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Urban High School Students' Academic Communities and Their Effects on Mathematics Success

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This article reports findings from a study exploring the roles of peer influences in cultivating urban high school students' academic success in mathematics. While the literature describing family/school influences on the academic achievement of students of color is compelling, much of it suggests that urban students' peer groups do not support academic achievement. This study of high school students sought to link their academic behaviors to a historical tradition of intellectual networks within their communities. The ways in which students' peer groups, families, and school communities fostered their mathematics success are discussed with the aim of helping researchers and educators gain a more complete vision of urban students' achievement.

KEYWORDS: academic success, ethnic minority students, mathematics, peer influences, urban education

The continued underachievement of African American and Latino/a students relative to their Asian and White counterparts (College Board, 1999; Jencks & Phillips, 2001) is a major problem in American education. While the nature of structural inequality in American society and education is well documented and recognized as being critical to understanding continued achievement differences (Conley, 1999; Darling-Hammond, 1995; Hilliard, 2003; Oakes, 1995), the ways in which beliefs about students of color and their intellectual potential are manifested in schools—by both teachers and students—are not often critically examined (Howard & Hammond, 1985; Pollock, 2001; Powell, 1997). In addition, our framing of this performance gap ensures that we spend a great deal of time and research exploring reasons for school failure. Some

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researchers have studied academically successful students of color, examining characteristics of these students' families and schools to explain their academic achievement (College Board, 1999; Conchas, 2001; Datnow & Cooper, 1997; Martin, 2000). However, more attention should be directed to the attitudes and behaviors of students themselves, the explanations they give for their academic success, the interaction between school climate and student peer group norms, and the implicit and explicit support (or lack of support) for academic success they may receive from their peers.

In particular, critical areas to explore are how these underserved students and their peers navigate the school environment and actively endorse behaviors that support academic achievement. Some current expositions of the performance gap suggest that Black and Latino/a student peer groups may not support academic achievement; but this view does not allow for discussion of the complexity of the contexts that may influence peer support. Nor have such expositions provided a space for understanding the extent of Black and Latino/a community involvement in education; in recent years, historical and current community engagement in both the African American (Anderson, 1988; Gunn Morris & Morris, 2000; Jordan-Irvine, 2000; Mirel, 1999; Perry, Steele, & Hilliard, 2003; Siddle-Walker, 1996) and Latino/a (Auerbach, 2002; Conchas, 2001; Moreno, 1999; Stanton-Salazar, 2001; Valenzuela, 1999) communities has been described. Limited and limiting perspectives have also minimized what we can learn from institutions that have served students of color and effectively used students' peer networks to promote high academic achievement (Cooper, 2002; Cooper, Cooper, Azmitia, Chavira, & Gullatt, 2002; Fullilove & Treisman, 1990; Gandara, 2004; Hrabowski, Maton, & Grief, 1998).

In mathematics, several authors (Fullilove & Treisman, 1990; Hilliard, 2003; Hrabowski et al., 1998; Moses & Cobb, 2001) have described the importance of students belonging to peer groups that support their mathematics learning. When describing ethnic differences in achievement in mathematics, researchers suggest that one reason for continued performance gaps in mathematics favoring Asian American students (on average) is the focus on collaboration within many groups in the Asian American community (Chen & Stevenson, 1995; Treisman, 1992), and particularly the fact that students frequently work in groups on academic tasks outside of school (Fullilove & Treisman, 1990; Treisman, 1992). In mathematics, this is particularly useful in that learning to communicate mathematical ideas, gaining insight from peers while completing problem-solving activities, and discussing mathematical reasoning, proof, and justification are important components of developing quantitative ability (Hiebert et al., 1997; National Council of Teachers of Mathematics, 2000; Webb & Mastergeorge, 2003).

The literature in mathematics education has shifted from merely documenting underachievement of African American, Latino/a, and Native American students in mathematics to examining ways in which effective mathematics education can occur, especially through pedagogy (Gutstein, Lipman, Hernandez, & de los Reyes, 1997; Ladson-Billings, 1995, 1997), mathematics education

curricular and policy reform (Allexsaht-Snider & Hart, 2001; Gutierrez, 2000; Tate, 1995), and increased access to advanced mathematics (College Board, 1999; Moses & Cobb, 2001). However, missing from this literature is an examination of how students' academic communities inside and outside of school contribute to mathematics learning, engagement, and behavior. In this study, I sought to examine, in particular, the ways in which students' peers contribute to their mathematics success.

