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The double pendulum: Accountability relationships and learning in urban South Asia

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ABSTRACT

Policy discourses posit an accountability deficit as an underlying cause of a "learning crisis" in many low-income countries. Many studies understand this perceived deficit from a principal-agent perspective, arguing that incentives facing teachers and schools often do not align to the interests of parents and students. Such perspectives underlie many randomized controlled trials, which associate interventions with outcomes, but which also produce varying or inconsistent results across contexts. This paper seeks to study the accountability of schools and teachers more directly, looking at how it varies across public and private schools and how it relates to students' literacy and numeracy abilities. We report results from a mixed methods study conducted in Mumbai and Kathmandu. Our results show that there are some relationships between accountability and learning outcomes, but these appear to be specific to the context. Quantitative data also show that differences between public and private models of schooling are negligible when students' social backgrounds and school composition are considered. Qualitative data show that accountability processes create a significant burden on staff time and embed complex power dynamics that are not always productive. Taken together, these results problematize policies that seek to improve learning through "demand-side" approaches such as privatization. They show that the dynamics of accountability are a complex system, like the motion of a "double pendulum," and therefore simple conceptual approoaches such as the principal-agent model are of limited academic and practical utility.

1. Introduction

Policy discourses cite a global "learning crisis" (UNESCO, 2014; World Bank, 2018) in many low-income countries. Despite improvements in access and completion, many children leave primary school without basic literacy and numeracy abilities. The economics literature suggests that this "crisis" requires shifting policy focus from the supply side (i.e. inputs such as schools, teachers and books) to the demand side, by focusing on educational outcomes (Banerjee and Duflo, 2011; Glewwe and Muralidharan, 2016; Pritchett, 2013). Such policies would align teachers' incentives with students' learning outcomes through mechanisms such as performance-related pay, short-term contracts, or competition between schools (e.g. through private schooling). However, evidence for this argument is mixed, with outcomes from randomized controlled trials (RCTs) on accountability differing across studies.

This paper presents a mixed-methods study of accountability in education in two urban South Asian contexts: Mumbai and Kathmandu. As well as offering a point of comparison to other studies on accountability in South Asia (e.g. Banerjee et al., 2010; Muralidharan and Sundararaman, 2011), urban South Asia represents an increasingly important educational context. Urban populations in the region grow at 2.5 % annually (World Bank, 2020), and by 2030 four of the world's ten largest cities are predicted to be in South Asia (United Nations, 2018). In migrating to urban centers, families look to education to secure a

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Table 1
Summary of variables used in the quantitative analysis. Mumbai and Kathmandu values denoted with M and K, respectively N(0,1) refers to a normal distribution with a mean of zero and standard deviation of one. These variables were scaled independently in each context, so the means are zero for each context.

Variable	Description	Distribution Summary
Literacy / Numeracy Score	Numeracy and literacy scores, averaged for each student	Scaled: N(0,1)**
Socioeconomic Status (SES)	Composite index of income, parents' education and household assets	Scaled: N(0,1)
Gender	Dummy coded (with option for "prefer not to state")	M: 42.8 % female (0.1 % not stated) K: 47.5 % female (0.0 % not stated)
Age	Student's age	M: 9.0 (sd = 0.6) K: 10.7 (sd = 1.3)
School Type	School types	M: BMC, Aided, Unaided K: Public, Private
School Average SES	Average of all students' SES score in the school	M: 0.0 (sd = 0.28) K: 0.0 (sd = 0.22)
Exit	Composite of four survey items	Scaled: N(0,1)
Voice	Composite of five survey items	Scaled: N(0,1)
Horizontal Accountability	Composite of six survey items	Scaled: N(0,1)
Vertical Accountability	Composite of three survey items	Scaled: N(0,1)
Caste	Categorical measure of caste, using categories appropriate to each context	M: 5 categories (1.7–38.7 %) K: 9 categories (5.4 %–20.2 %)
Home Language	Categorical indicator of language spoken at home (including multilingual and other)	M: 6 categories (6.4%–34.8%) K: 3 categories (8.4%–84.9%)
Parents Born Locally	Dummy variable to measure migration and urbanization	M: 44.2 %K: 27.2 %

livelihood for their children, meaning educational choices are particularly important.

Using matched assessments and questionnaire data, we look at differences in accountability across models of school management and funding and their link to students' literacy and numeracy abilities. We find that the link between accountability and learning outcomes varies by context, and although private schools are associated with higher levels of accountability, this does not translate to higher levels of learning.

Drawing upon qualitative data, we argue that the commonly cited notion of an accountability deficit actually misrepresents a complex set of accountability relationships. These relationships vary considerably in the nature and quality of accountability involved, ranging from situations that could well be characterized as a deficit to those in which there is a surplus of accountability to the extent that it becomes counterproductive. We present this complexity as an explanation for the inconsistent findings from RCTs, using the metaphor of a "double pendulum" (or chaotic pendulum) to illustrate the problems that arise when a complex system is modeled using a simpler approximation of the system (i.e. when the movement of a double pendulum is modeled using the mechanics of a simple pendulum).

2. Two perspectives on accountability and learning

We begin by identifying two contrasting approaches to accountability in the literature. We situate our study as a way to connect these largely parallel lines of enquiry by tracing links from potential drivers of accountability (i.e. models of school funding and management), to evidence of accountability perceptions and behaviors, to students' learning outcomes.

2.1. Principal-agent perspectives and experimental studies

The first approach to accountability and learning is rooted in the principal-agent model of rational choice economics. It understands accountability as alignment of the incentives facing schools and teachers with those of the government and citizens (Figlio and Loeb, 2011). This approach argues that the focus on inputs (schools, teachers, etc.) in many policies has been effective at increasing access but is much less successful at improving learning outcomes (Banerjee and Duflo, 2011). Instead, its proponents advocate focusing on the demand side by basing funding and other resources on students' learning. As Prichett argues,

> The problem in many countries with low levels of education is the way in which the production of schooling is organized—the relationships of accountability for performance simply do not exist. Currently schooling systems are entirely input oriented and systemic reform is necessary to create a performance orientation. (Pritchett, 2004).

Much research in this approach uses RCTs to link interventions (e.g. performance-based pay for teachers, private school vouchers) with learning outcomes, which Glewwe and Muralidharan (2016; 655) associate with "a sharp increase in the … quality of empirical research in developing countries." Proponents further claim RCTs "shed light on possible interventions and policies that could be employed to address the accountability and incentive problems facing schools in developing countries" (Mbiti, 2016; 128).

In most RCTs, accountability is not measured directly but is rather inferred from improvements in learning outcomes. Thus, one assumes that an intervention creates accountability if there is a measurable increase in learning outcomes. While emphasizing effectiveness and policy relevance, this approach also creates conceptual ambiguity as the approaches to accountability employed have little in common: private school vouchers, teacher incentive pay, and school-based management programs all target different actors and employ different incentives.

A further shortcoming with RCTs is that results from the same intervention often differ across contexts (Pritchett and Sandefur, 2015). This tendency is illustrated in a review of 19 results from RCTs of demand-side interventions aiming to increase test scores, in which Muralidharan and Glewwe (2016; 676) identify 11 positive, significant results versus 12 non-significant or negative results. Many well-designed interventions produce null results (Banerjee et al., 2010; Cullen et al., 2006; Muralidharan and Sundararaman, 2015) or results disappear as the intervention scales up (Das et al., 2013).

