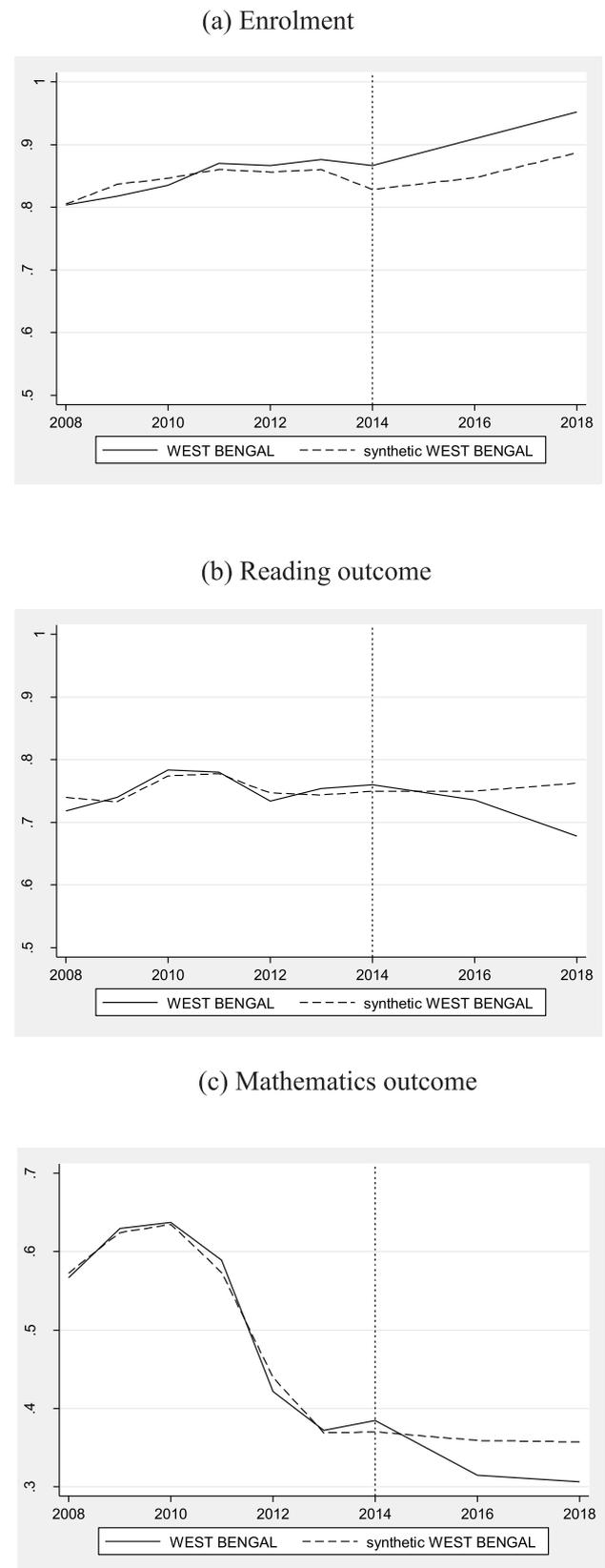


Fig. 4. Using Synthetic Controls. Note: The command “synth” in STATA 16 is used to generate these figures. Data from ASER 2008 to 2018 is utilized. (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article.)

has been done earlier. Appendix figure F2 presents the year-wise estimates of the difference starting from 2008. We find no major pre-treatment systematic trend ensuring that the parallel trend assumptions hold. We also observe a discernible effect post the implementation of KP in the event study analysis.

5.7. Other similar interventions

Time-varying interventions at the state/ district level may influence enrollment rates and learning levels. In that case, the causal linkage to KP that we intend to assess may not hold. To ensure this is not the case, we introduce time-varying district-level factors through district-specific year-fixed effects (districts*year fixed effects) as covariates in the regression along with the child, household and village level controls and assess the changes in the main DID coefficient. We observe qualitatively similar results indicating that our estimates are not confounded by other time-varying interventions. Importantly, even if we use state-level time-varying fixed effects instead of district-level ones, the results remain unchanged (Appendix table T8).