Background

A "Hidden" Legacy

It is important to understand that there is a legacy of achievement orientation in underserved communities that may be useful to our understanding of student achievement today. Recent work (Cooper et al., 2002; Guajardo & Guajardo, 2004; Moreno, 1999; Perry et al., 2003) highlights the intellectual heritage of people of color[1] and the role of their community traditions (e.g., historically Black colleges and universities, churches and other religious organizations, social clubs, and political organizations) in challenging limited and limiting education and developing academically successful individuals. In particular, the academic success of many African American students during the era of segregation despite odds imposed by societal mores and governmental agencies, both within segregated schools and in nominally desegregated schools, was largely due to an ethos facilitated by supportive social networks consisting of relatives, community members, and others who may or may not have had a close familial relationship with individual students (Gunn Morris & Morris, 2000; Perry et al., 2003; Siddle-Walker, 1996). These social networks formed an academic community that fostered academic success.

Although contemporary accounts of the education of African Americans before and after the civil rights movement have begun to shed light on these positive communities, they have not explicitly focused on the positive role of peers in Black academic achievement. For example, Perry et al.'s (2003) narrative analysis comprehensively describes the supportive roles of family and community in fostering African American success, but it does not explicitly address the positive role of peers in facilitating academic success, although this is implicit in some of the narratives included. There are critical differences between what we know to be the historic roles of communities in developing and supporting the academic success of Latino/a and Black students and the ways in which we currently view these students' peer groups and their impact on intellectual identities.

Academically successful African Americans and Latino/as have acknowledged the implicit and explicit support of their immediate peer groups, "near peers" (those who may not necessarily have been close to them in age but were still of their "generation"), and mentors. Tate (1994), for example, in describing his counselor's and other administrators' attempts to keep him and some of his high school classmates out of advanced mathematics and science

classes, wrote about the students' collective efforts to fight these attempts and his subsequent efforts to interest classmates, friends, and family members in doing mathematics. Flores-Gonzalez (1999) reported that the Latino/a students in her study formed a visible high school peer group that endorsed high achievement and promoted academic behaviors. Davis, Jenkins, and Hunt (2002) wrote powerfully about their experiences as young African American men working together to become doctors of medicine and dentistry. Their self-supporting peer network endorsed important academic behaviors, including their pushing each other to continue to take advanced mathematics and science courses, as well as persisting in college. Their book illustrates that they benefited from each other's encouragement.

Historical studies of Black and Latino/a educational communities (Anderson, 1988; Cooper et al., 2002; Franklin, 1990; Guajardo & Guajardo, 2004; Gunn Morris & Morris, 2000; Moreno, 1999; Siddle-Walker, 1996) reveal that, as communities of learners, Black and Latino/a students were driven to excel by each other as well as by older students (including their own siblings) and adults (both parents and supportive teachers and school administrators). Certainly in contemporary research focusing on adolescent students, there is a fundamental premise that students' peer groups may be critical in the development of an identity that supports academic success (e.g., Azmitia & Cooper, 2001; Datnow & Cooper, 1997; T. C. Howard, 2003; Steinberg, Dornbusch, & Brown, 1992; Yonezawa, Wells, & Serna, 2002).

It is also important to consider other interpersonal relationships that may affect students' academic identity and behaviors. We know much about how students' families and teachers support academic behaviors but less about how these relationships may interact and, specifically, how they might support mathematics engagement. Parental involvement in students' academic lives—ranging from homework help to advocacy of advanced course taking—is "widely recognized as an important contributor to the academic success of African American students" (Yan, 1999, p. 5). Teachers who have high expectations for academic achievement (Hilliard, 2003; Jordan-Irvine, 2000), provide rigorous and challenging work in class (Gutierrez, 2000; Ladson-Billings, 1997), and have supportive relationships with students that extend beyond the classroom (T. C. Howard, 2003; Valenzuela, 1999) are deemed to be important in the achievement of African American and Latino/a students.

The current discourse about the academic achievement of students of color has largely neglected the important context of their community's support for education and positive peer influences (for notable exceptions, see, among others, Perry et al., 2003). Furthermore, throughout the literature, there is a supposition that these networks that historically supported academic achievement have eroded. Now, in an era in which most urban schools are segregated 50 years after the *Brown* decision rendered school segregation unconstitutional (Orfield & Yun, 1999), a seemingly common (and largely anecdotal) perception is that there is less support for education, academic achievement, and academic activities among members of these communities in general and among Black and Latino/a adolescents in particular.