The emphasis on accountability through incentives extends beyond RCTs to literature more explicitly advocating for privatization. Most notably, Tooley (2007), uses the concept of accountability to argue for the introduction of for-profit schools in India, arguing

> for-profit schools would be beneficial for the poor, given that they are, *ex hypotheses*, providing a higher quality education, through greater accountability to parents, than the government alternative (Tooley, 2007, 331).

Thus, privatization and accountability and quality are posited as links in a causal chain that ultimately leads to student learning.

2.2. Studies of accountability processes and experiences

The second body of literature critically examines the processes and mechanisms of accountability, offering explanations of why models based on rational choice often poorly correspond to empirical results. Classically, Hirschman (1970; 44–45) illustrates the tensions between exit and voice as accountability mechanisms:

> Suppose…public schools deteriorate. Thereupon, increasing numbers of quality-education-conscious parents will send their children to private schools. This "exit" may occasion some impulse

> toward an improvement of the public schools; but… this impulse is far less significant than the loss to the public schools of those member-customers who would be most motivated and determined to put up a fight against the deterioration if they did not have the alternative of the private schools.

Similarly, many studies report dysfunctions and unintended consequences of accountability based on learning-outcomes, for example teachers alter content (teach to the test), and schools exclude students who might bring down test scores (Adams et al., 2009; Lauermann and Karabenick, 2011; UNESCO, 2014).

The literature proposes many conceptual models for accountability, identifying constructs such as horizontal, vertical and social accountability, and establishing links to underlying concepts such as participation, responsibility and trust (Ackerman, 2004; Dubnick, 2005; O'Leary, 2017). However, research on accountability is yet to coalesce around a well-defined conceptual model that applies in many contexts.

2.3. Synopsis of the literature

A key problem in the literature is not that these two approaches contradict one another, but rather that they are largely run parallel to one another: RCTs measure links between interventions and outcomes without ever measuring accountability directly; literature on accountability studies the processes and experiences of accountability extensively, but it has less direct evidence of its role in in influencing learning outcomes. This study therefore examines the links between the incentives, accountability, students' learning. We look at how the incentives entailed in different models of schooling (public, private, and hybrid) are associated with the accountability perceptions and behaviors of teachers and parents, and the extent to which these differences might translate to students' learning.

3. Methodology and data

Our study used an explanatory mixed methods design in which the qualitative component explains relationships established in quantitative analysis (Creswell and Plano Clark, 2018). Both components of the study drew upon a sample of 30 schools in each city, which yielded 27 participating schools in Mumbai and 30 in Kathmandu. We sampled schools using a stratified random sample with probability proportional to size (LaRoche et al., 2016), in which strata were defined by the type of school. Sampling weights, which were calculated post-stratification, allow for inference to the population of grade 4 students in each city. In Mumbai, schools consist of three types:

BMC Schools: Fully public schools run by the municipal government, the Brihanmumbai Municipal Corporation
Aided schools: Schools that receive grants, especially teachers' salaries, from the government but charge additional fees for facilities and supplementary teaching
Unaided schools: Non-profit private schools that meet all expenses through private funds.

In Kathmandu, schools were of two types:

Private Schools: Schools that raise all funds from private sources and include a range of nonprofit and for-profit models.
Public Schools: Also called "community schools," these are run on a decentralized model with a combination of funding from government, community and schools' own resources, but managed by the community.

3.1. Quantitative component

Quantitative data collection consisted of literacy and numeracy assessments administered to all students in their fourth year of schooling, with 9–12 items for each subject based upon the local curriculum. Assessment items were adapted from from the Trends in Mathematics and Science Study (TIMSS), the Progress in Reading Literacy Study (PIRLS) and locally available curriculum materials (IEA, 2013a, b). The items were selected to represent a range of difficulties in order to accurately measure students' abilities (with correct responses ranging from 93.3%–16.2% across all items, with a mean of 48.3 % correct), following a pilot study with a larger set of items administered to a group of 199 students (99 in Mumbai, 100 in Kathmandu) and consultation with teachers and curriculum experts. In addition to the assessments, students completed a simple questionnaire about household composition and assets. A random subsample of parents completed verbally administered questionnaires, which were matched to students' responses; these questionnaires focused on parents' interactions with the school, perceptions of accountability, participation in the school processes, and other social characteristics.

A summary of variables used in the analysis is presented in Table 1. While many variables are measured directly on the questionnaire (e.g. age, caste, gender), others were scaled from several items. Learning outcome scores were scaled using a Rasch model (Rasch, 1960; Rizopoulos, 2006), and an index of socioeconomic status was created from a principal component analysis of parents' income, education, and household assets. Finally, questions on accountability were scaled using confirmatory factor analysis to create measures of four key constructs:

Exit: Parents' belief that changing schools is an option, or a legitimate response to problems within the school (4 items)

Voice: Parents' belief that they have the ability to represent their views and make changes within the school (5 items).

Vertical Accountability: Teachers accounting for their performance or following the directives from a hierarchical authority (3 Items).

Horizontal Accountability: Teachers lateral accounting for their performance to other teachers, including sharing practice and peer observation (6 items).

Notably, we do not define a single construct of "accountability" because of the complexities of these different aspects of accountability, many of which are negatively related (e.g. exit and voice).

In addition to descriptive analysis, our primary methods of quantitative analysis are (a) multilevel regression analysis of students' assessment scores on individual and school level variables (Goldstein, 2011) and (b) a mediation analysis of accountability, school type, and learning outcomes (MacKinnon, 2008). The latter analysis specifically relates to Tooley's (2007) assertion that private schools offer "higher quality education, through greater accountability to parents, than the government alternative." This model effectively tests the hypothesis that differences in school funding result in different levels of accountability that translate into differences in learning. By tracing relationships between the antecedents of accountability (i.e. school funding models), the processes of accountability (i.e. perceptions and behaviors), and outcomes of accountability (i.e. students' learning), we seek to extend the RCT literature, which focuses primarily on inputs and outcomes.

3.2. Qualitative component

Qualitative data were collected through case studies in five schools in each country that were selected to represent a range of school types. In each case, semi-structured interviews and focus groups were conducted with the headteacher, teachers, parents, and governors (i.e. members of the school management committee or trustees), and local government officials, with 26 total individual and group interviews in Mumbai and 42 in Kathmandu. These interviews were conducted in the language of the respondents' choice, including Hindi, Nepali, Marathi and English, and they were translated during transcription. Questions

focused on respondents' conceptualization of quality in education (i.e. "What makes a good school?"), relationships between stakeholders in the school, processes for selection of teachers and governors, and mechanisms for ensuring quality. Additionally, field researchers collected field notes on the physical school facilities and interactions between students, parents and teachers.

Qualitative data were analyzed using open coding and thematic analysis (Thornberg and Charmaz, 2014), which also drew upon concepts of accountability established in the literature (e.g. vertical accountability, voice). Codes were applied through an iterative process, in which specific descriptive codes were applied to the data and then aggregated into broader concepts.