Notably, by incorporating the time-varying district fixed effects, we can negate the potential effects of other educational interventions like the bicycle program launched in West Bengal in September 2015 named Sabuj Sathi. The program aims to distribute bicycles to students enrolled in grades 9 to 12.²³ We obtain similar effects of KP on learning outcomes even when we restrict our sample of analysis to students studying below the 9th standard (Appendix table T9). This further indicates that the impact of KP that we document is unbiased and not confounded by other interventions targeting a similar cohort of beneficiaries.

6. Mechanisms

6.1. Complementary school inputs

Our findings from the regressions indicate significant program effects on increasing enrollment in government schools. Nevertheless, we also find a significant decline in learning abilities post-KP implementation among females, which resonates with several existing studies on other interventions (Baez & Camacho, 2011; Akresh, Walque, & Kazianga, 2013; Benhassine Devoto, Duflo, Dupas, & Pouliquen, 2015). As mentioned earlier, a possible explanation for the decline in learning outcomes might be higher enrollment without adequate improvement in school infrastructure. Complementary inputs that include better school infrastructure or teacher attendance may be necessary to translate the potential gains in enrollment into better learning outcomes. Literature on this issue has indicated that improving school amenities both in terms of learning facilities and physical infrastructure, often leads to better learning outcomes (Kazianga, Levy, Linden, & Sloan, 2013).

What are the possible reasons for the deterioration of learning outcomes given the context of WB? We speculate that the negative impact might have arisen due to structural factors like school facilities. For instance, if there is a systematic decline in classroom availability per student, it might lead to higher congestion. Hence it can result in a decline in the levels of learning. Anecdotes from the field often indicate multiple standards are being taught in a single room due to the non-availability of rooms.²⁴ Another possible factor might be the higher prevalence of teacher absenteeism from schools which can explain this decline.

The ASER data allows us to look at some of the indicators on school infrastructure that include the presence of boundary walls or taps in schools for drinking water along with teacher and principal attendance and room available per student enrolled. Using DID regression framework, we can assess the changes in these indicators after the initiation of KP in WB and compare it with the control states. Here, we employ the same regression as specified in Eq. (1) with the following as the dependent variables at the school level: (i) having a boundary wall; (ii) having taps for drinking water; (iii) if all teachers are present on the date of survey (full teacher attendance); (iv) if the school principal is present on the date of survey (principal attendance); (v) classrooms available for teaching per student enrolled in standard 1 to 8. Note that the unit of analysis here is schools, and the variables (i), (ii), (iii), and (iv) are binary while the last variable (v) is continuous.

The relevant event study figures are presented from 5(a) to 5(e) for the time 2010 to 2018. The findings indicate some deterioration in physical infrastructure in the post-KP period in WB in the sense that the likelihood of the schools having boundary walls has fallen though the availability of taps appears not to have changed significantly. However, the probability of full teacher attendance in the school is found to have fallen drastically over this period in comparison to the control states. Importantly, the average number of classrooms available for students for teaching has also reduced significantly during this period, while the changes in the student-teacher ratio remain statistically insignificant. While the likelihood of principal attendance also has fallen, the initial parallel trend assumption is found to be compromised and hence we prefer not to read too much into this. Nevertheless, our findings indicate strong evidence of the decline in school facilities that include the worsening of teacher involvement as well.

In this context, if we examine the budgetary allocation and decompose it in the period following KP, we note a sharp decline in the allocation for basic infrastructures like classrooms and office spaces as well other building amenities like separate toilets for girls. From 6% of the total budget in 2014–15, the allocation has declined to 3.8% in 2017–18.²⁵ This insufficiency in the supply side schooling factors which gets manifested in terms of student-classroom ratio among others is possibly one of the key contributing reasons as to why we observe a fall in learning outcomes because of KP. Literature also indicates that overcrowding in schools not only affects student performance but might also lead to teacher absenteeism (Corcoran, 1988). Our results indicate a sharp rise in teacher absenteeism, which can potentially be another reason, why we see a fall in learning ability as documented in the literature (Das, Dercon, Habyarimana, & Krishnan, 2007). Moreover, we observe a significant deterioration in learning outcomes among boys as well,²⁶ which appears to be plausible if reduced classroom availability per student or higher teacher absenteeism explains this decline.

