Principal Support, Professional Learning Community, and Group-Level Teacher Expectations

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Abstract

Although much literature highlights the importance of teacher expectations for students’ academic success, a very small number of studies used large-scale data to examine school-level factors associated with group-level teacher expectations – defined as expectations that teachers have for many students in their class or school, rather than for a specific student – in the US context. Using contextual data provided by mathematics and science teachers participating in the High School Longitudinal Study of 2009, the current study addressed this issue with paying attention to the roles of principal support and professional learning community in group-level teacher expectations. We found that both principal support and professional learning community were positively associated with group-level teacher expectations, even after controlling for other variables. We also found that much of the relationship between principal support and group-level teacher expectations was explained by professional learning community. Theoretical and policy implications are discussed.

Keywords: principal support, professional learning community, teacher expectations, High School Longitudinal Study
Researchers have long highlighted the importance of teacher expectations for the academic success of students (Brophy, 1983; Rosenthal & Jacobson, 1968; Rubie-Davies, 2007, 2010; Sebastian, Allensworth, & Huang, 2016; Sebastian, Huang, & Allensworth, 2017; see also Jussim & Harber, 2005 for a synthesis), especially disadvantaged students (Mistry, White, Benner, & Huynh, 2009; Tyler & Boelter, 2008; Woolley, Strutchens, Gilbert, & Martin, 2010). Therefore, it is important to understand how to increase teacher expectations of students at various levels. However, most prior research has focused on teacher expectations of a specific student (hereafter individual-level teacher expectations) (e.g., Brophy, 1985; Mistry et al., 2009; Muller, 1997; Muller, Katz, & Dance, 1999; Tyler & Boelter, 2008; Woolley et al., 2010). Less attention has been given to the expectations that teachers have for many students in their class or school (hereafter group-level teacher expectations), with a few exceptions (e.g., Brault, Janosz, & Archambault, 2014; Newmann, Rutter, & Smith, 1989; Park, Lee, & Cooc, 2019; Sebastian et al., 2016, 2017).

Studying group-level teacher expectations has important policy implications because group-level teacher expectations may have a greater impact on improving overall learning outcomes than individual-level teacher expectations by creating an effective school (or class) environment that benefits all students (Brault et al., 2014; Park et al., 2019). Specifically, group-level teacher expectations can set the norm for “how much is taught by teachers and how much active student participation is permitted” (Cooper, 1985, p.153). This norm can then shape the climate and processes in the classroom or school (Goddard, Neumerski, Goddard, Salloum, & Berebitsky, 2010), which in turn affects not only a few students but also the entire class or school population (Brault et al., 2014). As a result, group-level teacher expectations would help improving student achievement not just for a few students but for all students. Yet, little is
known about school contexts under which varying degrees of group-level teacher expectations are constructed.

In this study, we address this lack of research by examining school contexts that are associated with group-level teacher expectations. Specifically, using contextual data provided by mathematics and science teachers participating in the High School Longitudinal Study of 2009 (HSLS:09) in the United States, we investigate school-level factors associated with group-level teacher expectations beyond individual teacher-level factors. Among others, we are particularly interested in the role of contemporary principals in relation to group-level teacher expectations. In addition, we are interested in the role of professional learning community (PLC) as a key organizational process by which principals can relate to group-level teacher expectations. As will be discussed in detail later, this is because literature suggests that while principals play a key role in providing structures for establishing PLC, PLC plays an important role in shaping teachers’ instructional behaviors and attitudes (Bryk, Camburn, & Louis, 1999; Kruse, Louis, & Bryk, 1995; Louis, 2006; Louis, Marks, & Kruse, 1996). It is important to note that this study does not seek to fully establish causal and mediational relationships among principal support, PLC, and group-level teacher expectations, due to data limitations which will be described in detail later. Rather, we aim to identify principal support and PLC as important school process factors that are associated with group-level teacher expectations. Studying these school process factors has important policy implications because, unlike demographic characteristics of teachers and structural features of schools, these process features are much more malleable through interventions (Brault et al., 2014; Park et al., 2019).

A Review of Literature

Definitions and Measures of Teacher Expectations
As noted above, individual-level teacher expectations refer to educational expectations that a teacher has for a specific student (Brophy, 1983). In essence, individual-level teacher expectations are based on teacher-student dyadic interactions (Rosenthal & Jacobson, 1968). Accordingly, the nature of individual-level teacher expectations is interpersonal (Rubie-Davies, Flint, & McDonald, 2012). In empirical research, the way in which individual-level teacher expectations are measured varies across studies, but they are usually measured by a teachers’ perception of his or her particular student’s academic ability to succeed in the future. For example, in a study of predictors of college enrollment among rural youth, Byun, Meece, and Agger (2017) measured teacher educational expectations by teachers’ response to the question of “how far in school this student will go?” (emphasis added).

By contrast, group-level teacher expectations refer to educational expectations that teachers have for a greater number of students, e.g., in terms of a class or school population (Brault et al., 2014; Rubie-Davies, 2007). Accordingly, group-level teacher expectations have broader implications for instructional practices, compared to individual-level teacher expectations (Brault et al., 2014). While the conceptualizations and operationalizations of group-level teacher expectations also differ across studies, they are typically measured by teachers’ overall perceptions of the academic ability of their students as a group. For example, Newmann et al. (1989) measured group-level teacher expectations by teachers’ perceptions of their students’ capacity to succeed in school, using the following two items: (a) “many of the students I teach are not capable of learning the material I am supposed to teach” and (b) “the attitudes and habits my students bring to my class greatly reduce their chances for academic success” (p. 228).

In HSLS:09 which the current study draws on, group-level teacher expectations are more broadly defined and operationalized by considering not only teachers’ perceptions of their
students’ academic ability, but also teachers’ assessment of their peer teachers’ expectations for students and behaviors at schools. For instance, HSLS:09 asked mathematics and science teachers to what extent they think their peer mathematics and science teachers set high standards for teaching and learning, make expectations for instructional goals clear to students, and work hard to make sure that all students are learning. This additional inclusion of teachers’ assessment of their peers’ expectations for students is an important improvement in the measurement of group-level teacher expectations because it allows to reflect wider collective expectations, beliefs, and attitudes shared by a more inclusive group of teachers within a school, rather than by a specific or only a few teachers.

Meanwhile, numerous studies have documented the positive role of individual-teacher expectations in relation to students’ academic success (see Jussim & Harber, 2005 for a comprehensive review). The positive relationship between individual-teacher expectations and students’ academic success could be best understood by a theory of self-fulfilling prophecy (Brophy, 1983; Jussim & Harber, 2005; Rosenthal & Jacobson, 1968). According to this theoretical perspective, students act differently depending on their teachers’ expectations and feedback. In other words, as demonstrated by Rosenthal and Jacobson (1968), if students are given more instructional feedback and more challenging assignments by their teacher, they would believe that they are high achievers and behave accordingly by showing greater confidence and interests in a school subject (Brophy, 1983; Jussim & Harber, 2005).

