



Improving children's foundational learning through community-school participation: Experimental evidence from rural India

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ABSTRACT

Due to almost-universal enrolment in primary schools, policy focus has shifted towards improving learning outcomes. One important way of doing this is to enhance accountability, especially in the case of public provision of education. In this context, we examine the effectiveness of two different strategies of increasing accountability – one involving only the community, and the other which builds collaboration between the schools and the community. We implement a randomized controlled trial in 400 villages in India, and find: (i) both interventions led to a significant enhancement in children's foundational literacy and numeracy skills, (ii) we observed limited differences between the impacts of the two interventions, and (iii) the community-school intervention exhibited significantly greater effects when parents reported visiting the school, underscoring the vital role of parent-teacher interactions and their shared responsibility in shaping children's learning outcomes. In terms of mechanism, we find that direct learning inputs play a major role in mediating the observed effects of both interventions. Additionally, parent-teacher engagement and children's studying habits outside of the school are potential important channels through which the observed effects operate in the community-school intervention.

1. Introduction

Although there has been significant progress in enrolment around the world, this has not been accompanied by improved learning outcomes (World Development Report, 2018; ASER Report, 2018, 2022). For instance, in the case of India, the context that we focus on in this study, around 57 and 50 percent of fifth-grade students are unable to attain the reading and mathematics competency of a grade two student (ASER Report, 2022). Community participation has emerged as a potential approach for enhancing the quality of public service delivery (World Development Report, 2004), and its significance has been growing especially in education (Mansuri and Rao, 2013). School leaders are typically accountable for student enrollment, attendance, as well as the day-to-day operations, finances, and management of the school, but not always directly accountable for learning outcomes (Pritchett, 2015). This is largely because the administrative and bureaucratic processes involved in governmental accountability of schools seldom focus on learning outcomes (and in some cases, these are not even measured consistently). It is in this context that community participation can play a vital role – by providing oversight of

educational activities, school management and budgets, the community could help enhance accountability of school personnel and bring into focus the importance of (and need to) improve learning outcomes (Pritchett, 2015; Fox, 2015).

In this study, we analyze the impact of two distinct interventions aimed at enhancing community participation in government schools on children's learning outcomes. The study was conducted in collaboration with Pratham, an NGO, across 400 villages in Sitapur district (Uttar Pradesh, India). The study villages were randomly allocated into three groups: a control group consisting of 100 villages, the PAHAL (this is the Hindi word for "take initiative") intervention group comprising 100 villages, and the PAHAL+ intervention implemented in 200 villages. The PAHAL intervention primarily centered on promoting community engagement towards children's learning through various activities, including the creation of village (learning) report cards, volunteer-led classes conducted outside of regular school hours, and the establishment of reading and study groups within the village or hamlet. In addition to all elements of the PAHAL intervention, the PAHAL+ intervention also included additional activities aimed at strengthening the community-school relationship. This was done through organization

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and facilitation of parent-teacher meetings, providing support to parents for involvement in their children's homework, and coordinating community events and rallies with the active participation of teachers.

We have several significant findings. Both interventions exhibit a positive impact on the reading and math skills of students, with larger effects among students with lower initial skill level. Furthermore, the PAHAL+ (community-school) intervention demonstrates a greater impact compared to the PAHAL (community-only) intervention, indicating potential advantages in fostering the community-school relationship. While we observe limited variations by gender, caste group, and initial learning levels, a noteworthy finding is that children whose parents were more actively engaged in their education benefited to a greater extent in the PAHAL+ group. In terms of mechanisms, our findings point to two primary factors: (i) increased engagement between parents and teachers, and (ii) rise in learning-related activities outside of school hours. We examine the contribution of different mechanisms and find that direct learning inputs (such as "children studying in groups") have a major contribution in mediating the observed effect of both interventions on children's learning. In addition to this, children's school attendance, study at home, and parent-teacher engagement regarding children's education contributes significantly to the total observed effect of the community-school intervention on children's learning.

Previous attempts to involve communities in the realm of public education have encompassed a range of interventions, including decentralization initiatives, school management committees, and information campaigns (Patrinos et al., 2007; Banerjee et al., 2007; 2010; Bruns et al., 2011; Westthorp et al., 2014; Sawada et al., 2022). Their effects on learning (and other educational outcomes) have been mixed. The intervention we employed was designed to address some of the challenges faced by these previous studies. First, we adopted a collaborative and participatory approach, with an emphasis on fortifying existing school activities through community support. Second, we diverge from purely informational campaigns, which have demonstrated limited effectiveness (Kremer and Holla, 2009; Banerjee et al., 2010; Fox, 2015). However, our intervention stops short of the extensive decentralization programs or school management committees, which can sometimes falter due to a lack of clear guidance on resource management (Bardhan and Mukherjee, 2005; Banerjee et al., 2010). Third, rigorous measures were put in place to avert the "elite capture" of these community partnerships, ensuring equal participation opportunities for all community stakeholders—a concern that has surfaced in other contexts (Platteau and Gaspard, 2003; Mansuri and Rao, 2013). Fourth, the intervention program in PAHAL+ arm prioritized the establishment of community-school relationships by facilitating effective parent-teacher interactions, a factor found to be significant in enhancing children's learning outcomes in rural settings (Islam, 2019).

The findings of this study make several contributions to the literature. It adds to the findings on the effects of decentralization of governance to local entities in general (Pandey et al., 2009; Banerjee et al., 2010; Pradhan et al., 2014; Fox, 2015; Taniguchi and Hirakawa, 2016; Sawada et al., 2022), and specifically in the field of education. There have been similar reforms, such as establishment of School Management Committees or providing information to communities that have been implemented in other parts of the world, but studies have demonstrated that these kinds of reforms have limited effect on learning (Kremer and Holla, 2009; Banerjee et al., 2010; Fox, 2015; Taniguchi and Hirakawa, 2016). This has largely been attributed to the fact that simply providing information about the benefits of education, government operations, or grievance mechanisms does not necessarily motivate communities to actively engage (Banerjee et al., 2010). In our study, we build on this intuition and provide evidence that community participation, facilitated through a collaborative and participatory approach, can significantly improve children's foundational learning.

Existing research indicates that parents from disadvantaged backgrounds often feel ill-equipped to engage with schools (Ramachandran, 2004), and there is often a significant social distance between teachers

and students/parents (Rawal and Kingdon, 2010). Additionally, when children fail to make progress in school, teachers frequently attribute it to parental responsibility (Bhattacharjee et al., 2011; Sinha et al., 2016). Therefore, our study also contributes to the understanding of effective parent-teacher engagement by examining how involving stakeholders within and outside of the school can enhance children's learning. In particular, our results are indicative of the fact that community and school-based interventions can increase the children's learning potential through increased engagement and cooperation of the stakeholders, rather than through increased monitoring.