School-Family Relationships

Despite substantial research detailing the importance of parental involvement in student achievement and evidence that parents of students of color are committed to the academic success of their children, schools are often unwelcoming or hostile to parents and do not wish to include them in the planning of school events and academic decisions about their children (Auerbach, 2002; Delpit, 1995). School administrators, teachers, and counselors may consider parents of students of color obstacles to be overcome, contending that they are uneducated and not interested in students' academic work (Yan, 1999). In particular, school officials point to low rates of attendance on parent-teacher nights in urban schools as an indicator of parents' disinterest in their children's education. Too often, however, school practices and cultures are not conducive to enlisting the aid of students' parents in supporting academic engagement (Auerbach, 2002; Delpit, 1995). Well-connected, affluent parents are often more valued by schools (Valenzuela, 1999), and parents whose socioeconomic and ethnic background differs from that of administrators often find themselves outside of important decision-making processes involving their own children (Auerbach, 2002). Research shows that parents of color and those who are of low socioeconomic status may be less likely to question school decisions about their children, stating that "the teacher knows best" (Polite, 1994; Useem, 1992).

Secondary school course placement procedures are particularly problematic, because they are often complex, bureaucratic, and arbitrary (Useem, 1992). Occasionally, the breakdown in communication between parents and schools leads to disaster for students. For example, many of the students in Polite's (1994) study of male African Americans simply chose the easiest courses, unaided by their parents, because their parents believed that this was the counselor's job. However, the counselors and teachers at the school adopted a "hands-off" philosophy adhered to by the largely White teaching and counseling staff, which was fearful of inappropriately tracking Black students. While research has documented that there may be cultural differences in expectations of authority, there are many examples in which parents of color have advocated for their children's education (Auerbach, 2002; Walker & McCoy, 1997).

Students of color often feel that their teachers lack interest in them as academic scholars (Yonezawa et al., 2002). Students report various ways in which teachers make their disinterest apparent; level of classroom discipline, academic expectations, challenging work, and caring are all indicators for students of teachers' interest in them as students and human beings (Corbett & Wilson, 2002; Delpit, 1995). For example, the Black male high school students in Polite's study characterized the majority of their teachers and counselors as "uncaring" because of their perceived disinterest in student coursework. Similar to Polite's study, Ferguson (2002) found that Black students placed a greater premium than students from other groups on the role of teacher encouragement in their academic progress.

Substantial research reveals that school student body characteristics are strongly correlated with opportunities to enroll in high-level, rigorous, college-preparatory courses (e.g., Darling-Hammond, 1995; Gandara, O'Hara, & Gutierrez, 2004; Oakes, 1990). For example, consider school adults working at urban, predominantly Latino/a or African American schools; the attitudes and beliefs of these individuals about Latino/as and African Americans may affect how they interact with students at an academic level as well as a social one. Indeed, school adults' beliefs about students' prognosis for performance significantly affect policy decisions in the areas of curriculum, school organization, extracurricular activities, and discipline (Allexsaht-Snider & Hart, 2001; Gutierrez, 2000; Yonezawa et al., 2002). In these settings, academically supportive peer groups for students of color might exist but could be faced with school structures and policies that make it difficult for students to maintain connections to academics and may indeed help to perpetuate peer groups' negative social consequences in terms of student achievement.

Ensuring that schools respect and value the culture of their students, as well as both the tangible and intangible contributions that many parents make to their children's education, is an important component of improving education for underserved students. Parents have been shown to have the most impact on students' long-term academic plans, although peers are more influential than parents when it comes to school-related activities such as time spent on homework and behavior in school (Steinberg et al., 1992). Thus, if students are socialized by their parents to value education and to pursue postsecondary education, this may have a strong influence on how they perceive the importance of school and schooling activities. In addition, the way in which schools value parental involvement—through participation in school activities—may not be the most important factor affecting the achievement of students of color. Martin (2000) and others have found that frequent discussion of academic issues at home significantly contributes to student achievement.

Peer Influences and Academic Achievement

A substantial body of research reveals that adolescents of all ethnicities seem to lose interest in education as they progress through school (Osborne, 1997; Steinberg et al., 1992). The late elementary school years and middle school years are the times when the values of adolescents' peer groups begin to supersede the values of their parents and families and, according to many educators, the peer group focus shifts from academic to nonacademic activities and has a significant influence on students' beliefs and behaviors about school and academic achievement (Graham, Taylor, & Hudley, 1998; Steinberg, Brown, & Dornbusch, 1996). Parents may express concern that the academic influences of their adolescents' peers outweigh their own positive academic influences (Auerbach, 2002; Azmitia & Cooper, 2001; Stanton-Salazar, 2001; Steinberg et al., 1992, 1996). Furthermore, ethnic minority students often say that their peer group presents obstacles to their achievement (Azmitia & Cooper, 2001; Cammarota, 2004; Martin, 2000; Ogbu, 2003).

Some students of color may have to respond to challenges from peers (Azmitia & Cooper, 2001; Conchas, 2001; Ogbu, 2003) who question their allegiance to their ethnic group. If the perception of students' peer group is that they are not adhering to the group's norms around achievement, and these norms are not counteracted by school adults (Polite, 1994), students may find themselves constantly negotiating between their friends' perceptions of them and their own academic identities. Dominant peer group norms, especially if they do not support academic behaviors, can exacerbate a climate of underachievement, particularly in the case of African American and Latino/a students.