Similarly, this theoretical perspective could be applied to understand the relationship between group-level teacher expectations and students’ academic success. However, group-level teacher expectations can have rather far-reaching consequences on students’ academic success, compared to individual-level teacher expectations (Brault et al., 2014; Cooper, 1985). For
example, if teachers form expectations for their entire class or school population (i.e., group-level teacher expectations), they may try to engage more students in learning activities and put more effort into teaching for all students (Brault et al., 2014). In this regard, it is argued that group-level teacher expectations can play a more important role in improving overall student achievement than individual-level teacher expectations (Brault et al., 2014). Indeed, although very limited, research on group-teacher expectations found a positive effect on student achievement (Park et al., 2019; Sebastian et al., 2016, 2017).

Prior Research on Group-Level Teacher Expectations

Despite the importance of group-level teacher expectations, only a few studies used large-scale data to empirically investigate conditions under which teachers form high (or low) expectations. Newmann and his associates (1989) used data from the 1984 High School and Beyond (HS & B) Administrator and Teacher Survey to examine whether both structural (e.g., school socioeconomic, ethnic, academic composition, school size, and location) and organizational (e.g., principal leadership and teacher collaboration) features of the school were related to group-level teacher expectations. The authors found that school ethnic and academic composition was significantly related to group-level teacher expectations, even after controlling for other school-level variables. They also found that orderly teaching environments and teacher collaboration were positively related to teacher expectations, while principal leadership was not significantly related to group-level teacher expectations. Yet, Newmann et al.’s (1989) study has several limitations. First, the authors assumed and tested only the direct effect of principal leadership on group-level teacher expectations, ignoring potential mechanisms and processes by which principal leadership could indirectly relate to group-level teacher expectations. Second, Newmann et al. (1989) did not consider individual teachers’ characteristics, while using a
conventional regression approach to examine school-level factors associated with group-level teacher expectations. Finally, data that Newmann et al. (1989) used are outdated.

Another exception is the study done by Brault et al. (2014) in which they explore the determinants of group-level teacher expectations in high school located in Quebec, Canada. The authors examined whether both structural (e.g., school socioeconomic, ethnic, academic composition, school size, and location) and process (e.g., school educational climate) features of the school were related to group-level teacher expectations. They found that school composition in terms of students’ socioeconomic, ethnic, and academic backgrounds was significantly related to group-level teacher expectations, even after controlling for other teacher- and school-level variables. In addition, they found that school educational climate, measured by shared perceptions among principals, teachers, and students regarding how learning and education are valued within the school, was positively associated with group-level teacher expectations. Yet, Brault et al. (2014) did not consider principal leadership in their analysis.

Finally, Park et al. (2019) used HSLS:09 to examine the relationships among principal leadership, the school-level measure of teacher expectations (i.e., teacher expectations were aggregated to the school level), and student achievement. The authors found that while principal leadership was not significantly related to the school-level measure of teacher expectations, the school-level measure of teacher expectations was positively related to student achievement, even after controlling for demographic and background characteristics of the students. Although Park et al.’s work demonstrated the importance of the aggregate characteristics of the school in terms

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1 Brault et al. (2014) measured group-level teacher expectations by teachers’ perceptions of their students’ capacity to succeed in school, using the following three items: Most students at this school have (a) “what it takes, personally and socially, to successfully complete their secondary studies,” (b) “the competencies required to attain the learning objectives for their grade level,” and (c) “the potential to succeed in school” (p.152).
of teacher expectations for student achievement, it also has several limitations. First, Park et al. did not consider teacher-level characteristics at all while using the aggregate measure that describes teacher expectations. Second, they controlled for a very limited number of school-level variables. Finally, they focused only on mathematics teachers. In short, Park et al.’s findings lack robustness. In the current study, we address these limitations by including a more comprehensive set of teacher- and school-level variables to better address the relationship between principal leadership and group-level teacher expectations and additionally examining science teachers in addition to mathematics teachers.

The Role of Principal Leadership

As described above, while very limited empirical research examined the relationship between principal leadership and group-level teacher expectations, all prior research is plagued by several limitations that preclude accurate analysis of the role of principal leadership in relation to group-level teacher expectations. As a result, it remains to be further investigated whether principal leadership is related to group-level teacher expectations, controlling for other variables. Studying a relationship between principal leadership and group-level teacher expectations using recent data is important, given the context that contemporary school principals are expected to play a far more important role in school success than ever before (Murphy, 2002). Specifically, contemporary principals need to engage in direct coordination, control, and supervision of curriculum and instruction, while defining the school mission and goals that will affect instructional practice and student performance (see Hallinger & Heck, 1996, 1998; Leithwood & Jantzi, 2008; Leithwood, Louis, Anderson, & Wahlstrom, 2004). It is in this context that we expect to find a different pattern with respect to the role of contemporary principals in group-level teacher expectations as follows.
Hypothesis 1: The leadership of contemporary high school principals will be significantly and positively associated with group-level teacher expectations, even after controlling for other variables.

Meanwhile, in HSLS:09, principal leadership was operationalized as principal support, which integrates instructional and transformational leadership by covering core instructional and transformational practices, such as facilitating teaching and learning, motivating teachers, working closely with teachers, and focusing on innovation or change. The HSLS’s operationalization and measurement of principal support is new, but is line with recent literature suggesting that instructional leadership and transformational leadership are not mutually exclusive and a combination of strategies could be more beneficial in improving student outcomes (Day, Gu, & Sammons, 2016; Goddard, Goddard, Kim, & Miller, 2015; Goddard et al., 2010; Marks & Printy, 2003; Printy, Marks, & Bowers, 2009; Robinson, Lloyd, & Rowe, 2008). Yet, we acknowledge that principal leadership is a much broader concept, which encompasses more than instructional and transformational leadership (Grissom & Loeb, 2011; Grissom, Loeb, & Master, 2013; May, Huff, & Goldring, 2012). For example, Grissom and Loeb (2011) demonstrated that organization management skills not only constitute important parts of principal leadership, but also significantly predict school performance. Unfortunately, the HSLS:09 data do not provide alternative measures of principal leadership other than principal support. We acknowledge our inability to capture the multidimensional perspectives of principal leadership as a key limitation of our study.

The Role of Professional Learning Community
A large body of research has documented positive effects of PLC, including but not limited to a reduction in feelings of isolation and alienation among teachers, an increase in commitment to the mission and goals of the school and shared collective responsibility for students, and the creation of new knowledge and beliefs about schooling (see Vescio, Ross, & Adams, 2008 for a review). These research findings suggest that PLC plays a key role in shaping collective attitudes, beliefs, and expectations shared by teachers (Bryk et al., 1999; Louis & Marks, 1998; Wahlstrom & Louis, 2008). Accordingly, it is reasonable to assume that PLC will be related to the construction of group-level teacher expectations as well.

