Social Relations as Predictors of math achievement in Kenyan primary schools

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Abstract

This study examined how variations in key aspects of social relations among teachers, students and parents, affect achievement in mathematics among sixth graders in 70 schools in six districts in Kenya. We modeled mathematics achievement as a function of measures of social perception and support while adjusting for school-, classroom- and student level characteristics. We found that net of teacher subject knowledge and background characteristics, teachers who display commitment to teaching by always correcting homework and keeping students engaged during math lessons had students performing better. Teacher absenteeism, lack of interest in teaching, lack of parental involvement in the classroom also had negative effects on grades. The level of social engagement of principals measured by supervision of teachers, good interpersonal interactions with parents had positive effects on achievement. Schools where parents provided material and financial support had better grades, while student delinquency and absenteeism negatively affected grades.

1.0 Introduction

Explanations of academic achievement, like most explanations of wellbeing are naturally multifaceted. Theories formulated around academic achievement encompass various dimensions of student interactions including school, family, community and social factors (Pena 2007). At the individual level, there are explanations bordering on both biological and social cognitive aspects of learning, delineating how human agency explains academic achievement (Bandura, 1996). Home-based explanations emphasize the importance of factors such as parental socioeconomic status, family size, family structure; and socio-psychological aspects of the home environment such as the quality of parent-child relationships, parental expectations and support. School-based explanations, in contrast, emphasize factors such as school spending, quality of physical infrastructure and human resources, class size, and school- family, community, government interactions. At community level, contextual factors, for example, neighborhood effects, community involvement in school programs, civic engagement, community socioeconomic status, residential stability and ethnic diversity have been found to be associated with academic achievement (Ainsworth, 2002; Coleman, 1988). Even at larger aggregate levels, countries' economic status, gender socialization, kinship structure, and other cultural factors potentially explain differences in academic achievement (Heyneman and Loxley, 1983). Social predictors of achievement have also been posited and investigated widely; for example, social capital as a key predictor of schooling achievement (Bryk and Schneider 2002; Lin, 2001; Putnam 2000; Portes 1998; Colemen 1988; Bourdieu 1986).

In this paper, we focus on attention on the social elements of achievement and investigate how variations in social relations and perceptions among teachers; between teachers and students; between principals, teachers, parents and students affect achievement in mathematics among sixth graders in 70 schools in six districts in Kenya. Thus we model mathematics achievement as a function of such measures as social perception, support and controlling for school-, classroom- and student level background characteristics. We broadly define social relations as the interpersonal relations, and the quality thereof, that the principal actors in schools (students, teachers and parents) experience, which affect learning and performance. Specifically, we are interested in understanding the contributions of intangible resources embedded in the social relationships in school settings such as commitment to obligations, support, attitudes and discipline between key actors, which affect academic achievement.

Beginning with the seminal works of Bourdieu (1986) and Coleman (1988) on the role of social capital in education, studies have shown that shared values and reciprocity in the areas of respect, responsibility, trust, honesty and commitment in social relations in schools, affect schooling outcomes. The quality of expectations and exchanges existing between school principals, teachers, students and parents generate collective good which affects the success of students (Coleman 1990). Schools that build relationships grounded on high quality interpersonal relationships and support tend to facilitate academic success (Goddard 2003; Goddard et al. 2001). Studies have shown that the effects of harnessing social skills within the classroom, for example in the use of

cooperative learning techniques and skills that sustain student engagement are significantly related to learning (Gibbs 1995). Besides, studies have demonstrated that parental involvement in school activities and in their children's academic work is positively associated with school achievement (Horvat, Weininger and Largeau 2003; Adams and Christenson 2000; Adams and Christenson 1998; Ho Sui-Chu and Willms 1996). In addition, previous research has shown that the quality of students' peer relations affects academic orientation and performance (Wentzel and Watkins 2002; Welsh et al. 2001; Wentzel 1998; Wentzel and Caldwell 1997). The social experiences of school children shape their attitudes towards school, their motivation to engage in school activities and their determination to apply themselves to the demands of schooling.