One widely held theory regarding African American and Latino/a underachievement and the role of peer influences in achievement comes from the work of Fordham (1988), Fordham and Ogbu (1986), and Ogbu (1986). This theory suggests that "involuntary minorities" (Ogbu, 1986), including African Americans and Latino/as, eschew schooling because they do not see it as a legitimate enterprise in terms of improving the odds of social mobility for people who share their ethnic heritage. In Fordham's (1988) work, adolescents reported that students who did well academically were seen as "acting White." Even though some have challenged Fordham's and Ogbu's theories (Ainsworth-Darnell & Downey, 1998; Cook & Ludwig, 1998; Ford, Harris, Webb, & Jones, 1994), noting that they do not provide a framework for understanding ethnic minority students' success (Conchas, 2001), it is important to examine them because they have had a significant and pervasive impact on how educators view African American and Latino/a students and their responses to schooling.

In support of Fordham and Ogbu's theory, there is qualitative evidence that ethnic minority students may avoid taking certain advanced courses for social reasons—they want to attend classes with their friends, not be the sole ethnic minority students in certain classes, and not "stand out" academically (Polite, 1994; Walker & McCoy, 1997). In particular, academically successful students may attempt to minimize their academic success to be accepted by their peers (Cooper et al., 2002; Ford, 1996; Fordham & Ogbu, 1986; Walker & McCoy, 1997), who may not value academic success or consider it to be the domain of students from other ethnic groups. Using data from the National Education Longitudinal Study of 1988, Cook and Ludwig (1998) found that there was no difference between Black and White students in regard to social penalties incurred for success; that is, high-achieving Black and White students were "no more likely to be unpopular than other students" (p. 391). But Fordham's (1988) work suggests that Black students may adopt a stance of "racelessness" in which they "assimilate into the dominant group by de-emphasizing characteristics that might identify them as members of the subordinate group" (Tatum, 1997, p. 63). Several recent popular and empirical works paint the picture that academically successful Black students, more so than their White counterparts, may often have a tough choice: do well in school and be a loner or conform to group norms regarding academic performance and have a social life (Bempechat, 1998; Steinberg et al., 1996; Suskind, 1998).

Ogbu's (2003) recent work examining the academic achievement of African American students in Shaker Heights, Ohio, suggests that Black students' academic behaviors reflect their belief that performing well lessens their acceptance by their Black peers.

Many researchers have argued that different social penalties may be paid by underrepresented students of color than by White students. We know very little about these particular mechanisms, and, furthermore, we know little about the peer groups of Black and Latino/a students who are academically successful beyond stereotypical notions that such students are "loners" and socially inept. Nor do we know how strong the "codes" about academic achievement are in these students' peer groups or how they affect student achievement (Yonezawa et al., 2002). Undoubtedly, there are many students who do well academically and maintain connections to their ethnic group (Conchas, 2001; Datnow & Cooper, 1997; Flores-Gonzalez, 1999). Indeed, it is possible that peer support for Black and Latino/a students' academic achievement is not as dichotomous (Ogbu, 2003) as much of the research suggests.

The prevalent interpretations may lead to an oversimplified characterization according to which all Latino/a and Black students respond to schooling, whether or not they consider it oppressive, in the same ways: by overtly resisting schooling or by not trying hard. But it is certainly possible that some Latino/a and Black students respond to school in ways that support academic achievement. For example, some researchers have found that because of the pervasive intellectual stereotypes about African Americans, students may engage in academic activities as a "mission" to prove that they are not intellectually inferior (Ford et al., 1994; Perry, 2003; Yonezawa et al., 2002). Datnow and Cooper (1997) discovered that Black students attending predominantly White independent schools relied on formal and informal peer networks for various kinds of academic support. This support ranged from "modeling" of academic behaviors (by a student who studied in the library rather than spend free time playing in a basketball game) to older students explicitly helping and tutoring younger students (Datnow & Cooper, 1997). Cooper (2002) reported that peers' positive influences contributed to Latino/a students' success in a college outreach program. Thus, it is entirely possible, and indeed probable, that successful African American and Latino/a students draw different types of support from peers who may or may not share their academic success, in ways that we still do not fully understand (Azmitia & Cooper, 2001; Flores-Gonzalez, 1999).