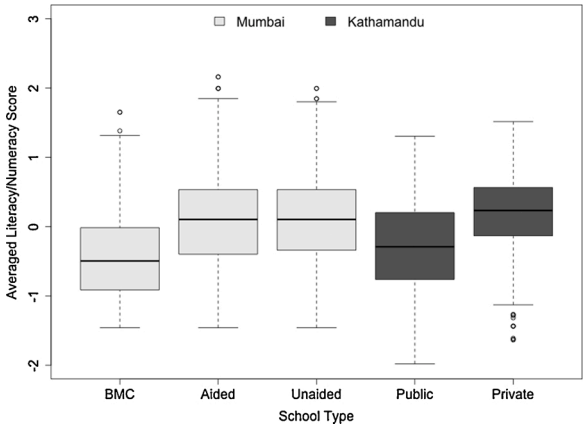

Fig. 1. Learning outcome differences across school types in Mumbai and Kathmandu.

4. Findings

4.1. Quantitative results

While differences in learning outcomes show higher scores for private and aided schools (Fig. 1), it is important to keep in mind that schools are substantially different in their socioeconomic, gender and caste compositions. Disaggregation of these variables is accomplished through the multilevel regression analysis presented below, in which these differences attributed to school type are shown to be negligible.

Similarly, differences in the four aspects of accountability differ substantially across school types (Fig. 2). However, the pattern of variation is more complex and differs for each aspect of accountability. As one might expect, accountability through exit is higher in schools that charge fees (i.e. private schools in Kathmandu, and aided/unaided schools in Mumbai), as parents have the option to change to another fee-charging school or to the public sector. In contrast, parents in public schools likely have fewer alternatives and therefore cannot use exit as a form of accountability. Voice follows a similar pattern, although wide variation in public schools in Kathmandu shows that high levels of voice are possible within public schooling, which is substantiated below in qualitative data on the dynamics of School Management Committees (SMCs).

In contrast, vertical accountability is higher in the public sector in

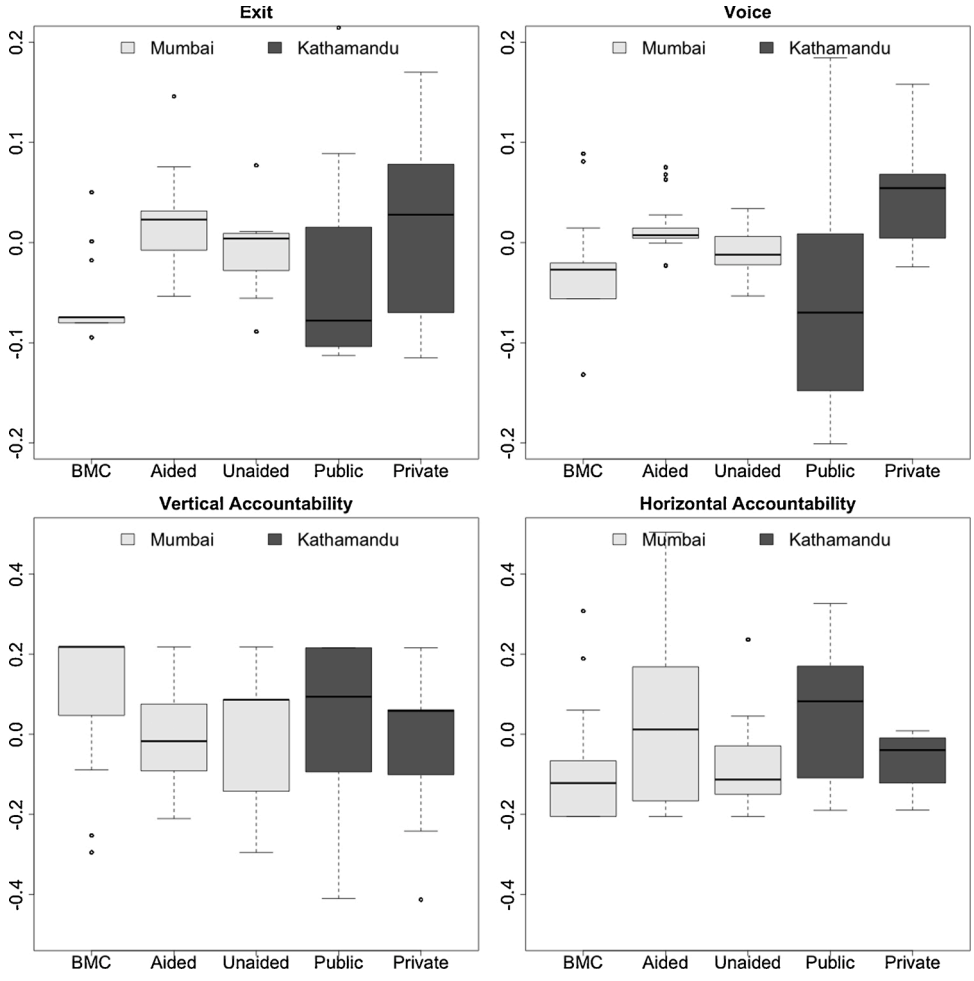

Fig. 2. Accountability variables across school types in Mumbai and Kathmandu.

both countries, which likely reflects forms of accounting to the state and government authorities. Horizontal accountability is distributed differently in each context: in Mumbai it is highest in aided schools while in Kathmandu in public schools. These results suggest that practices of horizontal accountability (e.g. sharing practice, peer feedback) may be more driven by organizational culture than through funding models.

Scatterplots of the relationships between accountability variables and learning outcomes (averaged at the school level) show moderate associations, with statistically significant correlations running from 0.173 to 0.313 (Fig. 3). This exploratory analysis presents a *prima facie* case that accountability mediates the effect of school type on learning: school types are associated with different levels of accountability, and accountability is associated with learning outcomes. However, these relationships may be confounded by other factors such as socioeconomic status and gender. To fully understand the set of relationships requires a more sophisticated set of analyses that consider these confounding variables.

Table 2 presents results from three multilevel regression analyses, with students' combined score as the dependent variable. The first two columns present results from Mumbai and Kathmandu independently, and the third model pools the dataset. Pooling creates a larger sample in order to improve estimates of variables that are shared in the datasets (specifically accountability variables), but it is difficult to interpret as school types are somewhat incomparable across contexts.

Results show that demographic variables have the strongest association to learning outcomes. In Mumbai, the student's SES, gender, and children's age are related to learning outcomes, with girls showing better scores on the assessment, while in Kathmandu only the average SES in the school is associated with learning outcomes. Both models include categorical variables for caste and home language that are omitted from output due to the large number of categories. Interestingly, only one level of caste or language in both locations is significantly related to learning: the Tamang ethnic group in Kathmandu receive significantly lower learning scores than all other groups in the study. However, including these variables explains variance that might otherwise erroneously be attributed to the type of school.