However, little is known about the linkage between schools' social and academic performance in sub-Saharan Africa; and specifically in the context of Kenya. In Kenya, studies have examined effects on primary school academic performance of school inputs such as textbooks, incentives (Glewwe et al. 2007; Kremer et al. 2007), neighborhood violence (Mudege et al. 2008) and socio-economic status (Onsomu et al. 2006; Hungi and Thuku 2010). Duflo and colleagues (2009) examined the impact of peer academic performance on peers of first graders in a randomized evaluation of a tracking system and found that high achieving students maintained their higher performance while low achieving students indirectly benefited from tracking through their teachers teaching at a level more appropriate to the students. Muola's (2010) study of eighth grade students in Machakos district in Kenya found that student motivation for academic achievement was associated with home background predictors, essentially parental socio-economic status

(SES); further evidence for the SES gap in achievement observed in earlier studies. Onsomu and colleagues (2006) document that most low SES parents in Kenya show little or no interest in their children's school work, let alone their schools. In settings like Kenya, where there is limited financial and human capital, it is important to further examine how social elements in schools may serve to promote or undermine human capital formation. As such, this study contributes, not only to the larger theoretical and empirical discourse about the effects of social predictors but also to the empirical literature on academic achievement in sub-Saharan Africa.

2.0 Method

The major research question guiding the analysis in the paper relates to whether in the context of Kenyan schools, social relations within the classroom and between schools and parents, matter for student achievement. Specifically, we sought to investigate whether 1) teacher characteristics, particularly, teaching style, interactions with the principal, attitudes towards other teachers, students and parents affect the average performance of the class; 2) parental involvement in school affairs, teacher commitment and student discipline matter for academic performance at the school level; and 3) whether students' attitudes towards other students, teachers and the school environment in general, affect their academic performance.

Like many studies examining the associations between social relations and schooling outcomes, we use proxy variables to capture notions of social perception and support

between key actors in schools. While our definition remains debatable, most researchers broadly agree that the scholarship has struggled with definitions as well as with the operational measures of social constructs (Portes 1998; Sandefur and Laumann 1998). Measures of social predictors in studies are not necessarily uniformly accepted, but generally lead to similar conclusions. For example, Grootaert and van Bastelaer's (2001) review of the construct of social capital conclude that using proxy variables does not diminish the validity of construct, especially where little systematic empirical work pertaining to the definition exists for schools. Thus, in this study, the proxy variables we used only attempt to measure social perceptions between teachers and students; between teachers and parents; between the principal and teachers; principals and parents; among students and among teachers.

2.1 Data Description

The empirical analysis presented in this paper are based on data collected in 2009 from a random sample of 70 schools in 6 districts in Kenya, under a project funded by GOOGLE.org and implemented by the Education Research Program of the African Population and Health Research Center. Overall, there were 2388 sixth grade students with an average of 34 per class, 70 mathematics teachers and 70 principals involved in the study. The sample was stratified on the basis of the performance of the school over the preceding four years in the standardized examinations conducted at the end of elementary school (8^{th} grade) in Kenya. Schools were randomly selected from the top 20 percent and bottom 20 percent of the school rankings. Separate questionnaires were

administered to students, teachers and principals. In addition, mathematics tests were administered to both students and mathematics teachers in each school. Classroom observations and video recordings of mathematics lessons were also conducted. These data include demographic background characteristics of teachers, teacher qualifications and training, teaching styles, attitudes towards mathematics teaching, other teachers, students and the principal. Likewise, students and principals were asked about their socio-economic backgrounds, attitudes towards various dimensions of school, family and community interactions. Of primary interest are questions principals were asked about parental support and involvement in school affairs, their perceptions about student discipline in their schools and teachers' commitment to work.

2.2 Key Variables

The dependent variables in our analyses are the average math achievement scores of the class and the students' individual math test scores. The math test was prepared by experts in education in consultation with research staff of the Kenya Institute of Education. The test was designed to examine cumulative numeracy skills and covered number concepts and operations, patterns and algebra, measurement, geometry and statistics. The raw scores were transformed to range from 0 to 100 percent. The average class score was calculated as the arithmetic mean for each class.

As mentioned earlier, this study uses a number of proxy variables to capture the effects of social perceptions and support between actors in schools. The specific variables used for

the analyses, together with their coding schemes are presented in Table 1. The distributions (means, standard deviations, minimum and maximum values) of the coded variables (including control variables) are further presented in Table 2. The proxy variables used for teacher-student, teacher-teacher, teacher-principal and teacher-parent interactions are: whether the teacher often gives individual attention in class, extent to which the teacher keeps class engaged (derived from the classroom observation data, subjective assessment), whether principal watches teaching often/sometimes in class, teacher perceptions of problems with student discipline and social behavior (measured as an index with higher values indicating more delinquency), whether the teacher perceives problems with teacher absenteeism in the school, problems with teacher knowledge and interest in the school, and whether there is a problem with parental involvement in class. These variables indirectly measure teacher commitment to students, and connectedness with other teachers, principal and parents.