It is clear that successful urban high school students benefit from attentive and interested parents, committed and caring teachers, and supportive peers who express in various ways that they share students' commitment to and interest in education. Evidence suggests that Black and Latino/a support for education remains strong (Azmitia & Cooper, 2001; Hochschild, 1995; Solorzano, 1992; Stanton-Salazar, 2001). However, many education researchers argue that this support is mitigated by adolescent behaviors or attitudes that do not foster academic achievement (Conchas, 2001; Ferguson, 2002; Gandara et al., 2004; Mickelson, 1990; Ogbu, 2003; Romo & Falbo, 1996). Here I sug-

gest that there are multiple dimensions of students' peer networks for academic work that are augmented by teacher and parent support.

The research literature on high levels of mathematics achievement among Black and Latino/a students and the mechanisms by which they are fostered by peers is limited. Students' peer groups may provide support that goes unnoticed by parents or school adults but can be useful in improving achievement among underserved students. In many ways, we think we know a great deal about high-achieving urban students' academic communities: We assume that they do not have one, that high-achieving students are in conflict with their peers, and that they have to compensate for community and parent "deficits." It is this limited understanding of urban high school students that contributes to school practices that may negate or undervalue positive academic behaviors and attitudes fostered by students' parents and peers.

Method

Much of the literature suggests that adolescent students have to balance the normative requirements of the worlds they belong to: family, peers, and school. Phelan, Davidson, and Yu (1998) proposed the multiple worlds model to explain students' engagement in school; in essence, the worlds of school, family, and peers can be mutually supportive, ambivalent, or hostile. They discovered, in part, that students could find crossing the "borders" of these worlds to be smooth (if the worlds were congruent or if students found crossing between different worlds to be easy), manageable (if students were supported in perhaps different ways in different worlds or used strategies or previous experiences to help them negotiate the crossing), or difficult (if students found it difficult to manage the transition between distinctly different worlds). Depending on the networks available to students, these transitions could influence their academic engagement as well as their performance in school. In their work, Phelan et al. argued that these transitions might be difficult for students who are members of ethnic minority groups because the cultures of their world may be so "incongruent" as to create insurmountable obstacles.

Cooper et al.'s (2002) adaptation of Phelan, Davidson, and Yu's model built on this theory by suggesting and analyzing ways to help ethnic minority students "bridge multiple worlds," incorporating these students' cultural identities, families, and peer networks within academic interventions designed to improve their academic achievement and access to and persistence in college. However, as revealed by Datnow and Cooper (1997), students of color may have already constructed these bridges for themselves in schools that do not actively seek to assist students in negotiating the competing worlds of home and school. In this study, I examined how students' existing worlds, and their compatibilities and incongruencies, are reflected in academic communities that support and facilitate their mathematics achievement.

In the research described here, I used this "multiple worlds" framework (encompassing peers, family, and school) to examine the academic communities of mathematically high-achieving African American and Latino/a

youth attending a public high school in New York City. I was particularly interested in learning how these students would describe the roles of significant others in these multiple worlds in their academic success. While the multiple worlds framework is useful in exploring students' interpersonal networks with peers or significant others and how these networks contribute to their academic engagement, I also examined how these worlds interact to facilitate or obstruct academic achievement. Because the aforementioned literature reveals that student academic beliefs and behaviors inside and outside of school affect and are affected by peer group beliefs, norms, and behaviors, I focused not only on students' academic interactions with peers but also on how they were augmented by the influences of students' families and school communities.

I sought to answer the following questions: How do mathematically successful African American and Latino/a young people describe their academic communities, both inside and outside of school? and How do their peer, family, and school relationships facilitate their success? The site of the study was Lowell High School,[2] a small public high school in New York City that served approximately 300 students in Grades 9 through 12 in 2004 and 2005. About 97% of the students attending Lowell are Latino/a (56%) or Black (41%). The student body is predominantly female (60%), and approximately 70% of the students qualify for free or reduced price lunches. Most of the students attending Lowell come from upper Manhattan, which is one of the least economically advantaged but most culturally rich regions of the city of New York. The school is highly valued among neighborhood parents for its small size and dedicated corps of teachers. About 80% of Lowell's 20 teachers are fully certified; many (about 74%) have advanced degrees. About half of the teachers have spent more than 2 years teaching at Lowell, but most have taught fewer than 5 years in total.

Lowell's average performance on the New York State Board of Regents examination, a battery of assessments that New York students must take to graduate from high school, is similar to that of many other high schools in the city with similar demographic compositions. In mathematics, 65% of Lowell's students scored above a 55 (the range is 0 to 100) on the examination in 2003, thus meeting basic graduation requirements; however, only 26% of the students met the requirements to earn the more prestigious regents-endorsed diploma that year, as opposed to the alternative awarded to students who score above a 55, the local high school diploma. Thus, while Lowell's administrators consider it to be a "safe and thoughtful community of learners" with the goal of "meet[ing] the academic and affective needs of students through a rigorous and engaging interdisciplinary Regents-based curriculum,"[3] it is the desire of the administrators and teachers to improve students' academic achievement, particularly in mathematics.

