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Social relations as predictors of achievement in math in Kenyan primary schools

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ABSTRACT

In sub-Saharan Africa, where there is limited financial and human capital, it is important to examine how social relationships may serve to promote or undermine human capital formation. However, little is known about the contributions of social relations to human capital development, especially in terms of academic achievement in Africa. This study examined how variations in key aspects of social relations 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. We modeled mathematics achievement as a function of measures of social perception and support while adjusting for school-, classroom- and student level background 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 their students performing better. Teacher absenteeism and lack of interest in teaching were negatively associated with performance in math. Lack of parental involvement in the classroom also had negative effects on grades. At the school level, the level of engagement of the principal, measured by supervision of teachers and good interpersonal interactions with parents had positive effects on math achievement. Schools where parents provided material and financial support had better grades, while student delinquency and absenteeism negatively affected grades.

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1. Introduction

Explanations of academic achievement, like other explanations of dimensions of human well-being are naturally multifaceted. Theories formulated to explain academic achievement encompass various dimensions of student interactions including school, family, community and social factors (Pena, 2007). At the individual level, there are explanations focusing on both biological and social cognitive aspects of learning, delineating, for example how human agency explains academic achievement (Bandura et al., 1996). Home-based explanations (common in the sociological literature) 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 and the level of parental expectations and support. School-based explanations (common in the educational literature), by contrast, emphasize factors such as school spending, quality of physical infrastructure and human resources, class size, and school, family, community and government policies. 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 et al., 2002; Coleman, 1988). Even at higher aggregate levels, countries' economic status, gender socialization patterns, kinship structures, 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 (Bourdieu, 1986; Bryk and Schneider, 2002; Coleman, 1988; Lin, 2001; Portes, 1998; Putnam, 2000).

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In this paper, we focus our 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 and support while 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, insofar as they 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 of exchanges 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). In addition, studies have demonstrated that parental involvement in school activities and in their children's academic work is positively associated with school achievement (Adams and Christenson, 1998, 2000; Horvat et al., 2003; Ho Sui-Chu and Willms, 1996). Further, previous research has shown that the quality of students' peer relations affects academic orientation and performance (Wentzel and Watkins, 2002; Wentzel, 1998; Wentzel and Caldwell, 1997; Welsh et al., 2001). The social experiences of school children shape their attitudes toward 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 linkages 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), neighborhood violence (Mudege et al., 2008) and socio-economic status (Hungi and Thuku, 2010; Onsomu et al., 2006). Duflo et al. (2008) examined the impact of peer academic performance on the 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 benefited indirectly 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 is 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. 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 (1) whether teacher characteristics, particularly, teaching style, interactions with the principal, attitudes toward other teachers, students and parents affect the average performance of the class; (2) whether parental involvement in school affairs, teacher commitment and student discipline matter for academic performance at the school level; and (3) whether students' attitudes toward 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 scholars have struggled with definitions as well as with 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 concludes that using proxy variables does not diminish the validity of a construct, especially where little systematic empirical work pertaining to the definition exists. Thus, in this study, the proxy variables we use attempt only 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 72 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. The districts were Nairobi, Embu, Murang'a, Garissa, Baringo and Gucha, but have since Kenya's national election in March 2013, been redefined as counties except for Gucha. The sampling was done at two stages: first, districts were selected based on performance in the Kenya Certificate of Primary Education (KCPE). KCPE is a national examination taken at the end of primary education. The 76 districts in Kenya were first stratified into ten deciles according to their performance in KCPE for four consecutive years. Thereafter, six districts were randomly selected using the following criterion: two districts from those that had consistently been ranked in the top 10%; two districts from those that had been consistently ranked within the middle 20%; and two districts from those that had been consistently ranked in the bottom 10%. The second stage was selection of schools based on the same examination over the same period. The schools in each of the districts were ranked into quintiles according to their performance. This was followed by a random selection of 12 schools in each district, six that were ranked consistently at the top 20% and six ranked consistently at the bottom 20%. This study uses data for 2388 sixth grade students with an average of 34 per class, 70 mathematics teachers and 70 principals involved in the study. The sixth grade was purposely chosen so as to provide comparison data with other similar studies that have been carried out in Kenya

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