This study's findings also highlight the importance of stakeholder involvement in collective action for the success of such policies (Hevia and Vergara-Lope, 2019). Our study finds that providing avenues for effective parent-teacher engagement can foster community-school relationships by sharing responsibility for children's education and learning. This is consistent with prior literature that shows that establishing avenues for parent-teacher engagement, such as organizing parent-teacher meetings within schools, accountability and transparency can lead to improved learning through better provision of school services and an improved learning environment (Kremer et al., 2013; Mbiti, 2016). In this study, we show that an intervention targeted at improving community-school interactions has a significantly higher impact on children whose parents interacted more with teachers. Our findings align with Islam (2019) results in rural Bangladesh - they find that creating opportunities for effective interaction between parents and teachers improves children's test scores as it is possible that this could foster a sense of mutual responsibility and trust. Moreover, others have found that parent-teacher interaction promotes mutual accountability by facilitating better monitoring of both the school and home environments (Mbiti, 2016). Therefore, this study also contributes to the area of parent-teacher engagement and children's learning.

Finally, our study sheds light on the types of intervention programs that can effectively improve learning outcomes for disadvantaged children in resource constrained environments. This complements other findings from other studies in the context of India. A study by Afridi et al. (2020) found that private schools successfully improved student performance by providing better information about school quality through the distribution of student performance report cards to both parents and schools. However, this approach did not yield similar results for government schools, which cater to the majority of underprivileged children in India. We address this gap in the literature by providing evidence that creating an enabling environment for collective action can effectively enhance foundational learning for children in government schools. This highlights the importance of tailoring strategies to specific contexts and institutional frameworks.

2. Understanding the intervention (contextual and empirical evidence)

2.1. Context

The study took place in Uttar Pradesh (UP), which ranks as the third-poorest state in India according to the 2021 National Multidimensional Poverty Index baseline report by NITI Aayog (NITI Aayog, 2021). In 2018, UP had a per-capita income of approximately Rs. 56,880 at current prices, equivalent to USD 811.53 per capita. Educational enrollment is nearly universal, with 95 percent of children aged 6 to 14 attending school in rural areas (ASER Report, 2018). However, despite the higher enrollment in private schools, a substantial challenge exists concerning the quality of education, particularly in government schools, where a significant number of children from disadvantaged backgrounds are enrolled. For instance, in rural UP, only 36.2 percent of grade 5 students in government schools could read a text intended for grade 2, compared to 68.8 percent in private schools (ASER Report, 2018). These statistics underscore the prevalent learning deficiencies in government schools and the pressing need to address the quality of education

provided to children from disadvantaged backgrounds in UP.

The study was specifically situated in the Sitapur district, which also faces educational challenges. The district exhibits a lower-than-national-average literacy rate of 61 percent, and learning outcomes for children in rural Sitapur are subpar. Approximately 4 out of 10 children enrolled in grades 3 to 5 could read a text intended for grade 2, and only one-third of children in the same grades could successfully solve subtraction problems (ASER Report, 2018). These indicators highlight the need for interventions to improve educational outcomes in this context.

2.2. PAHAL interventions

Both treatment arms in the study were spearheaded by Pratham, India's largest educational NGO. In the absence of the study intervention, community-school relationships in the Indian context were typically characterized by perfunctory interactions that focused mainly on administrative matters, with limited emphasis on discussions concerning learning processes and outcomes (Dyer et al., 2022a, 2022b). Our intervention aimed to empower communities, by demonstrating to them that their actions could positively impact their children's educational outcomes (Banerjee et al., 2010). This approach contrasts with several previous studies that employed an information-only strategy, providing information about the benefits of education or the academic performance of children, which has been found to have limited effects on education (Banerjee et al., 2010; Bano, 2022).

The design of these interventions considered various accountability frameworks within education provision (Pritchett, 2015; Hevia and Vergara-Lope, 2019). The framework outlined by Pritchett (2015) helped identify the types of community and school activities that should be central to the intervention, with a focus on improving learning outcomes, as opposed to other aspects of school accountability like enrollment and attendance. In the intervention's design, significant emphasis was placed on defining the roles and responsibilities of parents and other community stakeholders, while highlighting the collaborative roles of parents and school staff in shaping student learning (Fox, 2015; Hevia and Vergara-Lope, 2019). This is particularly relevant in the context of India, where a substantial social distance often exists between teachers and parents (Rawal and Kingdon, 2010). When students encounter challenges in their educational progress, teachers often attribute it to parental responsibilities, especially among students from disadvantaged backgrounds or those who are first-generation learners (Ramachandran, 2004; Banerjee and Duflo, 2006).

In the following sections, we provide a comprehensive discussion of the various activities implemented as part of both the PAHAL (referred to as the community intervention) and the PAHAL+ (referred to as the community-school intervention). We also delve into the research that guided the development of these interventions.

2.2.1. Community intervention (PAHAL)

This was a multi-faceted intervention, and below we describe the various aspects of this intervention in more detail:

1. Creating awareness

The intervention began with an assessment of the learning levels of children in the village/hamlet to create a "Village Report Card" (VRC)^d or a "Jhat-Pat Mohalla Report" (literally translates to Quick Community Report). The overall aim of the village assessment is to raise awareness and start the process of community mobilization. The math and reading assessment tools that were used to create the

VRC have been validated in the Indian context.^e Banerjee et al. (2010) find that such an assessment is useful as many parents are unaware of what is meant to be taught in schools and how their children are performing on foundational reading and numeracy tasks - the VRC enables them to better understand this, and also allows the volunteers to establish a rapport with the community.

2. Volunteer-led classes

Based on the reading levels in the VRC, children in grades 2 to 5 were divided into two categories: Readers, who were able to read a simple text aimed at children in primary grade 1, and Non-Readers, who were unable to read such a text. The Non-Readers were asked to attend volunteer-led classes – these were approximately hour-long sessions that were held six times a week. On average, the classes consisted of about 15 students, and they were taught basic reading and math skills using the Teaching at the Right Level (TaRL) approach, a method that is widely used across the country (Banerjee et al., 2010, 2016).

The volunteers for these classes were recruited from within the communities that they would serve – the recruitment events would involve demonstrations to showcase how simple activities (like play-based learning) could significantly improve children's learning outcomes. The community members who expressed an interest in volunteering were provided special training and learning materials that they could use. The volunteers received no financial compensation, but the NGO staff made regular visits to offer guidance and mentorship.

3. Children's study groups

Based on the assessment tasks, children who could not read at the second-grade level were grouped together to form community-based study groups.^f These largely consisted of around 5 children who lived close to each other. These students were encouraged to meet daily and learn from each other using the books that they already have (there was also some additional learning material that the volunteers would provide periodically). The intuition behind this was to instill a habit of studying beyond school hours, and to encourage a culture of sharing resources. The volunteers encouraged the participation of parents and other siblings in these study groups. For example, mothers were asked to assist the groups by providing a meeting space and ensuring that nearby children gathered when needed. Additionally, older siblings were encouraged to supervise the groups and offer support if necessary.

4. Other community events

The volunteers would organize other events in the communities that they worked in with the intention to mobilize support, celebrate progress, and create an environment conducive to learning. They set up "Fun Days," where children and their mothers participated in activities aimed at supporting caregivers with tasks they could do at home to support their children with reading and mathematics. Another example is an event called "Halla Bol" (literally translates to "make some noise"), where the intent was to celebrate the contribution of the community in fostering children's learning, and served as a space to recognize volunteers, teachers, and learners for their efforts.