As mentioned earlier, the event study results indicate a gradually declining effect on mathematics learning outcomes. We conjecture that this has resulted due to declining teacher availability which further accentuated the negative impact of reduced per-capita learning resources (like classrooms) due to a program-induced rise in enrolment. Notably, an examination of the budget for children welfare in West Bengal during 2013–2017 revealed that allocation for KP was highest followed by Integrated Child Protection Scheme (ICPS). At the same time, the annual share for children education in the state budget has shown a declining trend in the same period.²⁷ The utilization of the allocated fund for education also registered a decline: over 11% of the Budget Estimate (BE) remained underutilized in 2013–14, 11.64% in

²³ More information on the program can be accessed from <https://wbsaboojsathi.gov.in/v2/> (last accessed on November 18, 2022)

²⁴ Please refer <https://thebastion.co.in/politics-and/education/a-low-benchmark-the-state-of-infrastructure-in-our-schools/> and <https://www.financialexpress.com/india-news/delhi-school-shocker-classroom-shortage-no-benches-books-study-materials-teachers-blame-fund-crisis/1195118/> (accessed on November 27, 2022)

²⁵ Please refer <http://www.cbgaindia.org/wp-content/uploads/2019/03/Budgeting-for-School-Education-in-West-Bengal.pdf> (accessed on February 26, 2022)

²⁶ The regression results are provided in appendix table T10.

²⁷ Please refer <https://spanvoice.org/wp-content/uploads/2018/04/Spain-Budget-Report-2017-2018.pdf> (accessed on April 6, 2023)