Hypothesis 2: Greater PLC will be associated with higher group-level teacher expectations, even after controlling for other variables.

Additionally, research suggests that teacher-teacher relationships are more important and effective than principal-teacher relationships to shape their instructional behaviors and attitudes towards their students (Bryk & Schneider, 2002; Louis, 2006; Rosenholtz, 1991; Supovitz, Sirinides, & May, 2010). In other words, teachers are more willing to accept suggestions and recommendations made by their fellow teachers with respect to improving instructional strategies (Supovitz et al., 2010; Wahlstrom & Louis, 2008). By contrast, teachers may perceive the direct supervision of instructional methods by their principals as a threat to their professional autonomy (Rosenholtz, 1991). Indeed, Sebastian et al. (2017) demonstrated that principal leadership is more effective in improving classroom instruction and student learning when combined with teacher leadership. More importantly, they showed that learning climate, measured by school safety and teacher expectations of students regarding postsecondary
education,\(^2\) is a key mediator that links principal and teacher leadership to classroom instruction and student learning.

In the current study, we build on and extend Sebastian et al. (2017)’s work in two important ways. First, Sebastian et al. (2017) used data from high schools in Chicago (see Sebastian et al., 2016 for elementary schools), limiting the generalizability of their findings. By contrast, we use nationally representative data of US high schools to improve the generalizability. Second, in their study, informed by Bryk et al. (2010)’s work, Sebastian et al. (2017) assumed that both PLC\(^3\) and teacher expectations (as part of learning climate) constitute important organizational processes through which school leadership affects classroom instruction and student learning, but they did not specify the direction of a relationship between these two organizational processes. In the current study, we propose a directional relationship between PLC and group-level teacher expectations in such that PLC will predict group-level teacher expectations, but not the other way around. This is because PLC, which is established and developed under the structures provided by the principals (Bryk et al., 1999; Louis & Marks, 1998; Wahlstrom & Louis, 2008), is a primary venue for teachers to share their school mission and goals, reflect on their instructional activities, and discuss how to improve student learning (Lomos, Hofman, & Bosker, 2011; Vescio et al., 2008).

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\(^2\) In their study, Sebastian et al. (2017) measured teacher expectations of students for postsecondary education, using the following items: (a) teachers expect most students in this school to go to college; (b) teachers at this school help students plan for college outside of class time; (c) the curriculum at this school is focused on helping students get ready for college; (d) most of our students have the capacity to do college-level work; (e) most of the students in this school are planning to go to college; and (g) teachers in this school feel that it is a part of their job to prepare students to succeed in college. However, they did not use the term, “group-level” teacher expectations. Rather, they referred to teacher expectations as part of the learning climate.

\(^3\) Sebastian et al. (2017) used the definition of PLC developed by Kruse et al. (1995), which highlights five core practices (i.e., reflective dialogue, teacher collaboration, deprivatized practice, shared norms, and new teacher socialization), and operationalized PLC by using the items developed by Bryk et al. (1999) in a study of Chicago elementary schools, which were combined to capture school-wide professional community.
Data and Methods

Data and Sample

We used data from HSLS:09, administered by the US Department of Education, National Center for Education Statistics (NCES). HSLS:09 has collected information on a nationally representative probability sample of high school freshmen in the United States as they transitioned through high school into postsecondary education or the workforce. HSLS:09 focuses on students’ paths into and out of science, technology, engineering, and mathematics (STEM) fields of study and careers (Ingels et al., 2011). For HSLS:09, approximately 20,000 ninth graders randomly sampled from 940 schools across the nation were surveyed in 2009, the base year of the study. The first follow-up survey was conducted in 2012 when most of the sampled respondents were in 11th grade. In addition to student data, HSLS:09 collected important contextual data from school administrators, mathematics teachers, science teachers, and parents. Both school administrators and mathematics and science teachers of students were surveyed regarding their work history, work experiences, and school climate. School climate included but was not limited to “the central goals of the school, resources available for struggling and excelling students, challenges to student and school success, and discipline issues, as well as their own educational expectations for students and their perceptions of others’ expectations and behaviors” (emphasis added) (LoGerfo, Christopher, & Flanagan, 2011, p.1).

For the current study, we used only the base-year contextual data provided by school administrators and mathematics and science teachers who taught the ninth graders included in HSLS:09 (Ingels et al., 2011). In other words, the current study did not rely on student data. By design, HSLS:09 did not include a random sample of ninth-grade mathematics and science teachers at the sampled schools (Ingels et al., 2011). Thus, mathematics and science teachers
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included in HSLS:09 might not necessarily represent the populations of high school mathematics and science teachers in the United States. In addition, the cross-sectional nature of the base-year contextual data did not permit us to claim causal relationships among principal support, PLC, and group-level teacher expectations. Accordingly, our results should be interpreted with caution.

Despite these data limitations, however, we believe that the base-year contextual data from HSLS:09 are still useful to extend prior research by enhancing generalization of the results with respect to factors associated with group-level teacher expectations. This is because they included a much larger number of mathematics and science teachers than other NCES data. Indeed, approximately 4,120 mathematics teachers and 2,910 science teachers from 910 schools, the majority (approximately 80%) of which served grades 9-12, were found to participate in HSLS:09. On average, about three (SD = 2.10) and five (SD = 2.62) mathematics and science teachers, respectively, were included from each school. For the current study, we excluded schools that either had no or only one participating mathematics and science teacher included as well as teachers who did not provide valid information about their perceptions of other mathematics and science teachers’ expectations for their students.4 This yielded an analytic sample size of approximately 3,320 for mathematics teachers and 2,530 for science teachers, respectively.

Measures

Dependent variables. Our dependent variables were mathematics and science teachers’ perceptions of their students’ academic ability and their assessment of other mathematics and science teachers’ expectations and behaviors at their schools. These variables were measured for

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4 We excluded “unit nonresponses” and “item legitimate skip/NA.” We conducted supplementary analyses by including these cases with multiple imputations and found similar results reported in the current study.
mathematics and science teachers separately, and they were based on a question asking the extent to which s/he agreed or disagreed (1 = strongly agree; 4 = strongly disagree) with each of the following statements that peer mathematics and science teachers in school (a) “set high standards for teaching,” (b) “set high standards for students’ learning,” (c) “believe all students can do well,” (d) “make expectations for instructional goals clear to students,” (e) “have given up on some students,” (f) “care only about smart students,” (g) “expect very little from students,” and (h) “work hard to make sure all students are learning.” As articulated earlier, these items addressed not only teachers’ perceptions of their students’ academic ability, but also teachers’ assessment of their peer teachers’ expectations for students at schools, which better measures group-level teacher expectations. Our confirmatory factor analysis (CFA) using M-plus with weighted least squares means and variance adjusted estimation suggested a unidimensional factor for both mathematics ($\chi^2(20) = 91.733$, Tucker-Lew index [TLI] = .943, comparative fit index [CFI] = .959, root mean square error of approximation [RMSEA] = .155) and science ($\chi^2(20) = 25.351$, TLI = .971, CFI = .980, RMSEA = .096) teachers (see Appendix A for factor loadings and reliability statistics). We averaged these items for each group of mathematics and science teachers with higher values representing more positive assessments of their peer teachers’ expectations.