Variables relating to principals' own interactions as well as perceptions about teachers, parents and students include the following: principal watches teachers often/sometimes (self-report), principal knows at least three quarters of families, percentage never given homework in school, a parental support/involvement index (see Table 1 for questions included in deriving the index – higher values mean better support and involvement), principal thinks parental involvement is very important, teacher apathy index, and perceived student delinquency index (higher values in both teacher and student indexes indicate more apathy and delinquency).

Student achievement is a function not only of the student's ability and teaching quality but also of the interaction with other student and the school environment in general. As such, the proxy variables used to capture social perception from the student's perspective capture whether teachers never hurt students in the school; teachers always correct homework; and whether students often hurt each other in the school. The remaining variables in Tables 1 and 2 are control variables or capture some background characteristics of the key actors in the models.

2.3 Analytic Techniques

Modeling the effects of parent, student, teacher and principal characteristics on student achievement involves the use of data at multiple levels – there are data on individual students, a number of whom share the same teacher or attend the same school. The hierarchical structure lends itself to multilevel modeling to avoid underestimating standard errors of regression coefficients. However, principally, because we are interested in a relatively large number of independent variables, our use of multilevel regression techniques is constrained by the limited number of teachers and schools sampled, which present problems with statistical power. Our approach was to run a series of Ordinary Least Square (OLS) regressions at the classroom- or teacher-level using the mean score of the class as the dependent variable. In addition, we estimated an OLS regression model for school effects using the principals' responses about teachers, parents and students. Lastly, we run a multi-level random effects model using the raw student

scores as the dependent variable and included student-level, teacher-level as well as school-level explanatory variables.

Results

Table 3 reports the results of estimating the effects of teacher math test performance, teacher characteristics such as gender, socioeconomic status, length of experience teaching math, teaching style and other perceptions of social relations in the classroom. In model 1, we observe a positive and statistically significant association between teachers' math performance (subject knowledge) and the average score of the class. This association remains significant after controlling for teacher background characteristics in Model 2 but is rendered insignificant after controlling for teaching style in Model 3; implying that teaching style mediates between teacher subject knowledge and class performance. Teachers who often give individual attention to students and keep their classes engaged tend to have better student performance. These effects remain significant after controlling for teacher perceptions of social relations in the school and school characteristics. Teacher perceptions about key actors in the school and classroom are significantly associated with class performance – where teachers often have class visits by the principal and assess other teachers to be generally interested in teaching, students tend to do better in math, whereas perceptions of problems with student indiscipline, teacher absenteeism and parental involvement in class are negatively associated with grades. These differences in perceptions between teachers in schools explain a substantial proportion of the variation in class performance (adjusted r-squared difference between Models 3 and 4 is 0.36) and the effects only weaken a little in the final model that

controls for school characteristics. The above analyses which capture classroom effects invariably also measure differences in schools since each class represents a school in our sample. However, in order to further examine the effects of other school-level determinants of math grades, we run additional OLS models using principals' views about their schools. These results are presented in Table 4.

The results in Table 4 show that higher school average math scores are associated with schools where principals often supervise and interact with teachers; where principals know at least three quarters of the families in the school; where there is parental financial or material support and involvement; and where the principal values parental involvement. On the other hand, in schools where teachers are not committed to work and students are delinquent, grades suffer. At the school-level, however, the key drivers of math performance are whether or not the school was already doing well academically in the preceding four years of the survey and whether it was a private school.

In the student models (see Table 5) we find that student background variables and school characteristics and environment matter for academic success. Student absenteeism and delinquency (students often hurting each other) negatively affect grades, while positive habits such as reading often, having a supportive and caring teacher (teachers who never hurt students and always correct homework), belonging to a school where parents are supportive, and where the principal interacts with parents often, tend to be positively related to academic performance; controlling for other school characteristics.