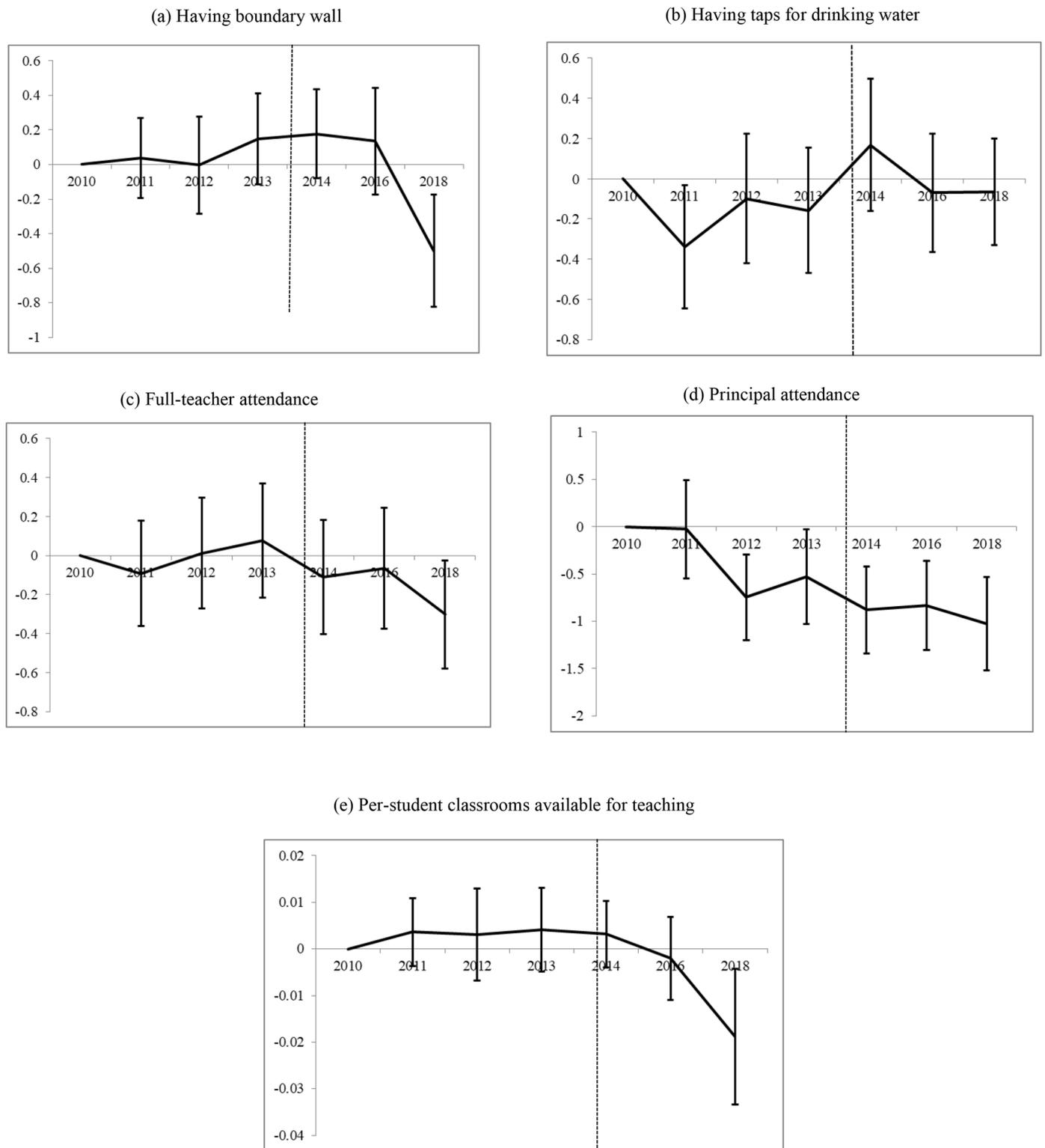


Fig. 5. Changes in school infrastructure.

Marginal effects from OLS and probit regressions presented along with 95% confidence interval calculated from standard errors which are clustered at the district level. The regressions controls for household, child and village level characteristics apart from district, and year fixed effects. Household and child level controls include whether the house is cemented or not, whether the household has electricity connection, toilet and mobile phones, household size and age of the child. Village level controls include whether there is a private school, private health clinic, bank and cemented road. . Control states include Assam, and Tripura. The regressions are run only for the sampled schools of the ASER survey. (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article.)

2014–15 and 17.05% in 2015–16. Therefore it is possible that allocating more funds to KP while cutting down education finances, a part of which is investment in school infrastructure, might have deterred the learning gains from school exposure. However, more research is needed to explore the interaction between school inputs and CCT impact on learning outcomes, especially in regions that are supply constrained.

6.2. Alternate channels

6.2.1. Higher enrollment

One of the key findings that we observed is a robust and significant increase in school enrollment among the potential beneficiaries. By lowering the opportunity cost of schooling, the program incentivizes female children to remain enrolled in schools and not drop out. Therefore, in absence of the program, children who would have otherwise dropped out remain enrolled now. These may include the weaker students or those with poorer household support to continue with their education among others. This might push the average learning score below. However, in our case, this is less of a concern as the ASER dataset collects information on the learning ability of all children, irrespective of whether they are enrolled in school or not. Therefore, the regression estimates we presented earlier include all children- enrolled as well as the non-enrolled ones. Notably, in Section 5.4, we present the estimates for children who are enrolled in government schools. We did not observe any statistically distinguishable difference in the estimated marginal effects when compared against what we observed for all children.²⁸ This indicates that the KP-driven systematic increase in school enrollment of those who would have dropped out did not influence the observed deterioration in average learning outcomes.

6.2.2. Progressing through grades

The enrolled children may progress through grades in a lesser age-appropriate way after KP implementation. If this happens, that can be a reason for the deterioration of learning outcomes. Accordingly, we test the program effects on grade progression, which we define as the ratio of actual to the expected grade where the child is enrolled (Biswas & Das, 2022). The expected grade is six minus the age of the child, six years of age being when a child is expected to start formal schooling. We run similar regression as explained in Eq. (1) using grade progression as the dependent variable. The findings indicate no effect of the program on the grade progression of children.²⁹ Therefore, it is unlikely that lower grade progression is the mechanism which can explain the observed reduction in learning outcomes post-KP implementation. This is also intuitive as a “no detention policy” was implemented in West Bengal in 2010, wherein a child is automatically promoted, and detentions are not permitted.