2.2.2. Community-School intervention (PAHAL+)

The community-school intervention includes two additional

^d Kindly refer to the following link for further details: <https://img.asercentre.org/docs/Key%20Documents%20Page/diyasereng.pdf>

^e Kindly refer to the following links for the ASER assessments tools: <https://v1.asercentre.org/p/141.html> for reading assessment tool, and <https://v1.asercentre.org/p/142.html> for the math assessment tool.

^f According to Banerji (2020), 'Just like groups who play together in their neighbourhoods, for a certain time in the day after school, groups also learn together. The idea is that children can help each other and that projects can be done together. Depending on the projects or tasks, others in the neighbourhood (like older siblings, parents, grandparents, or neighbours) help these groups.'

initiatives over and above the aspects discussed in the *PAHAL* intervention, which are described below:

1. *Providing learning material to teachers*

Pratham distributed Teaching at the Right Level (TaRL) materials, which are similar to the ones used in the volunteer classes, and conducted sessions with teachers. Discussions during the sessions included (i) the importance of the TaRL approach, (ii) the need to assess students regularly, and (iii) adjustments to pedagogical practices to suit the diversity of learners in classrooms. The last aspect is particularly important in the Indian context as previous studies, such as [Djaker et al. \(2022\)](#) and [Wadmare et al. \(2022\)](#), have highlighted a substantial discrepancy between teacher's perceptions of student's abilities and their actual learning levels.

2. *Encouraging parent-teacher engagement*

We also established avenues for effective parent-teacher engagement by organizing meetings where they could discuss children's learning and provide suggestions on ways to support this process. These meetings were aimed at bridging the gap between the school and the community. Teachers were encouraged to actively engage in community events and work with community mentor volunteers to better understand student learning needs, while parents were encouraged to send their children regularly to school and be more involved in their school work (like checking their homework). In fact, both community members and teachers were encouraged to organize and participate in such events. The intention behind this was to create a sense of collaboration among all stakeholders, and to build the idea that the active participation of teachers, parents, and the community at large is crucial for enhancing children's education ([Hevia and Vergara-Lope, 2019](#)). These have also been found to be effective at improving accountability, transparency, and the overall quality of school services ([Kremer et al., 2013](#); [Mbiti, 2016](#)), and encouraged parents to devote more time to monitor and assist their children with their schoolwork ([Islam, 2019](#)).

2.2.3. *Challenges in intervention implementation*

There are two key things to highlight here. First, prior to the interventions, all government schools in UP received training on the Teaching at the Right Level (TaRL). The government trained two teachers from each school, who then trained all other teachers in their respective schools. While this training may introduce some overlap with the activities conducted in *PAHAL* and *PAHAL+*, it is unlikely to bias our findings. If anything, we expect that this training would attenuate any observed differences in learning outcomes between the treatment and the control group.

Second, the implementation of the planned intervention activities, particularly school-based activities, faced various external disruptions. These disruptions included government elections (that required teachers to take on additional duties), a teacher strike, and extended vacation periods due to extreme weather conditions. These disruptions could have affected the intensity of the interventions and thus have dampened the effect of the treatment, especially in *PAHAL+* communities. Additionally, the COVID-19 pandemic happened six months after the start of the interventions. This implied that the intervention, which was supposed to go on for two years, had to be abruptly stopped. Therefore, we are unable to assess the medium-to-long run effects of the interventions (which was the original plan), and the paper focusses on the short-term effects of the *PAHAL* and *PAHAL+* interventions.

3. *Study design and data*

3.1. *Sampling, data collection and randomization*

The 400 sample villages were randomly assigned to three groups: 100 villages received the community-level intervention (*PAHAL*), 200 villages received the community-school level intervention (*PAHAL+*),

and the remaining 100 villages were assigned to a control group. The study included all the government primary schools in each of the sampled villages, resulting in a total sample of approximately 848 schools. From each of these schools, we selected 30 children for the baseline survey, with 10 students each from grades 2, 3, and 4. These students were selected using a targeted approach - we administered a basic reading proficiency test (more details provided later) to 20 randomly selected children per grade (based on the school's enrollment register), and the first 10 students from each grade who were unable to read at grade level were included in the study sample. Therefore, our sample consists of lower-achieving students.

The baseline survey was conducted between October 2018 and January 2019. The survey collected detailed information on students and their households - examples of the kind of information include sample child school enrolment information, family engagement with the sample child and school, parental perceptions and attitudes regarding their children's learning levels, and households' perceptions and attitudes towards teachers and schools. Additionally, we also collect data from the teachers and head teacher in the sample schools, including their basic information and characteristics, attitudes and perceptions on student learning, and engagement with parents and community.

The follow-up (endline) survey was conducted between December 2019 to March 2020. We were able to track 92 percent of the baseline children. In Table A1, we compare whether there was any differential attrition across the groups. We observe that there was no differential attrition between the control and *PAHAL* group, while the *PAHAL+* group had a statistically significantly higher attrition rate compared to the control group. We present results from a robustness check where we account for this differential attrition. Nevertheless, we found no evidence of selective attrition bias in the tracked study sample, and the results are provided on request.

3.2. *Measuring foundational learning*

We utilize the ASER test to assess children's foundational literacy and numeracy skills. The reading assessment categorizes each student into one of five levels based on their reading proficiency: beginner (unable to read simple alphabets), letter level (able to read alphabets/letters), word level (able to read commonly used two-syllable words), paragraph level (able to read a four-line text consisting of words typically found in grade 1 textbooks in India), and story level (able to read a story consisting of words typically found in grade 2 textbooks in India). The reading score ranges from zero to four, with each level assigned a score in increments of one point, starting with zero points for the beginner level. Numeracy skills are measured using the ASER numeracy testing tool, which also consists of five levels: beginner (unable to recognize even single-digit numbers), one-digit number recognition level (able to recognize single-digit numbers), two-digit number recognition level (able to recognize two-digit numbers), subtraction level (able to perform subtraction involving two-digit numbers), and division level (able to perform division involving three-digit numbers). Both literacy and numeracy skills are ordinal in nature, with a higher level indicating a higher level of foundational literacy and numeracy skills for a child. In this study, we analyse changes both on the intensive margin, which refers to changes in the absolute score, and on the extensive margin, which refers to the probability of achieving a high score on the assessments.

Table 1
Summary statistics and balance of covariates at baseline survey.