The relationship between accountability variables and learning outcomes is inconsistent in the two locations. In Mumbai, both vertical accountability and voice are associated with higher learning outcomes, but not in Kathmandu. To ensure that these results are not due to a few influential schools, we analyzed the influence of each school using elaborations of Cook's distance for multilevel models (Nieuwenhuis

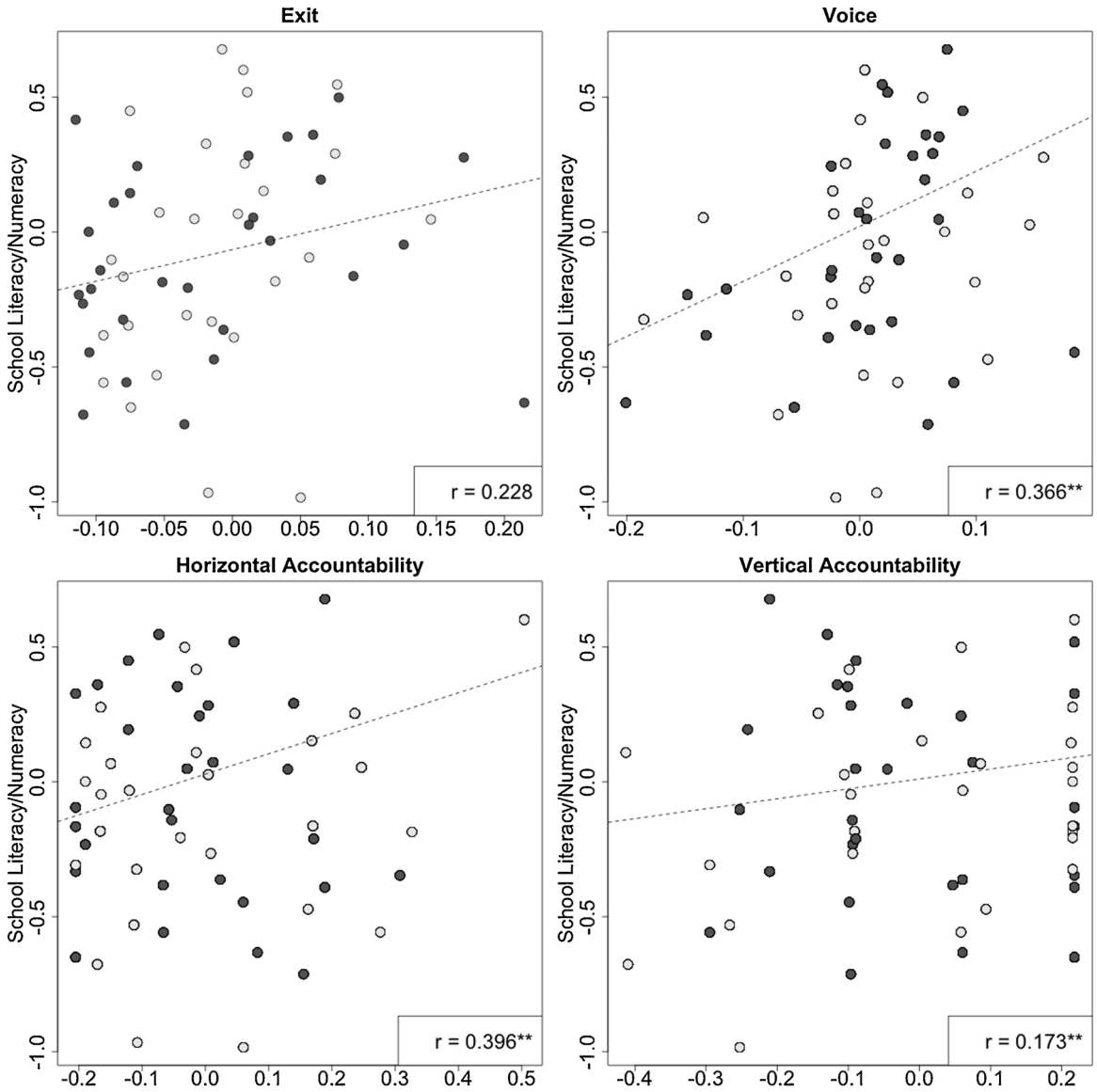

Fig. 3. The relationship between accountability variables and learning outcomes. Correlations are shown in the lower righthand corner, with asterisks denoting significance at the 0.05 and 0.01 levels.

Table 2
Multilevel regression results for Mumbai, Kathmandu, and the pooled dataset.

	Combined Learning Score		
	Mumbai	Kathmandu	Pooled
Socioeconomic Status (SES)	0.183**	0.105	0.166**
	(0.070)	(0.112)	(0.059)
Gender (Ref. Female)	0.181***	0.006	0.122***
	(0.046)	(0.060)	(0.037)
Age	0.095*	−0.044	0.013
	(0.039)	(0.026)	(0.023)
Mumbai School Type (Ref. BMC)			
Aided	0.383*		0.314*
	(0.187)		(0.156)
Unaided	0.358		0.189
	(0.203)		(0.173)
Kathmandu School Type (Ref. Public)			
Public			−0.081
			(0.277)
Private		0.112	0.147
		(0.145)	(0.288)
School Average SES	0.331	0.894*	0.517*
	(0.268)	(0.367)	(0.216)
Exit	−1.878	−0.593	−0.788
	(1.339)	(0.605)	(0.621)
Voice	4.482**	0.280	1.008
	(1.606)	(0.527)	(0.611)
Horizontal Accountability	0.433	0.404	0.398
	(0.351)	(0.384)	(0.266)
Vertical Accountability	1.127***	0.258	0.514*
	(0.390)	(0.275)	(0.246)
Groups	27	30	57
Intercept Std. Dev.	0.191	0.099	0.181
Observations	840	392	1,232
Note:	*p < 0.05; **p < 0.01; ***p < 0.005		

et al., 2012). This method identifies two high leverage schools, but running the regression with these schools' data omitted produces very similar results, with significant results for both voice and vertical accountability. We also found that when any of the three types of school was omitted (e.g. the regression was run without BMC schools), results were unchanged, which suggests the relationship between accountability and learning outcomes is not attributable to the school type.

We further examined the relationship between accountability and learning with a mediation analysis, which tests hypotheses associated with the causal model in Fig. 4. This approach is rooted in Baron and Kenny's original work on mediation analysis (1986), using a recent implementation by Tingley et al. (2014). In essence, an underlying cause *X* (i.e. school funding type) is related to an outcome *Y* (learning assessment scores) because *X* causes an intermediate variable *M* (one of the four accountability variables), which in turn causes *Y*. This process is called the *indirect effect* of *X* on *Y*, because it operates through *M*. Conversely, the direct effect of X on Y (indicated by *c* on Fig. 4) occur through the mediator. In practice, the effect of X on Y may be partially mediated, so that some occurs through M and some directly (MacKinnon, 2008). By analyzing data on all points of the causal pathway, we seek to extend the literature beyond RCTs that concentrate mainly on interventions (X) and outcomes (Y) but leave accountability itself (*M*) unmeasured.

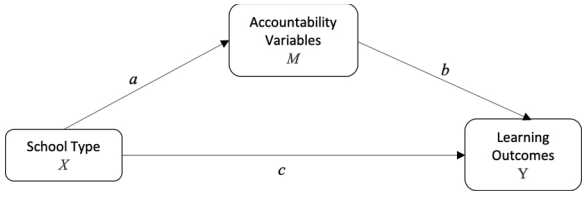

Fig. 4. Mediation model variables and pathways. Accountability variables are the moderator and school types are a potential cause.