**Teacher-level variables.** Prior research found inconsistent findings with respect to the relationship between individual teachers’ demographic characteristics and expectations. For instance, Rubie-Davies et al. (2012) found no significant gender differences in group-level teacher expectations, whereas Brault et al. (2014) found significant gender differences with male teachers showing a higher level of expectations than their female counterparts. Yet, it is critical to consider individual teachers’ characteristics when studying school-level factors associated
with group-level teacher expectations. Accordingly, building on prior literature (Brault et al., 2014; Newmann et al., 1989; Rubie-Davies et al., 2012), we controlled for a number of teacher-level variables, including (a) teacher efficacy, (b) gender, (c) race/ethnicity, (d) whether they hold an advanced degree, and (e) years of teaching.

Teacher efficacy\(^5\) was measured for mathematics and science teachers separately, and they were based on a question asking the extent to which s/he agreed or disagreed (1 = strongly agree; 4 = strongly disagree) with each of following statements as it applies to her or his instruction: (a) “the amount a student can learn is primarily related to family background,” (b) “if students are not disciplined at home, they are not likely to accept any discipline at school,” (c) “you are very limited in what you can achieve because a student’s home environment is a large influence on their achievement,” (d) “if students did not remember information you gave in a previous lesson, you would know how to increase their retention in the next lesson,” (e) “if students in your class becomes disruptive and noisy, you feel assured that you know some techniques to redirect them quickly,” (f) “if you really try hard, you can get through to even the most difficult or unmotivated students,” and (g) “when it comes right down to it, you really cannot do much because most of students’ motivation and performance depends on their home environment.” Gender and race/ethnicity were based on teachers’ report on their sex (male = 0, female = 1) and race (minority =0, white =1). Holding an advanced degree indicates whether a teacher earned an advanced degree (e.g., master’s degree or Ph.D. degree; = 1) or a bachelor’s degree (= 0). Years of teaching was a continuous variable and measured by teachers’ report on their years of teaching.

**School-level variables.** Our school-level variables of interest were (a) principal support

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\(^5\) Detailed reliability information about this measure of teacher efficacy is available from the authors upon request.
and (b) PLC. Principal support was measured for mathematics and science teachers separately and was based on a question asking to what extent a teacher agreed or disagreed (1 = strongly agree; 4 = strongly disagree) with each of following statements that her or his school principal (a) “deals effectively with pressures from outside the school that might interfere with my teaching,” (b) “does a poor job of getting resources for this school,” (c) “sets priorities, makes plans, and sees that they are carried out,” (d) “knows what kind of school he or she wants and has communicated it to the staff,” (e) “let staff members know what is expected of them,” (f) “is interested in innovation and new ideas,” and (g) “usually consults with staff members before he or she makes decisions that affect them.” As noted previously, these items addressed both instructional and transformational leadership (e.g., setting priorities and making plans, sharing new ideas, and communicating with teachers). CFA suggested a unidimensional factor for both mathematics ($\chi^2(14) = 16.459$, TLI = .994, CFI = .996, RMSEA = .064) and science ($\chi^2(14) = 21.372$, TLI = .989, CFI = .993, RMSEA = .088) teachers (see Appendix B for factor loadings and reliability statistics). We averaged these items for each group of mathematics and science teachers with higher values representing greater perceived support. We aggregated this information to the school-level and thus this variable indicates overall principal support perceived by teachers.

PLCs were also measured for mathematics and science teachers separately and based on a question asking to what extent a teacher agreed or disagreed (1 = strongly agree; 4 = strongly disagree) with each of following statements that their PLCs (a) “share ideas on teaching,” (b) “discuss what was learned at a workshop or conference,” (c) “share and discuss student work,”, (d) “discuss particular lessons that were not very successful,” (e) “discuss beliefs about teaching and learning,” (f) “share and discuss research on effective teaching methods,” (g) “share and
discuss research on effective instructional practices for English language learners,” (h) “explore new teaching approaches for under-performing students,” (i) “make a conscious effort to coordinate the content of courses with other teachers in this school,” and (j) “are effective at teaching students in [mathematics or science].” It is important to note that although the items used to measure PLC in HSLS:09 are not exactly identical to those items used in previous literature (e.g., Sebastian et al., 2017), they address key core PLC practices, such as shared norms, teacher collaboration, and reflective dialogue (Kruse et al., 1995). It is also important to note that HSLS:09 measure of PLC refers to a group of same-subject teachers (i.e., mathematics or science teachers), rather than school-wide professional community. Meanwhile, CFA suggested a unidimensional factor for both mathematics ($\chi^2(35) = 38.340$, TLI = .967, CFI = .974, RMSEA = .100) and science teachers ($\chi^2(35) = 30.174$, TLI = .965, CFI = .973, RMSEA = .106) teachers (see Appendix C for factor loadings and reliability statistics). We averaged these items for each group of mathematics and science teachers with higher values representing perceptions of greater PLC. We aggregated this information to the school-level and thus this variable indicates overall perceptions of PLC perceived by teachers with a school.

In addition to these two key school-level variables, we also controlled for (a) school type (public or private), (b) the number of full-time teachers, (c) % of free lunch students (0 = 0%, 1 = more than 0% but less than 10%, 2 = at least 10% but less than 20% ..., 11 = 100%), (d) % of black students (0 = 0%, 1 = more than 0% but less than 10%, 2 = at least 10% but less than 20% ..., 11 = 100%), (e) % of Hispanic students (0 = 0%, 1 = more than 0% but less than 10%, 2 = at least 10% but less than 20% ..., 11 = 100%), and (f) school academic performance (aggregate mathematics achievement). All these control variables were from the school data.

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6 HSLS:09 measured students’ mathematics reasoning in algebra and provided the item response theory (IRT)-
Analytical Model

First, we completed descriptive analyses for the variables included in analyses by mathematics and science teachers. Next, we used a hierarchical linear modeling (HLM) (Raudenbush & Bryk, 2002) approach to examine predictors of teacher expectations for mathematics and science teachers. To more systemically examine predictors of teacher expectations, we estimated four HLM models for mathematics and science teachers separately. The first model was a null or unconditional model where only the dependent variable was included. The second model introduced the teacher-level variables. The third model additionally added all school-level variables except for PLC. The fourth and final model added PLC to Model 3. The aim was to explore how the magnitude in the relationship between principal support and teacher expectations changed when PLC was additionally considered. Results of the final model including PLC would be useful to inform whether PLC could be possibly served as a pathway through which principal support is related to group-level teacher expectations. In this final model, the level-1 (teachers) equation was specified as follows.

\[
 (\text{group-level teacher expectations})_{ij} = \beta_{0j} + \sum_{k} \beta_{kj} X_{kij} + r_{ij} \quad \ldots \ldots \quad (1)
\]

where \( \beta_{0j} \) is the mean of (mathematics or science) teachers’ expectations of students in school \( j \) adjusted for teacher background characteristics, \( \beta_{1j} - \beta_{kj} \) is the corresponding effect of each of teacher-level variables (e.g., teacher self-efficacy, gender, and years of teaching) on group-level teacher expectations and \( r_{ij} \) is the individual-specific error.