Summary and conclusion

The purpose of this study was to examine factors that explain sixth grade math achievement in Kenya, focusing specifically on the role of social relationships between key actors in schools – teachers, principals, students and parents. The empirical evidence presented in this paper suggests that social perception and support between teachers, students and parents in schools contribute significantly to math achievement in Kenya. Positive social relationship helps school to maintain an environment where learning is enhanced. Specifically, we found that net of teacher subject knowledge and background characteristics, teachers who display commitment to teaching by always correcting homework and keeping their lessons engaged had their students performing better in math. Teacher absenteeism and lack of interest were negatively associated with performance in math. At the school level, the level of engagement of the principal evidenced by supervision of teachers, good interpersonal interactions with parents had positive effects on math achievement, controlling for other school-level factors. Schools where parents provided material and financial support and were generally involved in school affairs had better grades than schools where parents were not engaged. Lack of parental involvement in the classroom also had negative effects on grades. Lastly, the analyses consistently showed that student delinquency negatively affected grades. In conclusion, the evidence presented here suggests that the quality of social relationships is associated with academic outcomes, specifically mathematics achievement. While the study presents cross-sectional associations, limiting causal interpretations, the evidence goes to buttress the broader literature demonstrating the impact of the social environment in school on student achievement. More importantly, there is a need for school reform

policies aimed at improving academic achievement in primary schools in Kenya to promote elements of social relations that foster productivity in schools and minimize negative attitudes on the part of the key actors in schools.

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Table 1: Measurement of predictors of mean math test scores in 70 schools in 6 districts of Kenya

Variable	Measure
Student math test score	Correct score out of 100 total points
Class mean score	Simple mean of student test scores in each class
Teacher Model	
Teacher math test score	Correct score out of 100 total points
Class size	Number of math students observed in class
Gender of teacher	Dummy: female =1
Number of years teaching math:	Years
0-5 years	Dummy: : label =1
6-10 years	Dummy: : label =1
11-15 years	Dummy: : label =1
Over 15 years	Dummy: : label =1
Has no teaching certification	Dummy: : label =1
Teacher often gives individual attention in class	Dummy: : label =1
class engagement score	Interviewer observation: total score for level teacher-class engagement
Principal watches teaching often/sometimes in class	Dummy: : label =1
Perceives problem with teacher absenteeism	Dummy: : label =1
Perceives problem with teacher knowledge and interest in work	Dummy: : label =1
Perceives problem with student discipline and social behavior (index)	Do you frequently face the following problems? 0=No, 1=Yes a) discipline b) bullying and fighting among students c) safety/security d) student absenteeism, e) language problems f) lack of interest on the part of students. Index was calculated using principal components factor analysis. Values of index equal predicted values using factor loadings for first factor.
Perceive problem with parental involvement in class	Dummy: : label =1
Wealth index – teacher's household	Wealth quartiles derived from a set of questions on possession of household durable goods, quality of housing, access to sanitation facilities, etc. Index was calculated using principal components analysis. Values of index equal predicted values using factor loadings for first factor.
School model	
Wealth index – student's households	Wealth quartiles derived from a set of questions on possession of household durable goods, quality of housing, access to sanitation facilities, etc. Index was calculated using principal components analysis. Values of index equal predicted values using factor loadings for first factor.
School ranks among bottom 20% performing school in district	Dummy: variable =1 Derived from the distribution of student household wealth rankings for all students within each district.
School size	Number of students
Religious school	Dummy: label =1
Private school	Dummy: label=1
Number of teachers with secondary 'A' education	continuous
Percentage never given homework in school	Percent
Principal knows at least three quarters of families in school	Dummy: label=1
Principal thinks parental involvement is important	Dummy: label=1
Principal watches teachers often/sometimes	Dummy: label =1 (Principal's self-report)

Table 1 (contd): Measurement of predictors of mean math test scores in 70 schools in 6 districts of Kenya