	Control (C)	PAHAL (T1)	PAHAL+ (T2)	P-Value from F- Test of Equality (C = T1 = T2)
Panel A: Child level outcome variables				
Literacy Levels				
Literacy Level/Score	1.92	1.90	1.87	0.25
Can read Letters	0.66	0.63	0.63	0.23
Can read Words	0.18	0.18	0.16	0.23
Can read Paragraph	0.08	0.09	0.08	0.43
Numeracy Levels				
Numeracy Level/Score	2.08	2.08	2.07	0.90
Can recognize One-Digit Numbers	0.87	0.85	0.86	0.55
Can recognize Two-Digit Numbers	0.18	0.19	0.18	0.82
Can do a Two-Digit Subtraction	0.03	0.03	0.03	0.55
Observations	6043	6033	11948	24024
Panel B: Child/household level characteristics				
Female Child	0.54	0.52	0.53	0.30
Child Grade Enrolled	2.98	2.99	2.98	0.44
Child take Private Tuition	0.09	0.07	0.08	0.65
Father Education (Years of Schooling)	4.62	4.37	4.52	0.35
Mother Education (Years of Schooling)	2.04	1.91	1.91	0.37
Caste/Social Group				
Upper Caste/ General	0.10	0.08	0.09	0.59
Other Backward Classes	0.42	0.45	0.42	0.50
Scheduled Castes/Tribes	0.48	0.47	0.48	0.80
House Type				
Kacha (Mud) House	0.31	0.34	0.32	0.37
Semi-Pakka (Half Concrete) House	0.32	0.32	0.33	0.81
Pakka (Concrete) House	0.37	0.34	0.35	0.25
Other Household (HH) Indicators				
Electricity in HH	0.38	0.36	0.35	0.23
Toilet in HH	0.33	0.33	0.34	0.63
Motor Cycle	0.19	0.17	0.17	0.24
Mobile Phone	0.86	0.84	0.84	0.16
Television in HH	0.07	0.07	0.06	0.35
Electric Fan in HH	0.18	0.17	0.16	0.36
Observations	5873	5879	11685	23437

Note: Columns 2–4 present the raw means of the control and treatments group. Column 5 presents the p-values of the F-test for equality of mean across the control and treatment groups. P-values are estimated using standard errors clustered at the Village level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

3.3. Summary statistics and balance of covariates at baseline

Table 1 presents the summary statistics for our study sample and provides a comparison between the control and intervention groups. The sample consists of roughly equal numbers of boys and girls, and on average, the children have completed three years of schooling at the baseline. The majority (90 percent) of the sample belongs to disadvantaged caste groups, including OBC/SC/ST.⁸ Nearly 60 percent of mothers and 37 percent of fathers of the sampled students have never

⁸ The caste/social group variable contains four different categories as defined according to the Indian, “legal”, caste system. The National Sample Survey Office (NSSO) collects and provides information along similar lines by dividing it into four categories which are as follows: *Scheduled Castes (SCs)*, *Scheduled Tribes (STs)*, *Other Backward Classes (OBCs)*, and *other castes*.

been to school or have less than five years of education, indicating low levels of education within the sample. Moreover, more than one-third of the sample students are first-generation learners. Most households have non-concrete (kaccha) houses, and only about a third have access to a toilet and electricity connection, highlighting a low socioeconomic status among many families.

A significant proportion of the sample children did not meet the curriculum expectations for their respective grade levels (which is consistent with our targeted sampling approach). While the sample consisted of children who were not at grade 2 level, most were not even at grade 1 level. For instance, approximately 8 percent were able to read a paragraph, and only 3 percent could perform two-digit subtraction. The survey also collected information from parents and teachers regarding their perceptions of the children’s learning levels. However, there is a significant disparity between their perceptions and the actual abilities of the children. Both teachers and parents tend to overestimate the children’s learning levels significantly. For example, around 40 percent of the interviewed teachers incorrectly identified specific children as fluent readers at the grade 2 level, despite a large proportion of them struggling to read beyond individual letters, and none of them being able to read at a grade 2 level (Wadmare et al., 2022).

We conduct statistical tests to assess mean differences across the three groups in our study – the results are presented in Table 1, and demonstrate that the control and treatment groups are balanced at baseline. None of the 25 covariates that we have tested show statistically significant differences (at the five percent level) between the PAHAL and PAHAL+ and control groups. This balance across various characteristics enhances the credibility of the randomization process, and indicates that any differences in outcomes observed in the post-intervention period could be attributed to the interventions rather than pre-existing differences across the different groups.

4. Participation in treatment activities (PAHAL and PAHAL+)

In Table 2, we examine the fidelity with treatment – that is, at what rate did the different stakeholders (households, teachers, and head teachers) participate in the various intervention activities. Table 2, Panel A, presents self-reported knowledge/participation of households in various intervention activities. During the intervention period, approximately one-third of households in PAHAL reported observing volunteers conducting free classes/lessons, and about a quarter reported observing play-based activities in their village or hamlet. Interestingly, the proportion of households reporting such observations is statistically significantly higher (4–5 percentage points) in the PAHAL+ communities. In terms of studying in groups, 40 percent and 46 percent of households reported witnessing their children studying in groups in PAHAL and PAHAL+, respectively (a statistically significant difference of 6 percentage points). Furthermore, 42 percent and 53 percent of households reported receiving learning materials from the volunteers in PAHAL and PAHAL+, respectively (a statistically significant higher proportion of 11 percentage points). Overall, we find that approximately 71 percent and 76 percent of participants have either witnessed or have knowledge of at least one of these community-based intervention activities in PAHAL and PAHAL+, respectively. These findings indicate that the community-level interventions were implemented with high fidelity.

We also explore the teacher’s and head teacher’s self-reported measure of participation in (or knowledge of) various intervention activities (Table 2, Panels B and C). In PAHAL+, more than half of the teachers (55 %) and around one-third of head teachers reported that a Pratham representative visited the school in the last six months. Among these school actors, around 60 percent of teachers reported Pratham representative doing activities with children, and 53 percent of teachers reported that the Pratham representative demonstrated teaching-learning activities. In terms of head teachers, 58 and 65 percent reported Pratham representatives doing activities with children and

Table 2
Different stakeholder's participation in various intervention activities.

	PAHAL (T1)	PAHAL+ (T2)	Mean Difference (T2-T1)
Panel A: Household			
Received learning material from volunteers	0.426 [0.495]	0.540 [0.498]	0.114*** (0.0221)
Volunteers leading classes	0.346 [0.476]	0.392 [0.488]	0.046** (0.0220)
Children study in groups	0.400 [0.490]	0.460 [0.498]	0.060*** (0.0195)
Play-Based activities taking place	0.256 [0.437]	0.294 [0.456]	0.038** (0.0184)
Learning Rally in village (Halla Bol)	0.284 [0.451]	0.287 [0.452]	0.003 (0.0185)
Seen any of the above activities in village	0.714 [0.451]	0.762 [0.452]	0.047** (0.0199)
Observations	5185	10044	15229
Panel B: Teacher Community Activities			
Organised event on child learning	0.246 [0.431]	0.403 [0.491]	0.156*** (0.0324)
Seen volunteer leading classes at homes	0.292 [0.455]	0.392 [0.488]	0.100*** (0.0313)
Seen children study in groups at homes	0.323 [0.468]	0.400 [0.490]	0.078** (0.0302)
Learning Rally in village	0.634 [0.482]	0.667 [0.472]	0.032 (0.0304)
Seen any of the above activities in village	0.785 [0.411]	0.844 [0.363]	0.058** (0.0231)
School-level Activities			
Pratham representative visited school	—	0.555 [0.497]	—
If school visit, discuss children's learning	—	0.354 [0.479]	—
If school visit, did activities with children	—	0.601 [0.490]	—
If school visit, demonstrated TaRL	—	0.531 [0.500]	—
If school visit, discussed parents' participation	—	0.204 [0.500]	—
Observations	556	1033	1589
Panel C: Head Teacher (HT) Community Activities			
Organised event on child learning	0.220 [0.418]	0.430 [0.497]	0.209*** (0.0662)
Seen volunteer leading classes at homes	0.203 [0.406]	0.347 [0.478]	0.144** (0.0659)
Seen children study in groups at homes	0.237 [0.429]	0.339 [0.475]	0.102 (0.0717)
Learning Rally in village	0.560 [0.501]	0.686 [0.466]	0.127 (0.0777)
Seen any of the above activities in village	0.712 [0.457]	0.876 [0.331]	0.164** (0.0647)
School-level Activities			
Pratham representative visited school	—	0.320 [0.467]	—
If school visit, discuss children's learning	—	0.333 [0.476]	—