I worked with Lowell's mathematics teachers[4] during the 2002–2003 academic year in after-school professional development seminars to explore ways in which to make their mathematics lessons more aligned with the standards of the National Council of Teachers of Mathematics and to discuss the

role of teacher expectations in student learning. I visited the school frequently and observed the classes of each of the four teachers twice during the academic year. After these visits, I had informal conversations with the teachers about their lessons, the students, the state mathematics examinations, and the curriculum. Lowell's mathematics teachers work closely to plan lessons and design assessments for the students. They have instituted several measures to improve mathematics achievement at Lowell, notably double periods for students who are not adequately performing in ninth grade. The teachers had similar philosophies about the teaching of mathematics, using a problem-solving approach and developing student-centered mathematics lessons; in their classroom practice, however, most teachers reported that they adhere to the traditional lecture format, explaining mathematics concepts and sometimes enlisting student comments during their explication. Students then spend the remainder of the class period (about 45 minutes) solving problems. The teacher circulates throughout the class, assisting where needed. Students most often work individually, although occasionally they participate in group work.

For the study, I asked Lowell's mathematics teachers to nominate their highest-achieving students for participation. Sixteen students were nominated by their teachers. Because teachers may be more likely to nominate students they perceive as well behaved and least likely to cause trouble rather than or in addition to achieving at a high level, students participating during the first round of interviews were asked to identify other students who did well in mathematics. Their nominees' achievement was confirmed with the Lowell teachers. This combination of nomination and snowball sampling (Lincoln & Guba, 1985) yielded a final group of 21 students. Several rounds of interviews were conducted in spring 2004, summer 2004, and fall 2004. Interview questions included the following:

- Why do you think you are doing well in mathematics this semester? Have you always gotten good grades in mathematics? If so, why? If not, why not?
- Think about your experiences in mathematics in school. Have there been obstacles (persons or things getting in your way) at school that could have prevented you doing well in math? If so, what were they and how did you get around them?
- Who or what contributes to your success in math?

Teachers were allowed to nominate students according to their own definitions of "high achieving," but all teachers and students identified students who had earned grades of B or better in their courses. At the time of the interviews, all of the students were in Grades 9 through 12 and ranged in age from 14 to 18 years.

Table 1 provides demographic information about the participating students. Similar to the overall student population at Lowell High, the sample of students was predominantly female (14 of the 21 participants). Eleven of the students identified themselves as Latino or Latina (encompassing Dominican

Table 1

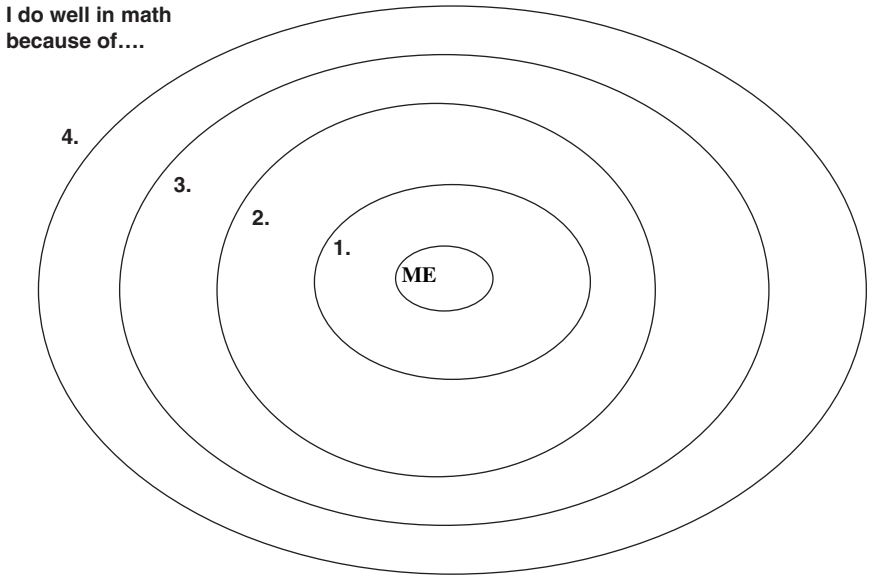
Sample of Lowell High-Achieving Mathematics Students (*N* = 21)

Name	Ethnicity	Grade
Adriana	Latina	10
Alicia	Black	10
Ana	Latina	10
Anita	Black	11
Elizabeth	Black	10
Ellen	Latina	10
Esteban	Latino	10
Gabrielle	Black	9
Ian	Latino	10
Isabel	Latina	11
Jana	Black	9
John	Latino	10
Kayla	Latina	10
Lamont	Black	12
Lena	Latina	11
Linus	Latino	10
Lourdes	Latina	11
Naomi	Black/Latina	10
Nicholas	Black	12
Thomas	Black/Latino	10
Yvette	Black	10