6.2.3. Lesser effort or lower support from household

Since the conditionality attached to KP is school enrollment and not educational attainment, it is possible that the beneficiaries put in lower effort on studies or receive lower support from the households. Literature has indicated lower dowry or higher bride price being one of the key drivers of educating girls in developing countries, which might incentivize parents to educate their daughters (Anderson, 2007; Ashraf, Bau, Nunn, & Voena, 2020).³⁰ However, studies in the context of India have argued that CCTs can often fund dowry expenses and cover a part of the marriage cost (Nanda, Das, & Datta, 2022). Therefore, the lumpsum transfer offered through KP at 18 years of age can potentially be used to fund dowry payments, thereby lowering the effort and support on

daughter’s education. If this is the case, it can partly or fully explain the fall in the learning outcomes. Unfortunately, the ASER dataset does not give direct information on indicators of effort that is put in, for example, the study time allocated or expenditure on private coaching/ tuition or other inputs like books.³¹ Nevertheless, it gives information on whether the child takes any paid tuition classes, which we use as an indicator of the effort put in by the child for education. In the context of West Bengal, it has been argued that schools often do not function efficiently, and hence students often have to depend on private coaching to supplement the learning that happens in schools (Gangopadhyay & Sarkar, 2014).

To check whether tuition plays a mediating role, we utilize this variable to create a dummy variable that takes the value of 1 if the sampled child takes paid tuition classes and 0 otherwise. Next, we introduce this as an independent variable along with the other set of covariates in the regression. The marginal effects of KP implementation on the learning outcomes are found to remain similar to what we observed earlier (Table 3). Importantly, this exercise would also account for students who receive lower educational support from households and hence score lower in terms of learning outcomes.

We also use whether the sampled household gets newspapers or other books (magazines and religious books among others) again as a dummy variable and introduce it as an additional covariate in the regression. The underlying assumption here is households that give higher weightage to the education of their children may be more likely to be from households where parents get newspapers or reading materials, and hence it may be considered a crude proxy of effort. The findings, presented in Table 3, indicate no significant changes in the estimates. The data further allows us to consider parental education, which can potentially influence the investment made in children (Dickson, Gregg, & Robinson, 2016). Accordingly, we use the educational level of the father and the mother as additional covariates in the regression and examine the changes in the regression estimates (Table 3). We again observe no significant difference in the marginal effects (Table 3). This leads us to believe that lesser effort or lower support from households after KP implementation may not serve as a clear mechanism that can explain the deterioration of learning outcomes.

7. Further analysis

7.1. Estimation from triple difference regressions

As an additional exercise, we use difference-in-difference-indifference (DDD) regression to estimate the program impact of the KP by comparing the DID estimates from West Bengal and that from the control states. Here, we consider girls of age group 13 to 16 years as the treated group and boys of similar age as the control group. As argued by Jayachandran and Lleras-Muney (2009) and Muralidharan and Prakash (2017), boys can serve as an useful control group for the KP because they would have been exposed to all the other interventions that were taking place in West Bengal after the implementation of KP except the cash transfers from the program. This includes gains in schooling due to increasing household incomes or increased public investment in education apart from the gains through other educational awareness programs. On similar lines, we run the following DDD regression to estimate the impact on enrollment and learning outcomes among the beneficiaries:

²⁸ The command “*suest*” in STATA 16 is used to compare the regression estimates.

²⁹ Appendix table T11 presents the estimates

³⁰ Dowry is a payment made by the bride’s family to the groom during marriage. Bride price is the payment made from groom’s family to the bride’s.

³¹ ASER 2018 till 2013 provides information on the amount spent on private coaching but the data was not collected in the rounds before 2013. So we do not use it as an indicator of effort.

Table 3
Support from households.