Parental support/involvement index	**Index created from questions:** Do parents and/or the community contribute to the school in any of the following ways? Yes=1, No=2 A) Building of school facilities such as classrooms, teacher houses etc; B) Maintenance of school facilities such as classrooms, teacher houses etc; C) Construction or maintenance and repair of furniture, equipment, etc; D) The purchase of textbooks; E) The purchase of stationary; F) The purchase of other school supplies, materials and or equipments; G) Payment of salaries of additional teachers; H) Payment of an additional amount on top of normal salary of teachers; I) Payment of the salaries of non-teaching staff. Index was calculated using principal components analysis. Values of index equal predicted values using factor loadings for first factor. J) Payment of an additional amount on top of normal salary of non-teaching staff; K) Provision of school meals
Principal's perception about students' delinquency	About how often does the school have to deal with the following behavior of students? 1=Never; 2=Sometimes; 3=Often: A) students arriving late at school; B) student absenteeism (i.e. unjustified absence); C) students skipping classes D) students dropping out of school; E) classroom disturbance by students; F) cheating by students; G) use of abusive language by students; H) vandalism by students; I) theft by students; J) intimidation or bullying of students by students; K) intimidation/verbal abuse of teachers/staff by students; L) physical injury to staff by students; M) sexual harassment of students by other students; N) drug abuse by students; O) alcohol abuse or possession by students
Teacher apathy index	About how often does the school have to deal with the following behavior of teachers**?** 1=Never; 2=Sometimes; 3=Often A) teachers arriving late at school; B) teacher absenteeism (i.e. unjustified absence); C) teachers skipping classes; D) intimidation or bullying of students by teachers; E) use of abusive language by teachers
Student model	
Gender of student	Dummy: female =1
Student's household wealth index	Wealth quartiles derived from a set of questions on possession of household durable goods, quality of housing, access to sanitation facilities, etc. Index was calculated using principal components analysis. Values of index equal predicted values using factor loadings for first factor.
Has no guardian at home	Dummy: label=1
Mother has completed at least secondary	Dummy: label=1
# of days absent from school this month	Number of days absent
Has extra math tuition outside school	Dummy: label=1
Reads very often (>= 3 times a week)	Dummy: label=1
Students often hurt each other	Dummy: label=1
Teacher never hurt students	Dummy: label=1
Teacher always correct homework	Dummy: label=1

Table 2: Description of variables included in models teacher, principal and student

	Mean	*Standard deviation*	*Minimum*	**Maximum**
Dependent variables				
Class mean score	46.90	10.85	30.92	82.33
Student (individual) test score (out of 100 points)	46.79	15.25	8	98
Teacher Model (n=70)				
Teacher test score (out of 100 points)	60.5	16.22	17.00	94.00
Class size	34.5	17.30	2	85
Female	0.44	0.49	0	1
Wealth index	0.06	0.54	-0.89	0.99
Number of years teaching math	4.02	4.45	0	30
0-5 years	0.37	0.49	0	1
6-10 years	0.14	0.35	0	1
11-15 years	0.23	0.24	0	1
Over 15 years	0.26	0.44	0	1
Has no training in last 18 months	0.84	0.37	0	1
Teacher often gives individual attention in class	0.33	0.47	0	1
Keeps class engaged	14.97	3.62	6	26
Principal watches teaching often/sometimes in class	0.40	0.49	0	1
Perceives problem with teacher absenteeism	0.13	0.49	0	1
Perceives problem with teacher knowledge and interest in work	0.13	0.34	0	1
Perceives problem with student discipline and social behavior (index)	0.00	1.00	-1.24	1.86
Perceive problem with parental involvement in class	0.61	0.49	0	1
School Model (n=70)				
School ranks among bottom 20% performing school in district	0.47	0.50	0	1
% of students in the bottom 20% of wealth distribution in district attending school	19.04	17.07	0	84.21
School size	493.71	403.79	56	2752
Religious school	0.30	0.46	0	1
Private School	0.13	0.34	0	1
Government school	0.57	0.50	0	1
Number of teachers with secondary 'A' education	1.23	0.33	0	11
Percentage never given homework in school	7.74	14.98	0	75.61
Principal watches teachers often/sometimes (self-report)	0.67	0.47	0	1
Principal knows at least three quarters of families	0.50	0.51	0	1
Parental involvement index	0.23	1.17	-0.94	3.71
Principal thinks parental involvement is important	0.90	0.30	0	1
Perceived student delinquency index	-0.11	1.02	1.44	3.37
Teacher apathy index	-0.10	0 .87	-0.74	2.79
Student Model (n=2133)				
Student is female	0.48	0.50	0	1
Household wealth index	0.01	0.89	-0.08	27.75
Has no guardian at home	0.05	0.22	0	1
Mother has completed at least secondary	0.49	0.50	0	1
# of days absent from school this month	0.86	1.51	0	20
Has extra math tuition outside school	0.57	0.50	0	1
Reads very often (>= 3 times a week)	0.66	0.47	0	1
Students often hurt each other	0.08	0.28	0	1
Teacher never hurt students	0.56	0.50	0	1
Teacher always correct homework	0.60	0.50	0	1

Table 3: Multivariate OLS regression results of the effects of teacher characteristics, teacher perceptions about students, other teachers, principal and parents on average 6th grade performance in mathematics. (n=70)