[n = 2], Puerto Rican [n = 5], and Guatemalan [n = 1] heritage), 8 identified themselves as Black (one of West Indian heritage), and 2 identified themselves as African American and Latino/a.[5]

Once the student sample was identified, students participated in an hour-long semistructured interview conducted by a graduate student researcher using a protocol. The interviews were audiotaped. Although the protocol included detailed questions and interviewer cues, interviews often included issues brought up by participants that were not included in the protocol. As part of the interview, students completed a "map" of influences they deemed pertinent to their mathematics success (Figure 1).[6]

Interviews were transcribed and then analyzed according to the coding procedures outlined by Miles and Huberman (1994). I began by closely reading the interview transcripts to identify major themes relating to students' mathematics experiences. These transcripts were also read by students in my graduate seminar. When agreement had been reached about the major themes, we used these preliminary themes to generate codes enabling us to categorize students' responses. During the coding process, themes relating to students' peer, family, and school worlds were characterized. Students in the seminar also assisted with coding. Finally, a second coder and I used organizational matrices to refine the coding and target the research questions for this study.



Please label each circle with the reasons you think you do well in mathematics (the circle closest to you would be the reason you think is most important). These reasons can include people, activities, clubs, etc. Include in the circle a short description of how each reason is related to your math success. [If you need additional room, please write on the reverse.]

REASONS FOR MY MATH SUCCESS

1.

2.

3.

4.

Figure 1. **Student map of influences on mathematics success.**

Along with the seminar participants, I reviewed the student maps of mathematical influences in concert with the students' interview transcripts. I used a matrix to summarize student map information and analyze evident patterns. In addition, the seminar participants wrote detailed research memoranda using the maps and interview transcripts, highlighting common experiences, interesting cases, and emergent patterns. We used a constant comparative approach (Lincoln & Guba, 1985) to evaluate whether students' experiences confirmed or refuted elements of the theoretical model posed and to add new theoretical perspectives. In addition, we used data from the student maps to question students about what was said during their interviews and to augment this information.

Students' Academic Communities

Students' webs of support for their mathematics work were widespread and complex, with many interrelationships. While several students, notably Linus, Naomi, and John, were considered to be popular and were widely known by other students in the sample, Ellen and Isabel were described by other students, and described themselves, as introverts. Some students could not identify other high-achieving students in math, whereas others could and spoke about why they thought those students were high achieving.

Unlike the students in Flores-Gonzalez's study (1999), these students did not perceive themselves to be officially labeled by other students as an identifiable "high-achieving" group, although individually they were known for doing well in mathematics. Their friendships and social networks encompassed students who were successful in school as well as those who were unsuccessful. In addition, it became clear that students' mathematics success was due to a host of interrelated factors; no single relationship with peers, parents, or teachers was deemed solely responsible for students' success in mathematics. For example, Linus described his relationship with his friend Andrew and how other friends commented on their mathematics prowess:

> Like me and my friend, Andrew, we are the good ones in math. And people always ask us how do we understand that, and how do we know it before the teacher teaches it? . . . And like my friends ask me, "How do you do that? How do you understand that if he didn't even teach it yet?"

Later, Linus pointed out that he and Andrew work together on mathematics problems when they don't understand something. But Linus also added that he is pushed by family members outside of school:

> I am the youngest of all of the cousins, so they push me . . . people always push me, like, a lot of it is in math, and my brother is like "Come on, you've got to compete with me, you've got to be up there with me."

Linus's older sister also had high expectations of him:

> My sister, she overrates me. Like if it's not 85 or higher [my test grade], 90 or higher, she goes, "Why get an 85? You only know 85% of this stuff?" Since she doesn't have a good math background, she wants to see me do good in math. She doesn't want me to mess up in math like she did. She used to have a lot of problems. She used to pass the class, but she would struggle.

Linus's relationship with a friend who did not attend Lowell High School indicated that his academic community encompassed people who were outside of his immediate sphere:

> Like, I have a friend who moved to Florida, my best friend, and whenever we talk he's like, "You still the king of math?" and I'm like, "Yeah." So he knows that I'm good at math and that he's good at math, too. We went to junior high together and the teacher used to separate me and him from the rest because people used to try to copy off our tests. So they used to sit me in one corner with him.

Linus spoke very highly of one Lowell teacher and the ways in which this teacher was important to his mathematics achievement, but he and his friends also talked about other school issues that affected their mathematics learning:

> Like, we talk about, like this school doesn't have, I don't think it has advanced math classes. Like, that's why I would like to go to another school, 'cause there are some schools that have advanced math classes, and that would look good on my college resume.