	Ability to read			Ability to do division		
	Takes paid tuition	Takes newspapers/reading materials	Parental education	Takes paid tuition	Takes newspapers/ reading materials	Parental education
West Bengal*Post KP dummy	-0.046* (0.024)	-0.028 (0.025)	-0.024 (0.022)	-0.080*** (0.027)	-0.077*** (0.029)	-0.068*** (0.026)
Post KP dummy	-0.053** (0.023)	-0.046* (0.026)	-0.058*** (0.022)	-0.014 (0.027)	0.001 (0.029)	-0.018 (0.027)
West Bengal dummy	0.066*** (0.014)	0.005 (0.017)	0.037*** (0.013)	-0.004 (0.014)	0.124*** (0.017)	-0.017 (0.013)
Household and child level controls	Yes	Yes	Yes	Yes	Yes	Yes
Village controls	Yes	Yes	Yes	Yes	Yes	Yes
District fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	26,154	26,209	28,862	26,089	26,146	28,783

Note. The outcome variable in the first three columns is whether the child can read a second standard story book or not and that in next three columns is whether the child can solve a 3 by 1 division. Marginal effects from probit regression are presented with standard errors which are clustered at the district level given in parenthesis. Household and child level controls include whether the house is cemented or not, whether the household has electricity connection, toilet and mobile phones, household size and age of the child. Village level controls include whether there is a private school, private health clinic, bank and cemented road. Post KP dummy indicates whether the corresponding year is after the implementation of KP, which is the year 2013. Control states include Assam and Tripura. This regression is run only for girls in the age group 13 to 16 years. Parental education includes two variables: father’s education and mother’s education.

* 10% level of significance.
** 5% level of significance.
*** 1% level of significance.

$$Y_{idst} = \beta_0 + \beta_1 \cdot Female_{idst} + \beta_2 \cdot WB_{idst} + \beta_3 \cdot Post_{idst} + \beta_4 \cdot (WB_{idst} * Post_{idst}) + \beta_5 \cdot (WB_{idst} * Female_{idst}) + \beta_6 \cdot (Post_{idst} * Female_{idst}) + \beta_7 \cdot (WB_{idst} * Post_{idst} * Female_{idst}) + \beta_8 C_{idst} + \delta_{ds} + \pi_t + \epsilon_{idst} \tag{2}$$

Here, $Female_{idst}$ indicates whether the child is a female or not. The unbiased causal estimate of the impact is given by the coefficient, β_7 . All other notations follow those in Eq. (1).

Appendix table T12 presents the estimations. We observe a positive and significant effect of school enrollment but no discernible impact on learning outcomes. As demonstrated earlier in Section 6.1, with the declining school facilities and teacher involvement over time, learning outcomes among boys have also been adversely affected (Appendix table T10). Therefore, in the DDD regressions, we do not find any systematic decline in learning outcomes among girls in comparison to the boys from WB. In short, both were affected adversely and hence the net effect remained statistically indistinguishable from zero.

7.2. Lower-level outcomes

In our analysis, we have used higher-order learning outcomes in the sense that out of the five categories of outcomes, we considered ability based on the highest category: the ability to read a story for reading outcomes and the ability to solve a 3 by 1 division. It is possible that due to congestion measured through a drop in classroom availability per student, higher-order learning outcomes may show a dip while there might be potential improvements in relatively lower-order abilities. In other words, the lower-order abilities may improve because of increased schooling among girls due to the KP, who would have otherwise dropped out of school in absence of the program.

We test this using similar DID regression for all females in the age cohort 13 to 16 years, comparing the pre and post-intervention period of WB and the control states. The outcome variable is the performance of the child in the corresponding category in terms of reading and mathematics scores. Fig. 6(a) and 6(b) present the marginal effects from the probit regression of each category of reading and writing scores, adjusted for the control variables, respectively. The findings indicate no significant effects on very low-level outcomes like recognition of letters

or single-digit numbers. However, we observe a positive and significant effect on reading words or identifying two-digit numbers. Therefore, while there has been a significant decline in the higher-order learning ability, we find discernible improvements in relatively lower-order learning, which might have accrued due to increased schooling exposure because of KP.