Table 3 shows results of mediation analyses corresponding to two pathways in the mediation model. In summary, there is little evidence of a mediation process. In all cases, the indirect effect is not distinguishable from zero, while the direct effect varies across contexts, consistent with the regression results above.

In summary, the quantitative analysis provides mixed evidence on the relationship between accountability and learning outcomes. Certain types of accountability (voice and vertical accountability) appear effective in one context, but not universally. However, support for the demand-side approach (specifically privatization) as a way to improve learning through accountability is very weak. We suggest that these results are largely due to the composition of variance: in both contexts (and generally in educational data), variation is mainly between students rather than schools, as shown in Fig. 5. In both contexts, the variation between schools (i.e. the intraclass correlation coefficient, 0.310 in Mumbai and 0.211 in Kathmandu) is much less than variation between students. Thus, the margin for improvement through school level factors such as accountability is limited, particularly when less changeable factors such as the school socioeconomic composition is taken into account.

In contrast, variation between students is substantial, even when ascriptive characteristics are taken into account. Thus, a more viable approach to improving learning may be through policies that work beyond schools and find innovative ways to support individual students.

4.2. Qualitative results

Larger policy contexts give rise to contrasting accountability relationships in the two research locations. While both share some degree of accountability related to markets, choice and private schooling, other relationships differ considerably. In Mumbai, hierarchical accountability to the state features prominently in both public and private schools, most evident in the reporting of copious amounts of data to government information systems. In contrast, in Kathmandu hierarchical relationships are embedded mainly within the school through relationships between the headteacher and teacher, while the school management committee (SMC) plays an active role in oversight.

4.2.1. Vertical accountability

Interview participants in Mumbai spoke at length about the Saral Portal, a comprehensive information management system that must be continually updated with data on students, teachers and school infrastructure. Teachers also assess the students based on the three subjects (English comprehension, math, and the language of instruction) at three points in time, and submit this information online. In addition, the state

Table 3
Mediation analysis. Direct effect corresponds to pathway *c* in Fig. 4. Indirect refers to the mediated effect (pathways *a* and *b* in Fig. 4).

	Mumbai			*Kathmandu*			*Pooled*		
	Direct	Mediated	Total	Direct	Mediated	Total	Direct	Mediated	Total
Exit	0.516*	−0.077	0.439*	0.176	0.005	0.180	0.453* *	−0.027	0.426**
Voice	0.367	0.076	0.443*	0.134	0.047	0.181	0.395*	0.030	0.425**
Hor. Acc.	0.430*	0.014	0.443*	0.208	−0.027	0.181	0.405* *	0.021	0.425**
Vert. Acc.	0.463*	−0.024	0.439*	0.205	−0.017	0.188	0.435* *	−0.014	0.421*

*p < 0.05; **p < 0.01;

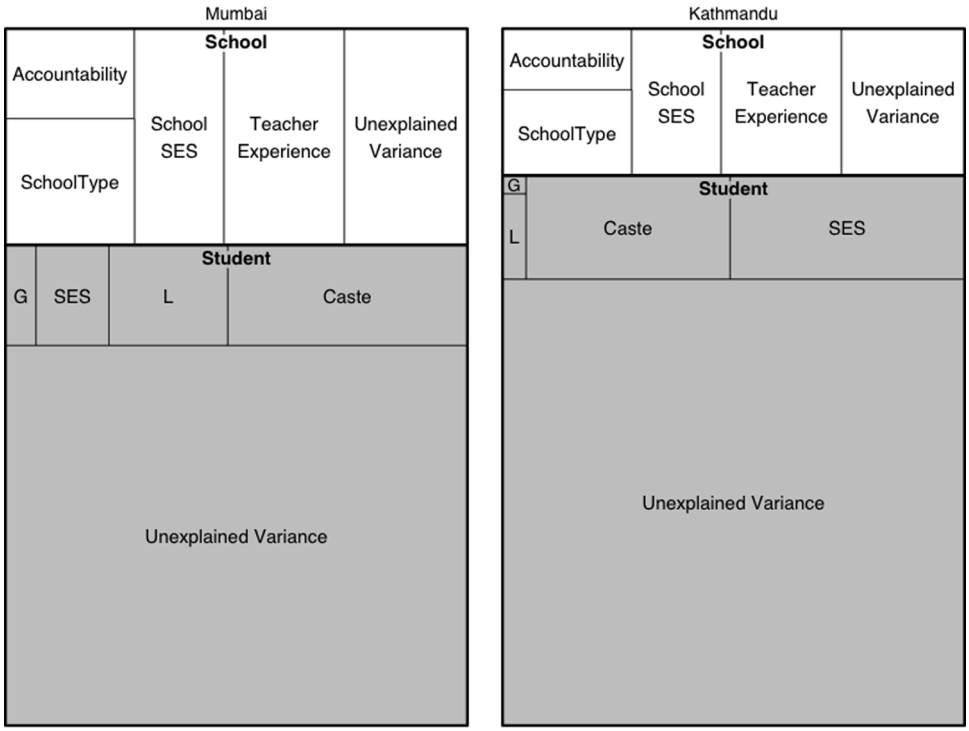

Fig. 5. Variance composition in Mumbai and Kathmandu. G indicates gender and L indicates language. The separation between the white and grey areas is based on the intraclass correlation coefficient of 0.310 and 0.211 in Mumbai and Kathmandu.

government has developed 25 *nikash* points (checkpoints such as attendance, reading, mathematical operations, etc.) to assess students' age-appropriate development, which must be entered online. One teacher at a BMC school summarized the information that must be compiled and entered online as follows,

> On a daily basis, we have to prepare a lesson plan that describes what a teacher teaches on which date and the teaching aids that would be used in the teaching process… Daily attendance is the second document which the teacher has to prepare…. there are a number of documents which are prepared for the school, i.e. the General Register, Activity Register, Scholarship Register…. The Government provides 24 items, such as bags, shoes, etc. to the students. That record is managed by the teacher. This process continues for the whole year….A teacher has to make a monthly student detail sheet …to maintain a record whether students come to school or not. One teacher has to handle the mid-day meal records and fill online information. Thus, the teacher is not able to give much time to teach children.

While structured and hierarchical data reporting is at odds with the autonomy and flexibility espoused in a demand-side focus, a teacher of another BMC school describes the effectiveness of information reporting in monitoring continual progress:

> If any student does not learn anything or gets a D grade in that year, the teacher has to make a 90-day plan where the teacher will give an extra one or two hours of attention to the student each day in reading, writing, and speaking. This plan should be completed within 90 days. The teacher has to do this activity for the student without giving any excuses. If the teacher cannot prepare the student, then the teacher cannot get a salary increment and they will be given a poor performance memo. This system was started three years ago by the beat officer [a municipal government official].