Table 2 (continued)

	PAHAL (T1)	PAHAL+ (T2)	Mean Difference (T2-T1)
Panel A: Household			
If school visit, did activities with children	—	0.579 [0.498]	—
If school visit, demonstrated TaRL	—	0.649 [0.482]	—
If school visit, discussed parents' participation	—	0.193	—
Observations	59	121	180

Notes: Columns 2–3 present raw means and standard deviations (in square brackets) of the indicated participation measure in each group. Column 4 presents regression-adjusted differences and standard errors (in parentheses) between the mean in the community-school treatment and the community treatment for households (Panel A), teachers (Panel B), and head teacher (Panel C). Standard errors are clustered at the village level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

demonstrated teaching-learning activities, respectively. In total, around one-third (35 %) of all teachers in PAHAL+ reported doing any of the above activities with the children. This is lower than initially anticipated, but in line with what one would expect in a curtailed and interrupted intervention (due to the disruptions discussed earlier).

Additionally, we verify if there was enhanced participation of school stakeholders (teachers and head teachers) in the PAHAL+ group – since this treatment focused on enhancing school and community participation through directly working with teachers, the expectation is higher engagement among teachers in this group. Table 2, Panels B and C also show that teachers and head teachers in PAHAL+ group reported significantly higher participation in community-based activities in the village. In PAHAL, about a quarter of teachers, and 22 % of head teachers, reported observing activities related to children's learning organized in the village. These proportions were 16 and 21 percentage points higher in PAHAL+. Among these, approximately 65 percent of teachers and 77 percent of head teachers in PAHAL helped in organizing these events/activities about learning. The participation in PAHAL+ was 70 percent for teachers and 75 percent for head teachers. Overall, more than three-quarters of the teachers, and 71 percent of head teachers, have seen or have knowledge of any of the community-based activities happening in PAHAL villages, while this proportion is 6 percentage points higher for teachers and 16 percentage points higher for head teachers in PAHAL+.

Overall, the findings in Table 2 demonstrate a relatively high level of knowledge about the intervention activities across stakeholders, particularly among parents. As expected, participation in community-based activities was higher in PAHAL+ relative to PAHAL, as by design there were additional activities to engage parents and schools. This information provides the background on the participation of different stakeholders, and is a vital first step in assessing the impact of the interventions.

5. Empirical strategy

We estimate the impact of being part of PAHAL or PAHAL+ group by modelling equation (1) and estimating it using ordinary least squares:

$$Y_{isj} = \beta_0 + \beta_1 * PAHAL_j + \beta_2 * PAHAL+_j + \delta * Y_{isj}^0 + \alpha * Z + \epsilon_{isj} \quad (1)$$

Where, Y_{isj} is the outcome of interest at the follow-up (or endline) survey for child i in school s in village j . PAHAL and PAHAL+ intervention indicate the treatment status of the village that the individual resides. The parameters of interest are β_1 and β_2 – they provide the impact on the outcome of interest (test scores) of being in PAHAL or PAHAL+, relative to the control group. The random assignment of the intervention ensures that our estimates are unbiased and consistent, and represent the intent-to-treat estimates of the effect of the interventions.

Y_{ij}^0 is the outcome of interest from the baseline survey. Although the intervention was randomly allocated (and there is balance in a number of observed characteristics), we include an extensive set of household and child level controls (Z) in our main specification. These include variables such as child gender, grade they are enrolled in, parents' education, caste status, and indicators for household assets (the full list of control covariates presented in Panel B of Table 1). In our main specification, we cluster the standard errors at the village level to account for the fact that the intervention is randomly allocated across villages. Also, all the regressions include inverse probability weights (IPW) to account for the sample attrition at the endline survey.

6. Findings

6.1. Impact on children's foundational literacy and numeracy

Table 3, Panels A and B, present the impact estimates of the PAHAL and PAHAL+ interventions on children's foundational literacy and numeracy skills using the main empirical specification. Results suggest that both interventions resulted in statistically significant improvements in children's foundational literacy and numeracy skills compared to the control group (p -value < 0.01). The outcomes in columns 1 and 5 are normalized, and hence the coefficients can be interpreted as standard deviation effects. PAHAL students improved literacy skills by 0.08 standard deviations (S.D.) and numeracy skills by 0.08 S.D. as compared to the control group (see Columns 1 and 5 of Panels A and B). The PAHAL+ intervention also led to improved foundational literacy (0.09 S.D.) and numeracy skills (by 0.09 S.D.), as compared to the control group (see Columns 1 and 5 of Panels A and B). The impact on test scores is marginally higher in PAHAL+ than in PAHAL, indicating that the additional school-community collaboration that this intervention encourages might translate into higher benefits for children. However, this difference in impact across the two interventions is not statistically significant – a possible explanation of why this might be the case is that the intervention period was too short, and larger differences might have emerged had the intervention continued for two years (as initially planned).^h

The ASER test captures varying levels of foundational skills: beginner, basic, intermediate, and advanced levels. Using this information, we generate categorical variables indicating whether a child was able to complete tasks of varying levels of difficulty. For example, using the reading test, we generated separate categories for children who were able to recognize letters (basic), those who were able to recognize words (intermediate), and those who were able to read at least a paragraph (advanced) level. Similar categories have been created for numeracy skills, where children were classified according to their ability to recognize one-digit numbers (basic), two-digit numbers (intermediate) or perform a subtraction (advance). Results in Table 3 suggest that both PAHAL and PAHAL+ significantly improved literacy (Columns 2 and 3) and numeracy skills (columns 6 and 7) at both basic and intermediate levels. In addition, both interventions significantly improved the probability of completing advanced reading task, but we find improvements at the advanced level of foundational numeracy skills only in PAHAL+. For instance, compared to the control group, the probability of reading at the advanced level increased by around 3 percentage points in both PAHAL and PAHAL+ (column 4), but the probability of performing subtraction only increased by 2 percentage points in PAHAL+ (column 8). These improvements constitute a large effect, representing around 10–11 percent for literacy (in PAHAL and PAHAL+) and 12 percent for numeracy (in PAHAL+) relative to the control group. We conclude that both interventions seem to be effective at improving

foundational skills, particularly for those at the lower end of the skill spectrum.

Overall, our intervention improved children's foundational learning by around 0.08 to 0.09 standard deviations, which is comparable to other education intervention studies in low and middle-income countries (Evans and Yuan, 2022). They document that the overall median effect size of various educational interventions on student learning (math and reading) is about 0.10 standard deviations,ⁱ and that among large-scale studies (sample size greater than 5000 students) is around 0.06 standard deviations. Based on the scale of our intervention our effect size is larger than the median effect size of comparable studies.