To sum up, we find a CCT like the KP, which gives period transfers to adolescent females with an attached conditionality of remaining enrolled in schools, resulting in a discernible improvement in enrollment and hence a reduction in dropout. Therefore, the program can incentivize females, who would have otherwise dropped out in its absence, to remain enrolled in schools. This led to a significant improvement in lower-order learning outcomes, including reading words or recognizing two-digit numbers. However, we find clear evidence of inadequate improvements in complementary physical infrastructure that, include the number of classrooms per enrolled student. Teacher absenteeism also appears to increase. Despite the reduction in dropout rates, which implies increased school exposure, lower per-capita availability of school inputs and higher teacher absenteeism seems to counteract the positive effect of the former on learning skills. These factors potentially led to a significant deterioration in relatively higher-order learning outcomes like the ability to perform by 3-digit by 1-digit division.

7.3. Effects on secondary and higher secondary education

As mentioned earlier, ASER data allows us only to evaluate the program effects on children below the age of 17 years. To assess the effects on learning outcomes relevant for the older cohort of individuals, we use performance in the Secondary and Higher Secondary Examinations conducted at the state level. The performance is reported at the state level, and as an indicator of learning outcome, we use the proportion of girls who passed the examinations. Using yearly state-level

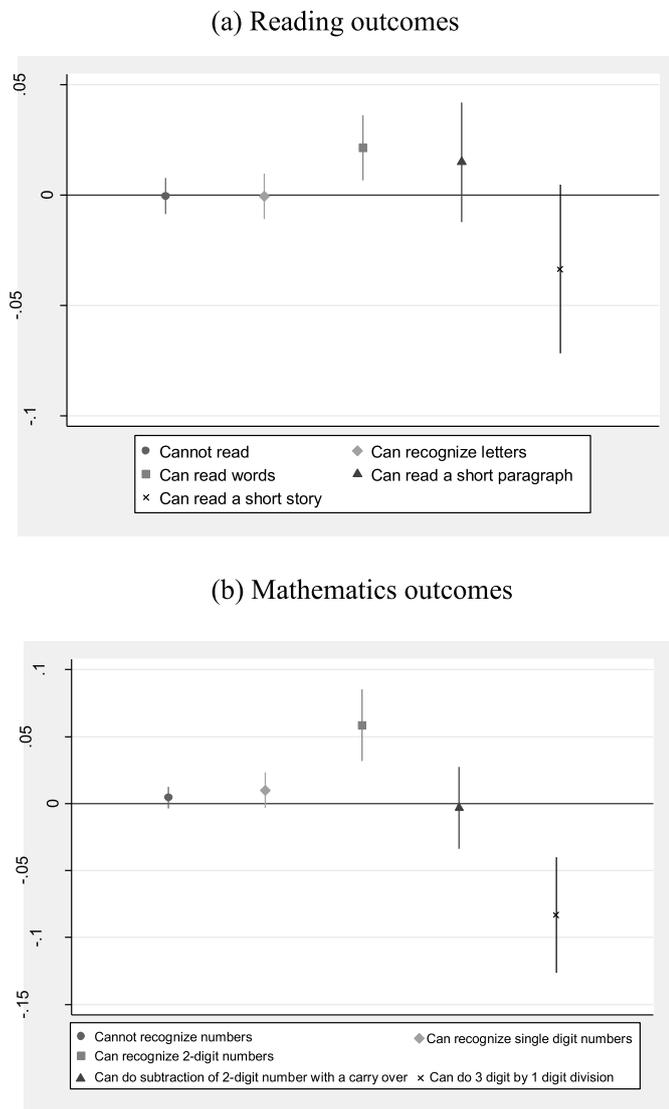


Fig. 6. Lower Order Learning Outcomes.

Marginal effects from probit regression from the command “margins” in STATA are presented along with 95% confidence interval calculated from standard errors which are clustered at the district level. The regressions controls for household, child and village level characteristics apart from district, and year fixed effects. Household and child level controls include whether the house is cemented or not, whether the household has electricity connection, toilet and mobile phones, household size and age of the child. Village level controls include whether there is a private school, private health clinic, bank and cemented road. Control states include Assam, and Tripura. The regressions are only for girls in the age group 13 to 16 years. (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article.)

data from 2009 to 2020, we estimate a DID regression as given below:

$$Y_{st} = \beta_0 + \beta_1 \cdot WB_t + \beta_2 \cdot Post_s + \beta_3 \cdot (WB_t * Post_s) + \epsilon_{st} \tag{3}$$

Here Y_{st} is the share of girls who passed the respective examination (secondary and higher secondary) in the state, s in the year, t . The $Post_s$ dummy takes the value of 1 for years 2014 to 2020 and 0 for 2009 to 2013. WB_t assumes the value of 1 if the corresponding state is WB and 0 otherwise. The regression findings presented in table 9 indicate no statistically significant impact either on the probability of completion of secondary education or higher secondary education of girl students (Appendix table T13).