The level-2 equation was specified as follows:

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estimated number-right score in the base-year survey, which consisted of 79 items. The IRT-estimated number-right score is defined as an IRT-based estimate of the number of items that a student would have answered correctly if he or she had taken all of the items in the mathematics assessment (Ingels & Dalton, 2013).
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\[ \beta_{0j} = \gamma_{00} + \sum_{q} \gamma_{0q} W_{qj} + u_{0j} \] ......... (2)

\[ \beta_{kj} = \gamma_{k0} \] ......... (3)

where \( \gamma_{00} \) is the intercept, \( \gamma_{01} - \gamma_{0q} \) the corresponding effect of each of school-level variables (e.g., school academic performance, principal support, and PLC) on school teacher expectations, \( u_{0j} \) is the school-specific error. In equation (3), \( \gamma_{k0} \) refers to the overall effect of the \( k \)th control variable at the teacher level. All categorical variables were centered around group mean, while all continuous variables were centered around grand mean.

For missing data (see Table 1 for the percentage of imputed data) on teacher- and school-level variables, we used multiple imputations. Note that there was no missing data for our dependent variables because we restricted the analytic sample to teachers who had valid information about their perceptions of other peer teachers’ expectations. Given literature suggesting that accurate results typically can be obtained from two to ten imputations (Rubin, 1987; von Hippel, 2005), we generated ten imputed datasets using the Stata ICE module. Specifically, following recommendations set forth by Johnson and Young (2011), we included all the dependent and independent variables in the imputed model to predict missing values. Then, we pooled estimates from the ten datasets with the HLM 7.03 program. We used the school weight at the school level.

RESULTS

Descriptive Results

[Table 1 about here]

Mathematics teachers. The left panel of Table 1 presents descriptive statistics for the variables included in analyses for mathematics teachers. The average of group-level teacher
expectations was 3.37, indicating a relatively high level of perceived expectations (e.g., 3 = agree, 4 = strongly agree). When it came to teacher self-efficacy, the mean was 2.81. Of 3,320 mathematics teachers, 61% were female and 12% minority. More than half of the mathematics teachers (56%) held an advanced degree. On average, mathematics teachers had about 10 years of teaching experience. Among 680 schools, approximately 90% were public. The average number of full-time teachers was about 88. The average percentage of free lunch students was about 4, corresponding to at least 30% but less than 40%. The average percentage of black students was about 2, equivalent to at least 10% but less than 20%. The average percentage of Hispanic students was also about 2. The average mean of school achievement was about 40. The average level of principal support and PLC were 3.11 and 3.06, respectively, showing relatively positive assessments of both principal support and PLC.

**Science teachers.** The right panel of Table 1 presents descriptive statistics for the variables included in analyses for science teachers. The average of group-level teacher expectations was 3.38, which is comparable to that of the mathematics teachers. The mean of teacher self-efficacy was 2.80, also indicating a similar level with that of the mathematics teachers. Of 2,530 science teachers, 57% were female and 13% minority. Sixty-one percent held an advanced degree. Like mathematics teachers, on average, science teachers included in the analyses had about 10 years of teaching experience. Among 760 schools, 85% were public. The average number of full-time teachers was about 83. The average percentages of free lunch students were approximately 4 (i.e., at least 30% but less than 40%). Both average percentages of black and Hispanic students were about 2 (i.e., at least 10% but less than 20%). The average mean of school achievement was about 40. Both average levels of principal support and PLC were 3.07, showing relatively positive assessments of principal support and PLC.
Mathematics teachers. Table 2 presents HLM results for mathematics teachers. Model 1, where only the dependent variable was included, suggested that about 15% of the total variance in group-level teacher expectations was attributable to the differences between schools. Model 2, which included all teacher-level variables, showed that teacher self-efficacy and years of teaching were significantly and positively related to group-level teacher expectations. In Model 3, we additionally included the school-level variables except for PLC. Results showed that principal support was significantly related to group-level teacher expectations, even after controlling for other variables. Specifically, mathematics teachers in schools with a high level of principal support showed a significantly higher level of group-level teacher expectations, compared to mathematics teachers in schools with a low level of principal support. In Model 4, we additionally added PLC at the school-level. Results showed that PLC at the school-level was significantly and positively related to group-level teacher expectations. One unit increase in the school-level PLC was associated with .396 increases in group-level teacher expectations. The coefficient of principal support, which was a significant predictor in Model 4, substantially reduced from .184 to .079 (approximately 57% reduction) but remained statistically significant.

Science teachers. Table 3 presents HLM results for science teachers. Model 1 where only the dependent variable was included suggested that about 17% of the total variance in group-level teacher expectations was attributable to the school-level. Model 2, which included only the teacher-level variables, showed that teacher self-efficacy and years of teaching were significantly and positively related to group-level teacher expectations, consistent with the results for
mathematics teachers. In Model 3, we additionally included all school-level variables but PLC. Consistent with the findings for mathematics teachers, results showed that principal support was significantly and positively related to group-level teacher expectations for science teachers. In Model 4 where we additionally added PLC, PLC was a significant predictor of group-level teacher expectations for science teachers, even after controlling for other variables, which is consistent with results for mathematics teachers. Specifically, one unit increase in the index of PLC at the school-level was associated with .396 increases in group-level teacher expectations. Meanwhile, the size of the coefficient of principal support was reduced by approximately 64% (from .151 to .055), even though it remained statistically significant.

**Discussion**

Although literature suggests the importance of group-level teacher expectations for students’ learning outcomes, a very small number of studies used large-scale data to examine school-level factors associated with group-level teacher expectations. Using contextual data for mathematics and science teachers from the HSLS:09, the current study addressed this research gap by paying attention to the roles of principal support and PLC in regard to group-level teacher expectations. Our analyses of HSLS:09 showed that principal support at the school-level was positively associated with group-level teacher expectations for both mathematics and science teachers, even after controlling for other variables, supporting the first hypothesis. This finding of the positive relationship between principal support and group-level teacher expectations is inconsistent with the evidence provided by Newmann et al. (1989) who analyzed data from the 1984 HS & B Administrator and Teacher Survey. We speculate that the significant role of contemporary principals may reflect current trends in increased responsibilities and accountability of school leadership (Wahlstrom & Louis, 2008). Yet, more research is needed to
understand the inconsistent findings with respect to the roles of principals in relation to group-level teacher expectations.