6.2. Heterogeneity by children's baseline foundational skills

We conducted a disaggregated analysis of the intervention's impact based on children's learning levels measured prior to the intervention. The aim here is to investigate whether the treatment had differential effects on children of varying baseline learning levels. To do this, we incorporate interaction terms between the treatment and baseline skill level in our main empirical specification (equation 1). Based on the observed results, and the fact that the intervention was active for a relatively short duration, we expect there to be limited increases from the baseline skill level. Therefore, we examine skill jumps in increments of one level – that is, for each baseline skill level (Beginner, Basic, Intermediate, and Advanced) we examine whether there is a differential effect on students gaining one level in the intervention period. For example, using the results in column 1 of Table 4, we examine whether there is an additional effect of the intervention on achieving basic level in reading for students who started at the beginner level. The results are presented in Table 4, and reveal significant heterogeneity in the results. We find that students who start at the *beginner* level have a higher chance of skilling up one level (to the *basic* level) in terms of reading (column 1) and numeracy skills (column 1) to be at the *basic* level at endline. However, there are largely no such differential benefits among students who begin at the *basic* (columns 2 & 5) or *intermediate* (columns 3 & 6) levels. These results suggest that both interventions had the greatest impact in improving foundational skills for those with lower levels of baseline achievement.

6.3. Heterogeneity by parental involvement at school

The PAHAL+ focused on enhancing effective interaction between parents and teachers regarding children's education and learning. It is possible that PAHAL+ could have had differential effects on children with varying initial levels of parental engagement. It is possible that children with parents who had lower levels of initial engagement with schools could have benefitted more from the intervention – as their parents might now potentially show more involvement in their education and related activities. On the other hand, it is possible that children of parents who demonstrated higher engagement at baseline would benefit more (as the treatment is likely to be more effective among these people). We explore this by investigating if there are differential impacts of the interventions on children's learning based on parental interaction with teachers, which is captured here through parental/household visits to the school. This is a categorical variable that takes a value of one for parents who had visited their child's school at least once in the past year, and zero otherwise. The results from this analysis are presented in Table 5, and they suggest an interesting pattern – PAHAL+ had a significantly higher impact on both literacy and numeracy skills for children whose parents were relatively more engaged. The same results

^h The study was designed to detect small treatment effects, but not adequately powered to detect such slight differences between PAHAL and PAHAL+.

ⁱ However, the standard deviations cannot be compared across studies. Standard deviations change across classes of tests as well as populations (Singh, 2015). Thus, they should be compared with caution both across contexts and tests.

Table 3
Impact of PAHAL and PAHAL+ on improving children's foundational learning levels.

	Panel A: Impact on Literacy Level				Panel B: Impact on Numeracy Level			
	(1) Literacy Score	(2) Letter Level (Basic)	(3) Word Level (Intermediate)	(4) Paragraph Level (Advanced)	(5) Numeracy Score	(6) NR 1-Digit Level (Basic)	(7) NR 2-Digit Level (Intermediate)	(8) Subtraction Level (Advanced)
PAHAL (T1)	0.075*** (0.026)	0.024* (0.013)	0.025* (0.013)	0.030** (0.013)	0.079*** (0.027)	0.024*** (0.005)	0.032** (0.014)	0.010 (0.010)
PAHAL+ (T2)	0.094*** (0.022)	0.036*** (0.010)	0.034*** (0.012)	0.026** (0.011)	0.087*** (0.024)	0.022*** (0.005)	0.032*** (0.012)	0.017* (0.009)
Difference (T2-T1)	0.019 (0.023)	0.012 (0.010)	0.009 (0.012)	−0.003 (0.011)	0.008 (0.024)	−0.002 (0.004)	0.001 (0.012)	0.007 (0.009)
Control Mean at Endline	−0.008	0.773	0.365	0.287	0.005	0.942	0.397	0.142
Observations	21472	21472	21472	21472	21472	21472	21472	21472

Notes: Columns 1–4 in Panel A and 5–8 in Panel B display estimated coefficients of treatment group dummies for literacy and numeracy skills, respectively. All the regressions include inverse probability weight (IPW) to account for the sample attrition at endline, and standard errors (in parentheses) are clustered at the village level. Also, we have controlled for the baseline outcome, and child and household level characteristics provided in Panel B in Table 1. Literacy and numeracy scores are normalized based on the control group means and standard deviations for each category of the score and in each round of testing. Row 3 provides the difference in impact between PAHAL+ and PAHAL to see whether PAHAL+ has an additional significant impact over PAHAL. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 4
Heterogeneity Analysis: Impact of PAHAL and PAHAL+ on improving learning levels by children's skills at baseline.

	Panel A: Impact on Literacy Level			Panel B: Impact on Numeracy Level		
	(1) Basic Level (Beginner level at BL)	(2) Intermediate Level (Basic level at BL)	(3) Advanced Level (Intermediate level at BL)	(4) Basic Level (Beginner level at BL)	(5) Intermediate Level (Basic level at BL)	(6) Advanced Level (Intermediate level at BL)
PAHAL (T1)	0.006 (0.010)	−0.006 (0.025)	−0.027 (0.024)	0.015*** (0.004)	0.016 (0.025)	−0.019 (0.065)
PAHAL+ (T2)	0.014* (0.007)	0.020 (0.021)	−0.005 (0.019)	0.013*** (0.003)	0.025 (0.022)	0.057 (0.054)
Baseline Skill	−0.385*** (0.017)	−0.495*** (0.019)	−0.615*** (0.018)	−0.204*** (0.016)	−0.444*** (0.020)	−0.544*** (0.045)
PAHAL (T1) # Baseline Skill	0.051** (0.025)	0.038 (0.029)	0.062** (0.028)	0.068*** (0.023)	0.020 (0.027)	0.031 (0.065)
PAHAL+ (T2) # Baseline Skill	0.063*** (0.022)	0.017 (0.024)	0.034 (0.022)	0.067*** (0.020)	0.009 (0.023)	−0.041 (0.054)
Observations	21472	21472	21472	21472	21378	21378

Notes: All the regressions include inverse probability weight (IPW) to account for the sample attrition at endline, standard errors (in parentheses) are clustered at the village level, and we have controlled for the baseline outcome, and child and household level characteristics. We have added an additional interaction between the treatment group and baseline skill in all the regressions. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 5
Heterogeneity Analysis: Impact of PAHAL and PAHAL+ on improving children's learning by parental involvement at school.