8. Conclusion

Existing literature on CCT programs across the world has documented positive effects on enrollment, but evidence on learning abilities has been mixed. Additionally, the majority of the evidence exists in the context of Latin American countries. In this paper, we evaluate the KP, which is among the largest education CCT programs implemented in the state of WB in India since 2013. The program provides monetary incentives to female adolescent children to get enrolled in secondary schools and remain unmarried until 18 years. We employ the exogenous timing in the implementation of the program for identification and use DID regression to assess the ITT program impact on enrollment and then the potentially associated benefits on learning outcomes. Our child-level regression estimates suggest a robust and significant impact of the program on increasing adolescent female enrollment by about seven percentage points and hence curbing adolescent female dropout rates. Despite the positive influence, we observe a decline in learning skills which is more pronounced for basic mathematic skills. Additionally, no significant impact on the likelihood of completion of secondary or higher secondary education is observed. Nevertheless, some improvements in lower-level learning are observed possibly owing to higher schooling among adolescent females because of the program. Existing literature indicates improved learning outcomes, especially that related to mathematics are significantly associated with a reduction in the gender wage gap and higher returns in the labor market (Hanushek & Woessmann, 2008; Murnane, Willett, & Levy, 1995; Altonji & Blank, 1999). This implies that the gains from enrollment or the potential delay in early marriage might wear away in the long run especially because inadequate learning skills hamper the female earning prospect and decision-making abilities.

Importantly, our findings also indicate a higher likelihood of teacher absenteeism and deterioration of school infrastructure that include lower classroom availability per student and having no boundary walls after the implementation of KP. This provides suggestive evidence that the decline in learning skills is potentially driven by inadequate physical and learning infrastructure in the state which did not complement the increasing enrollment due to the program. Our findings contradict the strand of literature that argues poor learning does not come at the expense of increased enrollment (Blimpo, Gajigo, & Pugatch, 2019; Lucas & Mbiti, 2012) and falls in line with those that held there is a trade-off between access and quality (Gajigo, 2016).³²

One of the main contributions of this paper lies in pointing out the problems in the design of CCTs in resource-scarce developing countries. From the point of view of the elected government, allocating funds for tangible assets with immediate returns assumes priority relative to, say, learning facilities that have a long gestation period. Ensuring the quality of education involves costly screening activities which might distort public investment. Add to this; the government may opt for a CCT-type visible transfer strategy to avoid the political cost of restructuring the education management system dominated by political leaders and unions even though it leads to weak human capital formation (Reimers, Da Silva, & Trevino, 2006). Nevertheless, we argue that schooling exposure through CCTs would effectively translate into improved learning skills provided there are accompanying public investments on complementary inputs like physical infrastructure and teachers.

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³² However, Lucas & Mbiti (2012) underscore the importance of school infrastructure as they reason that the increase in enrollment from Free Primary Education program in Kenya was matched by an increase in private school supplies that reduced the pressure on public school system.

Ethics approval statement

No ethical approval is required for the research as publicly available data has been used for the study and ethical approval for this type of study is not required by our institute

Patent consent statement

Not applicable

Clinical trial registration

Not applicable

CRedit authorship contribution statement

Upasak Das: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Software, Visualization, Writing – original draft, Writing – review & editing. **Prasenjit Sarkhel:** Conceptualization, Investigation, Writing – original draft, Writing – review & editing, Formal analysis.

Declaration of Competing Interest

We confirm that there are no known conflicts of interest associated with this publication among the authors.

Data availability

Data will be made available on request.

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Supplementary materials

Supplementary material associated with this article can be found, in the online version, at [doi:10.1016/j.econedurev.2023.102406](https://doi.org/10.1016/j.econedurev.2023.102406).

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