In addition, our results showed that PLC was positively related to group-level teacher expectations for both mathematics and science teachers, even after controlling for other variables, supporting the second hypothesis. In fact, PLC was the most important predictor of group-level teacher expectations among the variables included in our analyses. As described earlier, numerous studies suggest that transforming a school into a PLC generates many positive effects for both teachers and students (Akiba & Liang, 2016; Bruce & Flynn, 2012; Hord, 2004; Louis & Marks 1998; Park et al., 2019; Strahan, 2003). This is one of the reasons why PLC has been suggested as an important tool to improve school innovation and effectiveness (Hord, 2004; Stoll & Louis, 2007). Our finding of the significant role of PLC in regard to group-level teacher expectations adds to the evidence on the benefits of PLC. Additionally, this finding extends prior work by Sebastian et al. (2016, 2017) by demonstrating a directional relationship between PLC and group-level teacher expectations and improving the generalizability with more nationally representative data.

Finally, we found that much of the relationship between principal support and group-level teacher expectations was explained by PLC for both mathematics and science teachers. This finding suggests that principal support may be related to the construction of mathematics and science teachers’ expectations of their students largely through PLC that is established within subject departments in high school. This finding adds to evidence on the theory of school organization, which highlights that individual teachers’ instructional beliefs, expectations, and behaviors are shaped by interactions and networking with their peer teachers within each subject department (Bidwell, Frank, & Quiroz, 1997; Bidwell & Yasumoto, 1999). Although differing
operationalization of the mediators does not permit direct comparisons of results, our finding that PLC explained much of the relationship between principal support and group-level teacher expectations is also in consonance with the research done by Supovitz et al. (2010), which demonstrates that peer teacher influence mediates the relationship between principal leadership and teachers’ instructional practices. Together, these findings highlight the important roles of principal support and PLC in fostering group-level teacher expectations.

The current study has important policy implications for school effectiveness and school improvement. Our study highlights the importance of principal support and PLC in raising group-level teacher expectations. Although we did not investigate the impact of group-level teacher expectations on students’ learning outcomes, numerous studies have documented the positive effect of teacher expectations on student achievement (Mistry et al., 2009; Muller, 1997; Muller et al., 1999; Park et al., 2019; Rubie-Davies, 2010; Tyler & Boelter, 2008; Woolley et al., 2010). Therefore, one policy implication is that school reform initiatives or professional development focusing on either principal leadership or PLC or both can increase group-level teacher expectations.

**Limitations of the Study and Directions for Future Research**

The present study has several limitations that need to be addressed in future research. First, in the current study, we focused on group-level teacher expectations by conceptually

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7 Although our reliance on the base-year survey of HSLS:09 does not allow for appropriate mediation tests (Maxwell & Cole, 2007; Maxwell, Cole, & Mitchell, 2011), we conducted supplementary ordinary least squares (OLS) analyses to examine the relationship between principal support and PLC at the school-level in order to better address the potential role of PLC as a mediator in linking principal support to group-level teacher expectations, following the recommended steps set forth by Baron and Kenny (1986). We found significant and positive relationships between principal support and PLC for both mathematics and science teachers with and without school-level controls (see Appendix D). The Sobel test based on the estimates from the final OLS and HLM models suggested that the indirect effect of principal support on group-level teacher expectations via PLC was significantly different from zero for both mathematics and science teachers. Once again, however, the results from our supplementary analyses should be interpreted with great caution because of data limitations.
differentiating them from individual-level teacher expectations. However, group- and individual-level teacher expectations are likely correlated with each other. Accordingly, individual-level teacher expectations should not be considered unimportant. Second, as noted earlier, the cross-sectional nature of the base-year survey of HSLS:09 does not permit us to test mediation models because cross-sectional data can result in biased estimates (Maxwell & Cole, 2007; Maxwell, Cole, & Mitchell, 2011). In this regard, future research should use longitudinal designs and more sophisticated mediation models to better establish the causal relationships among principal support, PLC, and group-level teacher expectations.

Third, although we examined a number of teacher- and school-level variables, we could not rule out the possibility that omitted variables especially at the school level might affect the overall model. Importantly, in light of recent high-stakes accountability environments (Munoz & Barber, 2011) and increased interests in distributed leadership (Spillane, 2006), other school leaders including assistant principals and department chairs may also play a significant role in shaping PLC and group-level teacher expectations. In addition, although we highlighted the importance of PLC as a possible mechanism by which principal leadership relates to group-level teacher expectations, there may be other pathways by which principal leadership relates to group-level teacher expectations other than PLC, such as school safety and parent-community ties (Bryk et al., 2010; Sebastian et al., 2016, 2017). Therefore, future research should use a more

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8 Following Frank (2000), we conducted supplementary analyses to test the robustness of inferences and found that an omitted variable would have to be correlated at .49 and .51 with the group-level teacher expectations for mathematics and science teachers, respectively, and at .49 with the predictor of PLC (conditioning on the observed covariates) to invalidate an inference based on a threshold of .03 for statistical significance (alpha = 0.05). Correspondingly the impact of an omitted variable (as defined in Frank 2000) must be .24 and .26 to invalidate an inference for mathematics and science teachers, respectively. Together, these results suggest that our conclusions may be unlikely to change due to omitted variables. Yet, given that school-level organizational constructs are usually highly correlated among each other (e.g., Supovitz et al., 2010), supplementary results should be interpreted with caution.
PREDICTORS OF GROUP-LEVEL TEACHER EXPECTATIONS

comprehensive set of controls and multiple mediators to examine the relationships among principal support, PLC, and group-level teacher expectations.
References


PREDICTORS OF GROUP-LEVEL TEACHER EXPECTATIONS


PREDICTORS OF GROUP-LEVEL TEACHER EXPECTATIONS


https://doi.org/10.1177/0013161X08321501


http://dx.doi.org/10.2307/2112828


PREDICTORS OF GROUP-LEVEL TEACHER EXPECTATIONS


Strahan, D. (2003). Promoting a collaborative professional culture in three elementary schools that have beaten the odds. *The Elementary School Journal, 104*(2), 127-146. https://doi.org/10.1086/499746