However, there is also evidence of some dysfunctionalities in hierarchical accountability as the administrative burden can become very high, sometimes detracting from the substantive work for which teachers are accountable. A teacher in an aided school noted,

> Now the teachers have so much work burden that they are not able to monitor the children and give one to one attention. This is because the administrative written work has increased. In addition to teaching we have to monitor the child's mid-day meals and see how they are eating, how many children have eaten, how many kgs of mid-day meal had come and collect all these details and send it online. This information has to be provided caste-wise in each class. The teachers have a lot of workload such as this.[1]

In addition, vertical accountability can open substantial possibilities for corruption. A headteacher in an aided school voiced this concern as well as a focus on accountability instruments ("papers") over the substance of education,

> There is a lot of corruption in the department and it is very blatant. Sometimes the officers in the department ask bribe directly..some others under the table… We are being demanded to submit the documents and comply with the requirements of the department, but there is no response in terms of supporting the school to perform better. So, the papers that we submit are shown as proof of matters happening smoothly in school by these officials, the inspectors and are taken as an excuse for not doing anything further to improve the schools and the education sector as such. These papers are seen as the ultimate proof for the functioning of the education systems, whereas there is no input from the department or government in improving the education.

In Kathmandu, the decentralized approach of community schooling (Carney et al., 2007) entails less vertical accountability of schools to the

[1] Quotes from interviews conducted in English are reported verbatim, including aspects of South Asian dialect of English or grammatical mistakes. When translated, interview quotes are translated into a standard English dialect.

government. Instead, vertical accountability is embedded within the school, particularly in teacher-headteacher relationships. In case study schools, performance contracts and other accountability instruments (e.g. logbooks and lesson plans) were used to create vertical accountability. Field notes from a community school in Kathmandu describe

> There is a logbook in the classroom to track the teachers' timing, the time at which s/he enters and leaves the class. Some teachers agree that because of this they are more punctual and focus on utilizing full time in the classroom.

The notes also describe the performance contract,

> All teachers have their signature on a performance contract, which says that in addition to teaching they will contribute to all the school's activities. According to the performance contract, all teachers have to use a logbook, prepare lesson plans, agree to classroom observation by the headteacher and school management committee, … regularly check assignments and give feedback, conduct co-curricular activities, and participate in school events.

Interview participants also identified some differences in vertical accountability between public and private schools, related mainly to the differences in job security identified in much of the literature on privatization (e.g. Tooley and Dixon, 2007). Thus, a private school headteacher noted that teachers in private school either "do or leave, they are supervised and monitored closely so that they are accountable to the headteacher and school administration." In contrast, a parent in a public school described how job security leads to poor performance

> Most of the teachers in public schools are in a permanent position, they are qualified and trained, I have no question about their knowledge and skills, but their knowledge and skills are not being transmitted into the classroom…. They lack commitment and professionalism; maybe due to…'job security'. There's no job security in private schools but teachers are doing good job"

Overall, the qualitative data show how vertical accountability can be effective in increasing teachers' attention on students' learning, but also suggest that it can become overbearing and counterproductive.

4.2.2. Voice

In both contexts, the SMC is a key body for providing community voice. In India, the SMC is required by the 2009 Right to Education (RTE) Act in schools receiving government funds (i.e. BMC and aided schools), with three-quarters of seats held by school parents, including at least 50 % women and proportional representation for disadvantaged backgrounds. Private schools generally utilize other forms of governance, for example a board of trustees. In addition, schools utilize other forms of community participation such as parent-teachers associations (PTAs).

In Nepal, SMCs are required by law in both public and private schools. Membership is required to include parents (four in public, two in private) of whom half should be women as well as the headteacher, a teacher representative, and other community leaders or local government representatives. The decentralized nature of community schooling creates a particular importance for SMC, with a productive relationship between the SMC and headteacher seen as key to school performance. As explained by one SMC member,

> The relationship between the headteacher and SMC members should be like a needle and thread. The relationship should be clear, and there must be mutual understanding and effective coordination.

The possibility of and solutions to conflicts in this relationship are also prominent themes in data from Kathmandu. For example, field notes describe one SMC member who explained

> There are some factors that cause conflict between the headteacher and SMC like staff recruitment and other physical management, but such issues can be solved through communication and by conveying information at the right time. The issues are addressed by holding meetings and fully maintained documentation.

The notes also record an SMC member who reported that,

> Sometimes it is inevitable to get into minor arguments due to some differences in thinking, but such things are solved by mutual talking and understanding and trying not to let these conflicts occur in front of the other members of the school.

Thus, accountability of one party to another is seen as key to the functioning of the school, ensured through documentation and collaborative approach to school leadership.

Nevertheless, in both contexts, issues relating to SMC processes and the fidelity of policy implementation were prominent. For example, in Mumbai one parent in a BMC school reported that the headteacher "told me that she had added my name in the SMC… I was not aware about it for two months." Similarly, in Kathmandu a teacher in a public school reported,

> There is a huge gap between the words that we are told after making decisions in the SMC and the word used in the minutes. No teachers oppose decisions made by administration and SMC, most teachers won't oppose due to their gender, some new teachers lack courage to do so and the rest are influenced by the headteacher's leadership. A few of us felt that our voice remained unheard no matter how we opposed, and because of that I also stopped opposing.

Another difficulty is that meaningful participation in meetings is often seen to be lacking. As a headteacher in an aided school in Mumbai put it,

> The biggest challenge faced by the school is the lack of interest and/or participation in school activities. The parents' participation in Parent Teacher Meetings, as well as the SMC meetings is very low.

Furthermore, in both contexts, wider power relationships outside of school were clearly manifested within the SMC. Most notably, gender power relations were clearly manifested in SMC membership and processes in both research locations. In Kathmandu, despite policies stipulating that half of parent members are women, field notes from a public school indicate,

> Currently there are seven members in the SMC, but not a single female. According to the principal they are unable to find a suitable person for the female post; they are searching and hoped they would find one soon.

In contrast, interview participants described a gendered pattern of participation in which women attend most school meetings, as one SMC member in a BMC school in Mumbai expressed,

> I have talked with the headteacher about the frequent absence of other parents in the meeting. Mostly females come to meetings because the male members can't manage the time for the meeting from work. The meeting is kept at the time when parents come to drop the children at school…mostly women drop their children in school and so they attend the meeting rather than male members

Particularly in Kathmandu, the external influence of party politics on SMC was clear. For example, a public school headteacher explained

> In public schools, party-based politics has a great influence on the SMC formation, which in turn influences the selection of the headteacher and teachers. An unstable government, poor policy and no monitoring from the government level also influence the school system.

Experience from private schools also highlights the complexities of voice. While private schools are often argued to provide accountability through parent's consumer power, parents at an unaided private school in Mumbai did not find this to be the case. Field notes describe,

> Parents when asked why they are not raising their issues about the large strength and lack of space in classrooms, etc., they said that the administration told them that they can leave the school if they have so many issues/ problems. The parents feel that this is the situation in every school and at least their children are getting good education here.

Thus, our data show that accountability through voice is a prominent feature of schooling in both research contexts. However, creating a forum for community voice does not necessarily guarantee participation, and, even when present, authentic community voice necessarily carries with it the politics (and Politics) of the wider social context. Rather, data illustrate Hirschman's view of voice as a "messy concept" (p. 16) due to its entanglement with social marginalization (i.e. gender), politics and power relationships between teachers and headteachers. These findings also offer some explanation for experimental studies that find interventions to increase participation "had no impact on community involvement, teacher effort, or learning outcomes inside the school" (Banerjee et al., 2010, p.1), as complicating factors and pervasive social relationships seem likely to limit these intended outcomes.