	Model 1	***Model 2***	***Model 3***	***Model 4***	Model 5
Teacher math test score	0.165*	0.157*	0.108	0.040	0.061
Background variables:					
Female		-2.532	-2.251	1.438	1.729
Wealth index scale		-6.603*	-6.572*	-3.914†	-3.136†
[a]# of years teaching math: 6-10 years		-6.115	-7.154†	-8.503*	-5.358†
[a]# of years teaching math: 11-15 years		-1.995	-0.764	-1.967	-1.249
[a]# of years teaching math: > 15 years		-3.484	-4.063	-9.324**	-6.601**
Has no training in last 18 months		0.153	-0.792	0.719	-0.571
Class size		-0.001	-0.029	0.123	0.085
Teaching style					
Often gives individual attention in class			0.788	2.838	2.137
Class engagement score			0.935*	0.608*	0.458†
Teacher perceptions about key actors					
Principal watches teaching often/sometimes in class				4.780*	3.836*
Teachers have interest in work				7.933*	5.153†
Problem with student discipline and social behavior (index)				-3.963**	-2.108†
Problem with teacher absenteeism				-7.336*	-4.260
Problem with parental involvement in class				-7.278**	-5.826**
School Characteristics					
School in bottom 20% of district					-9.144***
[b]Religious school					2.125
[b]Private school					10.179***
Intercept	36.835***	41.037***	31.422***	35.703***	48.860***
Adjusted R-squared	0.048	0.074	0.141	0.456	0.665

a, base category is 5-10 year; b, base category is government school ; Legend: †p<0.10 * p<0.05; ** p<0.01; *** p<0.001

Table 4: Multivariate regression results of the effects of school characteristics, teacher and student delinquency and parental involvement on average 6th grade performance in mathematics. (n=70)

Control variables	***Model 1***	***Model 2***	Model 3
School ranks among bottom 20% performing school in district	-12.058***	-11.677***	-10.941***
% of students in the bottom 20% of wealth distribution in district attending school	-0.074	-0.040	-0.032
School size	0.006	0.006	0.005
Religious school[a]	2.766	2.086	1.688
Private school[a]	13.938***	12.432***	11.190**
Number of students in math class	-0.078	-0.051	-0.040
Number of teachers with secondary 'A' education	0.279	0.383	0.629
School, parent, teacher characteristics			
Percentage never given homework in school		-0.067	-0.050
Principal watches teachers often/sometimes (self-report)		2.304	2.288
Principal knows at least three quarters of families		1.380	0.712
Parental support/involvement index		0.906	1.047
Principal thinks parental involvement is very important		1.881	2.357
Teacher apathy index		-0.041	1.084
Perceived student delinquency index			-1.954†
Intercept	62.790***	57.529***	55.899***
Adjusted R-squared	0.520	0.524	0.543

a: base category is government school. Legend: †p<0.10 * p<0.05; ** p<0.01; *** p<0.001

Table 5: Random effects regression results of the effects of student characteristics, teacher perceptions, parental involvement and school characteristics 6th grade math academic achievement (n=2133)

	Model 1	***Model 2***	***Model 3***	Model 4
Student background				
Female	-2.434***	-2.360***	-2.492***	-2.517***
Household wealth index	-0.227	-0.257	-0.276	-0.277
Has no guardian at home	-0.148	-0.351	-0.258	-0.242
Mother has completed at least secondary	0.473	0.105	0.106	0.012
Other characteristics				
# of days absent this month		-0.340*	-0.331*	-0.318†
Has extra math tuition outside school		-1.043†	-1.024†	-0.991†
Reads very often (>= 3 times a week)		4.148***	4.100***	4.071***
School environment				
Collective parental involvement at school			3.282**	1.204
Principal knows at least ¾ of families			2.360	2.441
Students often hurt each other			-0.636	-0.567
Teacher never hurt students			1.336*	1.311*
Teacher always correct homework			0.653	0.638
Other School Characteristics				
School ranks among bottom 20% performing school in district				-10.800***
School size				0.006*
Class size				-0.047
% population in bottom 20% of wealth distribution of district				-0.059
[b]Religious School				2.447
[b]Private School				11.476***
Intercept	47.527***	45.871***	43.015***	56.883***
-2log likelihood	-8306.240	-8270.511	-8260.271	-8235.413
Within school residual standard deviation	10.436***	10.207***	9.045***	6.031***
Between school residual standard deviation	11.287***	11.122***	11.110***	11.114***
Intraclass correlation	0.461	0.457	0.398	0.228

b, base category is government school ; Legend: †p<0.10 * p<0.05; ** p<0.01; *** p<0.001