## Table 1.
Descriptive Statistics of the Variables Used in Analysis for Mathematics and Science Teachers

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mathematics teachers</th>
<th>Science teachers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SE</td>
</tr>
<tr>
<td><strong>Level 1: Teacher level (Ns)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group-level teacher expectations (dependent variable)</td>
<td>3.37</td>
<td>0.43</td>
</tr>
<tr>
<td>Teacher self-efficacy</td>
<td>2.81</td>
<td>0.39</td>
</tr>
<tr>
<td>Female</td>
<td>0.61</td>
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<tr>
<td>Minority</td>
<td>0.12</td>
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</tr>
<tr>
<td>Advanced degree</td>
<td>0.56</td>
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<tr>
<td>Years of teaching</td>
<td>10.19</td>
<td>8.39</td>
</tr>
<tr>
<td><strong>Level 2: School level (Ns)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Public</td>
<td>0.88</td>
<td>–</td>
</tr>
<tr>
<td>Number of full-time teachers</td>
<td>87.96</td>
<td>43.99</td>
</tr>
<tr>
<td>% of free lunch students</td>
<td>4.02</td>
<td>2.45</td>
</tr>
<tr>
<td>% of black students</td>
<td>2.09</td>
<td>1.71</td>
</tr>
<tr>
<td>% of Hispanic students</td>
<td>2.04</td>
<td>1.89</td>
</tr>
<tr>
<td>School academic achievement</td>
<td>40.24</td>
<td>5.93</td>
</tr>
<tr>
<td>Principal support</td>
<td>3.11</td>
<td>0.39</td>
</tr>
<tr>
<td>Professional learning community</td>
<td>3.06</td>
<td>0.34</td>
</tr>
</tbody>
</table>

*Note.* Sample sizes rounded to the nearest 10 for the National Center for Education Statistics requirements. The estimates are an average of the results across ten imputed datasets.
## Table 2.
### HLM Models Predicting Group-Level Teacher Expectations: Mathematics teachers

<table>
<thead>
<tr>
<th>Fixed effect</th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
<th>Model 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Intercept)</td>
<td>3.370 ***</td>
<td>2.738 ***</td>
<td>2.066 ***</td>
<td>1.318 ***</td>
</tr>
<tr>
<td>Level 1: Teacher level (N = 3,320)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Teacher self-efficacy</td>
<td>—</td>
<td>0.208 ***</td>
<td>0.183 ***</td>
<td>0.170 ***</td>
</tr>
<tr>
<td>Female</td>
<td>—</td>
<td>0.001</td>
<td>0.003</td>
<td>-0.007</td>
</tr>
<tr>
<td>Minority</td>
<td>—</td>
<td>0.028</td>
<td>0.059 *</td>
<td>0.023</td>
</tr>
<tr>
<td>Advanced degree</td>
<td>—</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>Years of teaching</td>
<td>—</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>Level 2: School level (N = 680)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Public</td>
<td>—</td>
<td>—</td>
<td>-0.068</td>
<td>-0.062 *</td>
</tr>
<tr>
<td>Number of full-time teachers</td>
<td>—</td>
<td>—</td>
<td>0.000</td>
<td>-0.001 **</td>
</tr>
<tr>
<td>% of free lunch students</td>
<td>—</td>
<td>—</td>
<td>-0.017 **</td>
<td>0.006</td>
</tr>
<tr>
<td>% of black students</td>
<td>—</td>
<td>—</td>
<td>0.002</td>
<td>0.006</td>
</tr>
<tr>
<td>% of Hispanic students</td>
<td>—</td>
<td>—</td>
<td>0.000</td>
<td>0.005</td>
</tr>
<tr>
<td>School academic achievement</td>
<td>—</td>
<td>—</td>
<td>0.008 ***</td>
<td>0.002</td>
</tr>
<tr>
<td>Principal support</td>
<td>—</td>
<td>—</td>
<td>0.184 ***</td>
<td>0.023</td>
</tr>
<tr>
<td>Professional learning community</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>0.396 ***</td>
</tr>
</tbody>
</table>

### Variance components

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<th>Level 1 (teacher)</th>
<th>Total</th>
</tr>
</thead>
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<tr>
<td></td>
<td>0.03</td>
<td>0.15</td>
<td>0.18</td>
</tr>
<tr>
<td></td>
<td>0.02</td>
<td>0.15</td>
<td>0.17</td>
</tr>
<tr>
<td></td>
<td>0.01</td>
<td>0.15</td>
<td>0.16</td>
</tr>
<tr>
<td></td>
<td>0.00</td>
<td>0.15</td>
<td>0.15</td>
</tr>
</tbody>
</table>

*Note.* The estimates are an average of the results across ten imputed datasets.

***p<.001, **p<.01, *p<.05 (two-tailed tests)
Table 3.
HLM Models Predicting Group-Level Teacher Expectations: Science Teachers

<table>
<thead>
<tr>
<th>Fixed effect</th>
<th>Model 1 B</th>
<th></th>
<th>Model 2 B</th>
<th></th>
<th>Model 3 B</th>
<th></th>
<th>Model 4 B</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>(Intercept)</td>
<td>3.382</td>
<td>***</td>
<td>2.637</td>
<td>***</td>
<td>2.199</td>
<td>***</td>
<td>1.326</td>
<td>***</td>
</tr>
<tr>
<td>Level 1: Teacher level (N = 2,530)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Teacher self-efficacy</td>
<td></td>
<td></td>
<td>0.251</td>
<td>***</td>
<td>0.227</td>
<td>***</td>
<td>0.212</td>
<td>***</td>
</tr>
<tr>
<td>Female</td>
<td></td>
<td></td>
<td>0.008</td>
<td></td>
<td>0.011</td>
<td></td>
<td>0.017</td>
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<td>Minority</td>
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<td>0.026</td>
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<td>0.026</td>
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<tr>
<td>Advanced degree</td>
<td></td>
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<td>-0.013</td>
<td></td>
<td>0.018</td>
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<td>0.018</td>
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</tr>
<tr>
<td>Years of teaching</td>
<td></td>
<td></td>
<td>0.005</td>
<td>***</td>
<td>0.001</td>
<td>***</td>
<td>0.001</td>
<td>***</td>
</tr>
<tr>
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<td></td>
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<td></td>
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<td></td>
<td>0.039</td>
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<tr>
<td>Number of full-time teachers</td>
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<td></td>
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<td>0.000</td>
<td></td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td>% of free lunch students</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-0.013</td>
<td></td>
<td>0.007</td>
<td></td>
</tr>
<tr>
<td>% of black students</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.002</td>
<td></td>
<td>0.006</td>
<td></td>
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<tr>
<td>% of Hispanic students</td>
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<td></td>
<td>-0.006</td>
<td></td>
<td>0.006</td>
<td></td>
</tr>
<tr>
<td>School academic achievement</td>
<td></td>
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<td></td>
<td></td>
<td>0.004</td>
<td></td>
<td>0.002</td>
<td></td>
</tr>
<tr>
<td>Principal support</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.151</td>
<td>***</td>
<td>0.023</td>
<td>0.055***</td>
</tr>
<tr>
<td>Professional learning community</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Variance components