	Panel A: Impact on Literacy Level				Panel B: Impact on Numeracy Level			
	(1) Literacy Score	(2) Letter Level (Basic)	(3) Word Level (Intermediate)	(4) Paragraph Level (Advanced)	(5) Numeracy Score	(6) NR 1-Digit Level (Basic)	(7) NR 2-Digit Level (Intermediate)	(8) Subtraction Level (Advanced)
IG (Ref.- Control)								
PAHAL (T1)	0.060** (0.028)	0.020 (0.015)	0.021 (0.014)	0.022 (0.014)	0.059** (0.028)	0.025*** (0.006)	0.015 (0.015)	0.008 (0.010)
PAHAL+ (T2)	0.076*** (0.024)	0.031** (0.012)	0.030** (0.013)	0.014 (0.012)	0.063** (0.026)	0.022*** (0.005)	0.021 (0.013)	0.009 (0.009)
Visited School (VS)	0.058*** (0.022)	0.021* (0.011)	0.039*** (0.012)	0.023* (0.012)	0.044 (0.028)	0.006 (0.007)	0.018 (0.014)	0.018* (0.011)
IG # VS								
PAHAL (T1) # VS	0.043 (0.032)	0.009 (0.015)	0.013 (0.018)	0.023 (0.017)	0.050 (0.035)	−0.006 (0.009)	0.044** (0.018)	0.007 (0.015)
PAHAL+ (T2) # VS	0.066** (0.030)	0.021 (0.013)	0.019 (0.017)	0.039** (0.016)	0.075** (0.034)	−0.001 (0.008)	0.036** (0.017)	0.023* (0.014)
Observations	21038	21038	21038	21038	21038	21038	21038	21038

Notes: All the regressions include inverse probability weight (IPW) to account for the sample attrition at endline, standard errors (in parentheses) are clustered at the village level, and we have controlled for the baseline outcome, and child and household level characteristics given in Table 1. We have added an additional interaction between the treatment group and parental visit to school in all the regressions. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

for the differential impact of the treatments are also provided in Fig. 1 which provides a clear picture of the additional impact of PAHAL+ for children whose parents were engaged at school through interacting with teachers. These estimates are there in the aggregate (columns 1 and 5), and are largely driven by effects at the higher end of the skill spectrum (columns 4, 7 & 8). This suggests that initial parental engagement is an important determinant of eventual intervention effects, especially in the intervention group where community-school relationships are encouraged.

6.4. Mechanisms

To probe the mechanisms that are likely driving the observed impacts of the interventions, we investigate the effect on various intermediate outcomes which could subsequently influence learning outcomes. The estimations were done separately for activities related to parent-teacher engagement and those directed at children. These results are presented in Table 6.

6.4.1. Parent-teacher engagement

We examine whether parent-teacher engagement changed as a result of the interventions, particularly considering that it was a crucial component of PAHAL+. We observe an increase in the interaction between parents and teachers, specifically parents in PAHAL+ are more likely to report being invited to the school by the teachers, whereas this was not the case in PAHAL (row 1 Table 6) - there is a 7.3 percentage point difference between PAHAL+ and PAHAL, a difference that is statistically significant at the one percent level. This finding aligns with our expectations, as PAHAL+ specifically emphasized cooperation and interaction between the community and the school. Interestingly, despite the invitations from teachers, there was no significant increase in the number of parental visits to the school in either group. This suggests that despite the encouragement, the overall quantity of parental interaction with the school remained relatively unchanged. However, when parents did visit the school, they were significantly more likely to engage in discussions with teachers about their children's learning - PAHAL+ parents were 5.6 percentage points more likely to participate in such discussions. This implies that even though there might not have been a change in quantity of interactions, the PAHAL+ intervention likely led to an improvement in the quality of the interactions between parents and teachers. Further, we do not find any significant effects of the interventions on parental perceptions of teachers and their perception regarding the teachers' job performance. This lack of effect is likely because the intervention program was implemented for six months, and perceptions/attitudes are unlikely to change in such a short space of

time.

6.4.2. Activities related to children's learning

In this part of the analysis, we focus on intermediate outcomes such as school attendance and studying in groups, as these factors have been found to have a positive association with students' learning outcomes (Das, 2019; Kumar et al., 2021). We find that PAHAL+ had a significant positive effect on the likelihood of children attending school (row 6) and studying in groups with other children (row 7), compared to the control and PAHAL groups (Table 6). For example, the probability of a child being present in school on the day of a random check by the research team is significantly higher by 4.1 percentage points in the PAHAL+ group, while there are no significant differences between the PAHAL group and the control group.

We also examine the differences between the PAHAL and PAHAL+ groups and find that attendance is 6.7 percentage points higher in the PAHAL+ group compared to the PAHAL. Additionally, the probability of a child studying in groups (or attending reading groups) has significantly increased by 12.9 percentage points and 18.3 percentage points in the PAHAL and PAHAL+ groups, respectively, compared to the control group. For this outcome, the increase in the PAHAL+ group is statistically significantly higher than the PAHAL group. In addition, children in the PAHAL+ group show a 5.5 percentage points higher improvement compared to those in the PAHAL. This suggests that community-school partnerships have substantial effects on children's learning activities outside of the school as well (acting as a complement to inputs received at the school).

The results follow a similar pattern when examining other outcomes in this category, such as children studying outside school hours (at home) and seeking private tuition. The negative effect on private tuition is noteworthy as it suggests that parents and households may view private tuition services as substitutes for other learning inputs. As students receive more educational inputs through volunteer-led classes, they may choose to reduce spending on private tuition. Taken together, these findings suggest that students who received support from both school and the community were more likely to spend time studying, both independently and with peers. However, they reduced their reliance on other educational inputs, such as private tuition.

6.5. Relative contribution of mechanisms through PAHAL and PAHAL+ intervention

Post-estimation, we calculate the relative contribution of different channels on the observed effect of the two interventions on reading and math scores. These estimates are obtained through the following

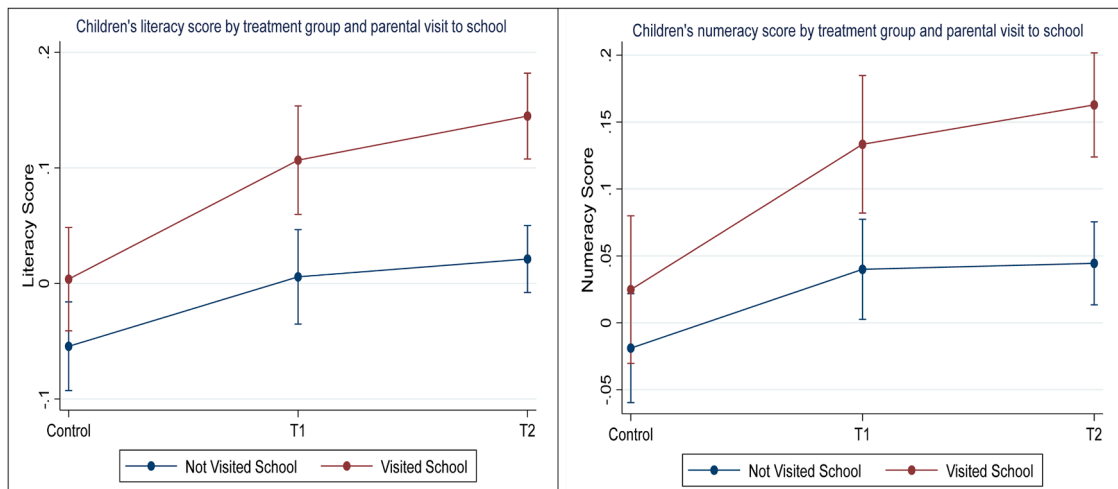


Fig. 1. Predicted literacy and numeracy scores for children whose parents visited and not visited school across control, PAHAL (T1) and PAHAL+ (T2) groups.

Table 6

Impact of PAHAL and PAHAL+ on children's learning related activities and parental-teacher engagement.