4.2.3. Policy and reciprocal accountability from the state

In both contexts, respondents indicated that policy commitments from the state were not met. While a common approach in the literature is to discuss the "short" and "long" routes to accountability, meaning accountability of schools to parents directly, and to public through the government (e.g. World Bank, 2003; Gershberg et al., 2009), the reciprocal commitments of the government to schools is often not considered.[2] The main concern voiced in both locations was around the inability to obtain staffing resources, particularly additional teachers, despite commitments defined in policy. For example, one teacher in Mumbai noted how provisions in the RTE Act are often not met:

> According to RTE, one of the first points is that the teacher to student ratio is 1:30. It is useless to implement the rest of the points without implementing this point. Under RTE, the department is trying to implement everything else other than a 1:30 ratio. They are forcing us to implement RTE with regard to what teachers can do, but they are not doing what they can do.

Headteachers in Kathmandu voiced similar frustrations with unfilled teaching positions, leading one respondent to remark, "the government itself does not follow rules and regulations but requires us to do so; the government should fulfill its own responsibility first." Interestingly, a headteacher in a private school also noted that more government support should be forthcoming,

> The government is not providing any support to the private sector in education. Private schools are registered under the Company act of Nepal and are paying tax regularly, but the government offers no support to this sector. The government needs to support the private sectors in education as it is contributing to society.

Similarly, respondents in both locations noted problems that arise from the use of part-time teachers as a solution to staffing shortages. In Kathmandu, these are described as "helmet teachers" because they are often seen with a motorcycle helmet, required to commute to several schools within the day, with an SMC member acknowledging "we can't expect quality from such teachers."

In Mumbai's private aided schools, all teachers are first hired as *shikshan sevaks* (apprentice teachers) on probationary contracts of three years, during which their salary is limited to 6,000 Indian rupees (approximately $80 USD) per month. After completion of this probationary appointment and passing a Teacher Eligibility Test (TET), they are eligible for permanent appointment on government salary scales. However, the precarious and exploitative nature of the probationary appointment raises concerns, for example one teacher argued,

> This appointment of shikshan *sevaks* has to stop. The teachers are appointed as *sikshan sevaks* on contract basis, they are given 6,000 rupees per month for three years and meanwhile they have to pass the TET exam. After that they will be appointed as permanent teachers and they start getting the department stipulated salary which is the same as the salary received by the municipal school teachers. Three years is the probationary period. We have two teachers who have been appointed like that. 6,000 rupees is nothing nowadays and it is difficult for them to manage. They have to do all the work of a teacher, same as the other teachers but get paid only 6,000. That is an injustice to the teachers.

Interview participants further indicated that aided schools had difficulty obtaining clearance letters from the municipal government to appoint new teachers, even when required to maintain the class sizes stipulated in the RTE Act.

4.2.4. Poverty and out-of-school life

In both contexts, respondents' accounts point to a large and often overwhelming influence of life outside of school on students' education which include poverty, child labor, seasonal labor migration, and the social and environmental challenges of life in informal (slum) settlements. A teacher at a public school in Kathmandu described these challenges,

> Financially some of our students are so poor that they are not able to come to school regularly, at this age many are involved in jobs and support their family by generating income. Most of the students are working as domestic workers and some work in the street as cobblers or selling food and other things. A number of students have migrated to work in Kathmandu and regularly send money to their parents back at home.

Similarly, a teacher in a BMC school in Mumbai described how poverty at home impacts children's learning at school

> No two children have the same understanding and comprehensive skill but at the same time, they all have some very basic physical needs. When they come to school, some students come with an empty stomach. In such situations, students wait for the food which is being provided by the school at noon time. So, children hardly listen in class until then if they are hungry and they do things that they like or activities in class and out of class during the break.

Similarly, a headteacher in an aided school in Mumbai described how demands of seasonal migration, specifically parents returning to a village home outside the city for agricultural work, can disrupt education

> … there is an issue of absenteeism, especially after summer holidays. Many students do not turn up even one month after the reopening of the school. The reason is that the students go to their native [village], … it is the season for festivals and farming and the families return back to their work in Mumbai late… The children fall back in their studies and it becomes difficult for them to catch up on their lessons. The child does not acquire the learning required for that standard and the teacher exerts herself more than she should by taking remedial classes and so on.

[2] An exception is found in Dreze and Sen (2002, p. 174), who note "the issue is not just teacher accountability, but the erosion of accountability in the schooling system as a whole"

The challenges of out-of-school factors also intersect with other processes of accountability, and, indeed, a considerable amount of voice is dedicated to improving the school environment to a level where teaching and learning can function more effectively. For example, field notes from an unaided school in Mumbai recount,

> There was garbage being dumped near the entrance of the school. Parents complained about this one by one to the head teacher, but the head teacher kept ignoring the issue. Finally, parents raised this issue amongst themselves and they met the head teacher as a group and brought this issue up as it was harmful for the children who generally have to stand or wait for parents near this area. Later, upon putting pressure, the school took steps to solve the issue.

Importantly, qualitative data also attest to the influence of many factors not covered in the quantitative data, showing that our measurement of socioeconomic status is necessarily incomplete and will likely underestimate the disadvantages faced by students in public schools.

These factors also influence other aspects of accountability relationships. For example, a large amount of SMC attention focuses on behavioral issues or the nutrition and hygiene of schools' mid-day meals. One SMC parent in a BMC school described the typical content of meetings,

> Mostly they discuss the education of the students. Sometimes children don't come in school uniform, or they misbehave. They talk about the discipline which should be followed by the students and parents while the children leave the school or parents receive their children from school. Even about the food distribution in school, how it should be given to children on a daily basis and should not be stored in the school.

Thus, out-of-school factors influence both learning, in that there are multiple barriers to education well beyond those captured in survey data, and accountability processes, as a substantial focus of these processes becomes overcoming or ameliorating challenges related to the urban context and the complex, often impoverished, social environment.

5. Discussion

Our results make several contributions to the literature. First, we provide direct evidence of the relationship between accountability and learning outcomes; unlike RCTs, we analyze data on accountability perceptions and behaviors directly as well the models of school management and funding that might give rise to this accountability. We find evidence that some types of accountability (i.e. parental voice and vertical accountability) are associated with higher learning outcomes. However, this relationship appears to be context-specific (i.e. in Mumbai but not Kathmandu); it is therefore likely that different types of accountability will yield varying results across contexts. Thus, our findings problematize the argument that increased accountability through the incentives and sanctions suggested by a principal-agent perspective would increase learning in all contexts.

In particular, our analysis problematizes the possibility of private schooling as a way to improve learning through greater accountability (Tooley, 2007). We show that accountability perceptions and behaviors do differ between school types (public, private, and hybrid models), but they do not seem to translate into improved learning outcomes. While many studies report a "premium" from private schools (e.g. Singh and Bangay, 2014, p. 143; Ashley et al., 2014), suggesting that they add more value to students' learning, we find negligible differences between school types. We believe that this is because we analyze more variables on students' home and family backgrounds than other studies, and so can better control for the effects of socioeconomic status and school composition. Our results are also consistent with Muralidharan and Sundararaman (2015), who in an RCT of private school vouchers "find no difference between test scores of lottery winners and losers…suggesting that the large cross-sectional differences in test scores across public and private schools mostly reflect omitted variables" (p. 1012).