<table>
<thead>
<tr>
<th></th>
<th>Level 2 (school)</th>
<th></th>
<th>Level 1 (teacher)</th>
<th></th>
<th>Total</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Level 2 (school)</td>
<td>0.03</td>
<td></td>
<td>0.02</td>
<td></td>
<td>0.00</td>
<td></td>
</tr>
<tr>
<td>Level 1 (teacher)</td>
<td>0.17</td>
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<td>0.16</td>
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<td>0.16</td>
<td></td>
</tr>
<tr>
<td>Total</td>
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<td></td>
<td>0.18</td>
<td></td>
<td>0.16</td>
<td></td>
</tr>
</tbody>
</table>

Note. The estimates are an average of the results across ten imputed datasets.
***p<.001, **p<.01, *p<.05 (two-tailed tests)
## Appendix A.
**Survey Measure Reliability and CFA Loadings for Group-level Teacher Expectations among Mathematics and Science teachers**

<table>
<thead>
<tr>
<th>Items</th>
<th>CFA Loading</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mathematics</td>
</tr>
<tr>
<td>1. Mathematics / science teachers at your school set high standards for teaching.</td>
<td>0.96</td>
</tr>
<tr>
<td>2. Mathematics / science teachers at your school set high standards for students’ learning.</td>
<td>0.94</td>
</tr>
<tr>
<td>3. Mathematics / science teachers at your school believe all students can do well.</td>
<td>0.69</td>
</tr>
<tr>
<td>4. Mathematics / science teachers at your school make expectations for instructional goals clear to students.</td>
<td>0.76</td>
</tr>
<tr>
<td>5. Mathematics / science teachers at your school have given up on some students.</td>
<td>0.59</td>
</tr>
<tr>
<td>6. Mathematics / science teachers at your school care only about smart students.</td>
<td>0.68</td>
</tr>
<tr>
<td>7. Mathematics / science teachers at your school expect very little from students.</td>
<td>0.77</td>
</tr>
<tr>
<td>8. Mathematics / science teachers at your school work hard to make sure all students are learning.</td>
<td>0.69</td>
</tr>
<tr>
<td>Reliability (α)</td>
<td>0.85</td>
</tr>
</tbody>
</table>
**Appendix B.**

*Survey Measure Reliability and CFA Loadings for Principal Support among Mathematics and Science Teachers*

<table>
<thead>
<tr>
<th>Items</th>
<th>CFA Loading</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mathematics teachers</td>
<td>Science teachers</td>
<td></td>
</tr>
<tr>
<td>1. The principal deals effectively with pressures from outside the school that interfere with my teaching.</td>
<td>0.81</td>
<td>0.81</td>
<td></td>
</tr>
<tr>
<td>2. The principal does a poor job of getting resources for this school (reverse coded).</td>
<td>0.62</td>
<td>0.64</td>
<td></td>
</tr>
<tr>
<td>3. The principal sets priorities, makes plans, and sees that they are carried out.</td>
<td>0.90</td>
<td>0.89</td>
<td></td>
</tr>
<tr>
<td>4. The principal knows what kind of school he or she wants and has communicated it to the staff.</td>
<td>0.90</td>
<td>0.90</td>
<td></td>
</tr>
<tr>
<td>5. The principal lets staff members know what is expected of them.</td>
<td>0.89</td>
<td>0.88</td>
<td></td>
</tr>
<tr>
<td>6. The principal is interested in innovation and new ideas.</td>
<td>0.79</td>
<td>0.81</td>
<td></td>
</tr>
<tr>
<td>7. The principal usually consults with staff members before he or she makes decisions that affect them.</td>
<td>0.75</td>
<td>0.77</td>
<td></td>
</tr>
<tr>
<td>Reliability (α)</td>
<td>0.87</td>
<td>0.92</td>
<td></td>
</tr>
</tbody>
</table>
Appendix C.
Survey Measure Reliability and CFA Loadings for Professional Learning Community among Mathematics and Science Teachers

<table>
<thead>
<tr>
<th>Items</th>
<th>Mathematics teachers</th>
<th>Science teachers</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Mathematics / science teachers in this department share ideas on teaching.</td>
<td>0.91</td>
<td>0.89</td>
</tr>
<tr>
<td>2. Mathematics / science teachers in this department discuss what was learned at a workshop or conference.</td>
<td>0.79</td>
<td>0.82</td>
</tr>
<tr>
<td>3. Mathematics / science teachers in this department share and discuss student work.</td>
<td>0.74</td>
<td>0.75</td>
</tr>
<tr>
<td>4. Mathematics / science teachers in this department discuss particular lessons that were not very successful.</td>
<td>0.84</td>
<td>0.83</td>
</tr>
<tr>
<td>5. Mathematics / science teachers in this department discuss beliefs about teaching and learning.</td>
<td>0.84</td>
<td>0.84</td>
</tr>
<tr>
<td>6. Mathematics / science teachers in this department share and discuss research on effective teaching methods.</td>
<td>0.83</td>
<td>0.84</td>
</tr>
<tr>
<td>7. Mathematics / science teachers in this department share and discuss research on effective instructional practices for English language learners.</td>
<td>0.61</td>
<td>0.59</td>
</tr>
<tr>
<td>8. Mathematics / science teachers in this department explore new teaching approaches for underperforming students.</td>
<td>0.74</td>
<td>0.77</td>
</tr>
<tr>
<td>9. Mathematics / science teachers in this department make a conscious effort to coordinate the content of courses with other teachers in this school.</td>
<td>0.56</td>
<td>0.60</td>
</tr>
<tr>
<td>10. Mathematics / science teachers in this department are effective at teaching students in mathematics / science</td>
<td>0.63</td>
<td>0.68</td>
</tr>
<tr>
<td>Reliability ($\alpha$)</td>
<td>0.89</td>
<td>0.90</td>
</tr>
</tbody>
</table>
PREDICTORS OF GROUP-LEVEL TEACHER EXPECTATIONS

Appendix D.
Ordinary Least Squares Regression Models Predicting Professional Learning Community

<table>
<thead>
<tr>
<th></th>
<th>Mathematics teachers</th>
<th></th>
<th>Science teachers</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Model 1</td>
<td>Model 2</td>
<td></td>
<td>Model 1</td>
</tr>
<tr>
<td>B</td>
<td>SE</td>
<td>B</td>
<td>SE</td>
<td>B</td>
</tr>
<tr>
<td>Principal support</td>
<td>0.294***</td>
<td>0.032</td>
<td>0.282***</td>
<td>0.032</td>
</tr>
<tr>
<td>Controls</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>$R^2$</td>
<td>0.11</td>
<td>0.15</td>
<td>0.11</td>
<td>0.12</td>
</tr>
<tr>
<td>N</td>
<td>680</td>
<td>760</td>
<td>680</td>
<td>760</td>
</tr>
</tbody>
</table>

Note. The estimates are an average of the results across ten imputed datasets by using Rubin’s rule. Controls include school sector, number of full-time teachers, % of free lunch students, % of black students, % of Hispanic students, and school academic achievement.

a. $R^2$ is based on one complete and imputed dataset.

***p<.001, **p<.01, *p<.05 (two-tailed tests)