	Control	Relative to Control		Relative to T1	T1=T2	
	(Mean)	PAHAL (T1)	PAHAL+ (T2)	PAHAL+ (T2)	(p-value)	Observations
Panel A: Parent-Teacher Engagement						
Teachers regularly invite parents to discuss child studies (1)	0.47 (0.0067)	−0.022 (0.0191)	0.051*** (0.0183)	0.073*** (0.0164)	0.000	21498
Parents Visited School (2)	0.36 (0.0064)	−0.013 (0.0165)	−0.023 (0.0156)	−0.011 (0.0141)	0.456	21996
Parent-Teacher Discussed Learning (3) (If parents visited school)	0.34 (0.0104)	−0.010 (0.0339)	0.056** (0.0286)	0.065** (0.0299)	0.030	3324
Meeting the teacher is a waste of time (4)	0.97 (0.0021)	0.000 (0.0045)	−0.006 (0.0044)	−0.006 (0.0038)	0.118	21383
Teachers do everything to ensure learning (5)	0.35 (0.0071)	−0.027 (0.0209)	−0.003 (0.0185)	0.025 (0.0197)	0.209	21778
Panel B: Child Learning Activities						
Child school observed Attendance (6)	0.43 (0.0065)	−0.026 (0.0211)	0.041** (0.0173)	0.067*** (0.0239)	0.000	22925
Child study in group with other children (7)	0.22 (0.0056)	0.129*** (0.0166)	0.183*** (0.0142)	0.055*** (0.0239)	0.002	21694
Never study at home after school (8)	0.16 (0.0048)	0.004 (0.0106)	−0.019** (0.0091)	−0.023*** (0.0091)	0.012	21993
Taking Private Tuition (9)	0.09 (0.0039)	−0.017* (0.0090)	−0.019** (0.0079)	−0.002 (0.0073)	0.830	22202

Notes: Columns 2 and 3 display estimated coefficients of an OLS regression of the outcome in each row on treatment group dummies, controlling for the baseline outcome. Similarly, column 4 displays estimated coefficients of an OLS regression of the outcome in each row on the T2 group relative to the T1 group, controlling for the baseline outcome variable. Column 5 displays the *p*-value of the *F*-test that the impacts of T1 and T2 are equal. Standard errors (Clustered at Village level) in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

process: we divide the local average treatment effect of the intervention under consideration (PAHAL/PAHAL+) on reading and math scores (presented in Table 3) by the product of (i) the local average treatment effect of the PAHAL+ (and PAHAL) on each channel, and (ii) the regression coefficient obtained by regressing the outcome of interest on the relevant mechanism of interest. This method is based on the technique employed in Mazumder et al. (2023). The results from this analysis are in Tables A2 and A3, respectively – here we present results for a number of different mechanisms from Table 6, but focus our discussion on those which are significantly impacted by the interventions.¹

There are four key findings from this analysis. First, the results in Tables A2 and A3 suggest that direct learning inputs play a relatively larger role in mediating the observed effect of our intervention on children's learning. For example, “child study in groups” is a major contributor in mediating the observed effect of PAHAL+ on math (24 percent) and reading (18 percent) levels (Table A2). The results highlight the importance of direct learning inputs which can effectively improve children learning (in both interventions). Second, “child school attendance” and “(never) studying at home” were key channels for the effect of PAHAL+ (Table A2) - the results suggest that each of these mechanisms contribute around an estimated 7–8 percent of the total observed effect for each of these channels. The results for the PAHAL intervention (Table A3) do not demonstrate the same pattern – this potentially implies that the engagement between schools and communities, which was only a part of the PAHAL+ intervention, had an important role in shaping these mediators. Third, results in Table A2 suggest that “teachers inviting parents to school to discuss child studies” and “parents discussing child learning with teacher” contribute significantly to the total observed effect of PAHAL+ on children's reading (5 and 7 percent, respectively) and math scores (4 and 6 percent, respectively). This finding also adds credence to the importance of the effective engagement between school and community actors through the PAHAL+ intervention. Fourth, “Private Tuition” contributes around 6–7 percent to the observed effect of both interventions on math and reading scores, which is sizable. In our previous section, we discuss the potential

substitution away from private tuition as children received additional educational inputs (such as volunteer-led classes) through the interventions. Despite this substitution, we observe that children's learning improves and this channel plays an important role in mediating this effect.

7. Conclusion

The literature on social accountability in education suggests the importance of bringing stakeholders together to form partnerships, which can then together enhance accountability (Hevia and Vergara-Lope, 2019; Pritchett, 2015). Yet, evidence shows that many community members and parents largely fail to have meaningful interactions with schools, particularly with government schools. Community and parental participation in schools is often viewed as central in supporting the learning process. This implies that interventions that encourage enhanced interaction between community members and school personnel is likely to have beneficial effects on children's learning, which might be larger than interventions that solely focused on the community.

It is in this context that our interventions were implemented. The aim of the community intervention (PAHAL), was to develop an understanding of children's learning in the community, to facilitate the activities which require the support of parents and community, and as the name of the intervention indicates, to take initiative. Ultimately, PAHAL+ conveyed the message that every individual shares the responsibility for a child's learning. By examining the effects of PAHAL and PAHAL+ (community-school intervention), we aim to understand the extent to which community participation alone or in collaboration with schools may play a role in improving foundational learning for children enrolled in government schools in rural India. In doing so, we also focus on the extent to which the interventions improve foundational learning, and whether improvement happens more for those with the lowest foundational skills. We move beyond the average impact and focus on whether the intervention was advantageous for those with the greatest educational needs, whether there were differential impacts by children's sex and caste group, whether the impact of the intervention was greatest for those whose parents participated in the interventions through interacting with teachers and the possible mechanisms which

¹ The effect of the intervention on some of the potential channels is negative, however most of them are not statistically significant different from zero.

may explain our findings. We also discuss the contribution of different mechanisms in mediating the observed effect of both interventions on children's learning.

We find that both the community and community-school interventions improved foundational learning among children – this is consistent with past studies evaluating similar interventions (Banerjee et al., 2010). While the magnitude of the impact was slightly higher for children in the community and school intervention, but this additional effect was not statistically significant. It is possible that these differences could have emerged had the intervention been operational for a longer period of time (as the intervention was limited to six months, due to the COVID-19 pandemic) – this would imply an enhanced role for community-school partnership, beyond the traditional compliance-oriented and administrative meetings between parents and teachers (see Dyer et al., 2022a, 2022b). Further, we find that the children's direct learning inputs and effective parent-teacher engagement contributes significantly to the total observed effect of the PAHAL+ intervention on children's learning. Similar to other community interventions by Pratham and evaluated by Banerjee et al. (2010), we also found that both community and community-school interventions were effective at raising foundational learning for children without any literacy or numeracy skills. In conclusion, this paper provides evidence that community participation, facilitated through a collaborative and participatory approach between parents and teachers, can significantly improve children's foundational learning particularly for those who have not yet achieved foundational skills.

CRedit authorship contribution statement

Deepak Kumar: Writing – original draft, Formal analysis, Data curation. **Naveen Sunder:** Writing – original draft, Supervision, Conceptualization. **Ricardo Sabates Aysa:** Writing – review & editing, Supervision, Methodology, Funding acquisition, Conceptualization. **Wilima Wadhwa:** Writing – review & editing, Project administration, Methodology, Funding acquisition.

Declaration of competing interest

None.

Data availability

The data that support the findings of this study are openly available in UK Data Service website: <https://dx.doi.org/10.5255/UKDA-SN-856280>

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Supplementary materials

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