More generally, our results also raise questions about the "demand side" approach to improving learning. Our qualitative study highlights the organizational complexity of schools and interactions with their social contexts, including the ways in which accountability can become counterproductive. For example, requirements to report classroom activities and learning progress quickly become so time consuming that they eclipse the time spent on the learning itself. Similarly, voice is easily captured and distorted, and other accountability relationships (e.g. the accountability of the state to schools) are not duly considered.

A key limitation in the principal-agent approach is that it expects that teachers, schools and even schooling systems follow systems of incentives *in aggregate*, at least to the extent that deviation from expectations can be considered as statistical noise (Blau, 1997). Thus, by making a private school accountable to the demand-oriented forces of the market, it assumes that corresponding incentives will be translated to individual teachers.

However, rather than imperfectly approximating a set of dynamics, our findings raise the possibility that the principal-agent model more fundamentally misrepresents the relationships involved in school accountability. An analogy can be made with the double pendulum (also called a "chaotic pendulum"), which structurally resembles a simple pendulum, but involves a second arm (effectively a pendulum within a pendulum) that creates a complex and chaotic pattern of motion. Like the principal-agent model, the position and speed of a simple pendulum can be modelled with a relatively small set of variables (i.e. length and starting height), but this model does not yield even a vague approximation of the chaotic pendulum. Based on the complexities observed in our qualitative study, modelling the complex relationships of accountability in education as a simple principal-agent relationship seems broadly analogous to modelling the trajectory of chaotic pendulum as if it were a simple pendulum: while there are structural similarities, the underlying model is different (Fig. 6). This analysis would explain inconsistent results in the experimental literature noted in the literature review, in which similar interventions yield different outcomes across contexts.

Instead, our results support policies that focus on inputs to students rather than schools. Much economics literature tends to dismiss inputs such as schools and teachers as ineffective in improving learning. For example, Banerjee and Duflo (2011, p. 55) speak rather dismissively of the "supply *wallah*," equating a focus on inputs with the status of traditional occupations (e.g. the *chai wallah*) that increasingly appear archaic in contemporary India. However, the experimental literature itself suggests that a focus on inputs, particularly to individual students, may hold great potential to promote learning. For example, Glewwe and Muralidharan (2016, p. 690) show that *all* RCTs involving new school construction, additional teachers, textbooks, and school meals yielded positive results. Our results corroborate this evidence by demonstrating the limited margin for improvements in learning through accountability, particularly in comparison to the large amount of variance that occurs between students rather than schools as illustrated in Fig. 5. Given the limited amount of improvement that would be possible by improving accountability, the large variation between students, and evidence on the wide range of individual challenges they face (e.g. seasonal migration, hunger, and difficult living environments) policies that offer inputs such as meals, individual tutoring, and supplementary education may be a productive way to improve learning outcomes in these contexts.

5.1. Limitations

Our study inevitably suffers from limitations that should be considered in interpreting our results. Most notably, a cross-sectional design could be critiqued as a poor way to assess the value added by different types of schools. In essence, our model assumes that students in different

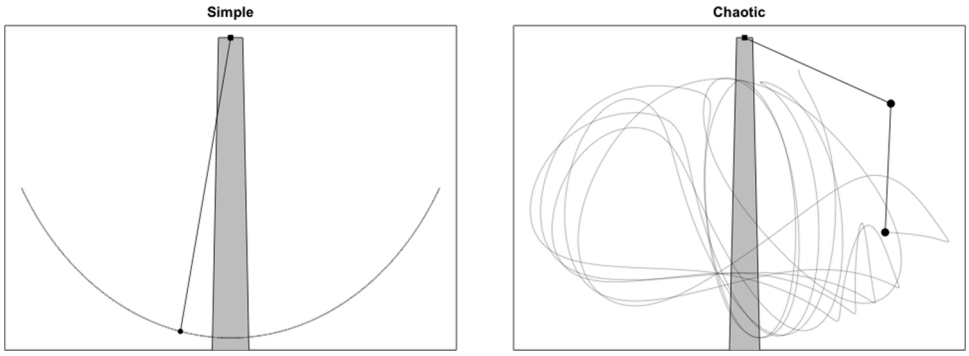

Fig. 6. Differing trajectories of a simple pendulum (left) and double (or chaotic) pendulum (right). The path of motion of the pendulum over time is shown as a light gray line. The trajectories show how additional linkages or relationships can fundamentally alter the dynamics of a system, so that simple model no longer approximates more complex situation.

school types enter school with equivalent abilities in literacy and numeracy, and our analysis attributes differences in their abilities in year four to the type of school they have attended (conditional on covariates such as socioeconomic status, gender and caste). Of course, students begin school with large differences, but a reasonable assumption is that these would be biased higher in private schools, particularly given that time invariant aspects of socioeconomic status are higher in these schools. Thus, our statistical models will tend to *overestimate* the value added by private schools by assuming students in these schools start at the same level as their counterparts in public schools

In addition, our primary outcome variables - literacy and numeracy abilities - are narrow and imperfect measures of the learning that happens in schools. While our outcomes are an appropriate basis to contribute to discussions on the "learning crisis" (UNESCO, 2014; World Bank, 2018), they do not capture the wider range of educational enrichment and acculturation opportunities at elite private schools (Kenway and Koh, 2015).

Finally, our sample, particularly at the school level, may not have the statistical power to reliably identify some relationships between variables, particularly if they are rather weak in relation to variance in the data. This is particularly true in the mediation analysis (Table 3), in which parameters are estimated from a system of equations. However, our results suggest estimated parameters center quite squarely on zero, with none of the mediated effects approaching statistical significance at even marginal levels. It is therefore unlikely that a larger sample would meaningfully alter findings, particularly in terms of practical relevance.

6. Conclusion

This study contributes to literature that focuses on the accountability of teachers and schools as a way to improve students' learning of basic literacy and numeracy skills in low-income countries. We seek to answer two questions: The first is whether greater accountability of teachers and schools is likely to increase students' learning. We start with the observation that accountability is a multifaceted construct that actually involves competing forces (e.g. exit and voice) but find that aspects of accountability are linked to learning outcomes in some contexts. The second question concerns creating accountability through approaches to schooling that focus on the demand for learning, rather than inputs. In this case, differences in accountability are easily associated with models of private schooling, but there is no evidence that these differences are translated into students' learning.

These findings suggest several directions for future research. First, we suggest that in RCTs that have previously focused on interventions and outcomes, a greater focus on mediating variables and qualitative data would help to substantiate the causal relationships that this line of enquiry seeks to identify. Second, our analysis suggests a reconsideration of inputs, particularly to students, as a way to improve basic skills in literacy and numeracy. Following Pritchett's (2013) argument that "schooling ain't learning," a focus on students' lives outside of school may do more to improve their performance in school than reforms to accountability in schools. More fundamentally, our analysis raises the possibility that accountability relationships in schools cannot be modelled in terms of relatively simple models such as the principal-agent relationship. Attempting to impose a simple model onto a much more complex and chaotic system may lead to an inconsistent research base and miss opportunities for deeper understanding.

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Declaration of Competing Interest

None.

Appendix A. Supplementary data

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