Several other students (notably, Elizabeth, Ana, Ian, and Jana) described academic communities that were as extensive as Linus's but placed different emphasis on the contributions that various members of their communities made to their mathematics achievement. Using maps completed during the interviews, I identified members of students' academic communities. Students most often ranked peers as being the primary reason for their success, family as the secondary reason, and teachers as the third reason. Three students (Lena, Isabel, Yvette) talked about their parents or other family members being their most important influences and did not mention the role of their peers, friends, or classmates. Because this was the way in which students ranked their influences, I discuss the components of students' academic communities that were further described in interviews in this order.

Varied Peer Responses to High Achievement

High-achieving students benefited from several types of support from their friends and peers, both inside and outside of Lowell. In addition, students reported a mix of responses to their success from peers: Some of their peers were indifferent to their success, while others congratulated them on their mathematics prowess, "good-naturedly" referring to them as "geniuses" or "nerds." Students reported little teasing, and none of them said that their friends or peers questioned their ethnic identity or suggested that they were "acting White." These responses indicate that peer support and encouragement are multidimensional and that students' peers may serve as academic resources. Even when a student belongs to a peer group whose members are not as successful as she is, her peers' response to her performance may often be positive. Speaking about his friends, Ian noted:

> They're not the type of people to tease anybody, so I don't think they would tease me. Maybe they would call me a nerd or whatever,

> 'cause I get called that a lot by the other students, but you know, it's like I just brush it off, it don't matter to me.

It might be inferred that these students were not teased because they had selected peer groups similar to them in terms of their attitudes toward and behaviors in school; however, other students pointed out that their peers were doing less well than they were for reasons that included "lack of focus" or "not doing the work."

For some students, doing well in mathematics seemed to provide a certain amount of social cachet. According to Anita, "My friends like that I am a geek or genius or something." However, other students, including Adriana, noted that there is some awareness of social repercussions: "You don't want to look like a geek [by raising your hand in class to ask for help]!"

In addition to reporting positive peer responses to their academic behaviors, these high school students did report distractions inside as well as outside of the classroom. Tomas said ruefully, "I try to get away from my friends in math class." What these students termed socializing many of them viewed as potentially harmful to their current academic plans or future paths to career and college success. As Ian pointed out, "There's always peer pressure not to go to class or anything, but other than that I don't think that anyone stops anyone from doing what they gotta do."

Ian's contention that students have agency to engage in behaviors outside of ones that are championed as peer norms is in direct opposition to much of the literature, which often suggests that peer pressure is always constant and negative and, furthermore, is something that students cannot or do not resist. Many of the students in this study were adept at resisting advances by other students to engage in classroom behaviors that would interfere with their classwork.

Ellen was one student of many who recognized that some friends' academic decisions might not be aligned with her own:

> My friends are not going to be there for everything. . . . As much as I would like [to be in] a class with friends, not being in a class with them would help me focus more. It would be for my own good [to take an advanced class].

Like Ellen, other high-achieving students noted that high school was an atmosphere that facilitated socializing. Several talked about how they viewed school and the need to limit social behaviors in favor of academic ones. For example, according to Adriana, "School is not a social club. This is to do what you need to do and then go." Or, in the words of Jana: "Since we are in high school, it's a pretty social environment, so there's a lot of socializing going on in class. . . . I just say OK, OK, we'll just talk after class." When asked whether she would take an honors math class if recommended by her teacher, even if her friends weren't going to be in it, Yvette said, "Yes, because I'd be away

from my friends. Sometimes they distract me. It would probably be more advanced, right? I'd like more advanced [work] since I'm [understanding it]."

Other students noted that their friends were ambivalent in regard to teasing them about their mathematics success or talking about mathematics. Lamont reported that "most of the time they want me to help them [rather] than tease me, so, no, I get encouraged more by my friends [for doing well] than teased about it." John asserted that mathematics, while "it's not like a topic of choosing" among his friends, is important. He noted that he studied with his friend Damon: "He's in my class so whatever we learn together, if we don't understand something we help each other to get it."

Evidence of Intellectual Communities

John's contention that he and his friends didn't talk about their mathematics work but yet he and Damon[7] worked together when they didn't understand something seems somewhat contradictory. It may be that he did not really consider Damon to be a close friend, but rather a "mathematics class" friend. Students might have intellectual communities that help them to be successful in mathematics and that they consider to be important that extend beyond their closest friends. For example, Anita noted that Lena, another student in the sample, is "good in math but we don't have nothing in common." Students talked about how their peers (including those who were in the same mathematics class, who did not take the same mathematics class, and who did not even attend Lowell) supported their mathematics achievement in various ways (as detailed later). The types of collaborative conversations that John and Damon had about mathematics were also reported by other students when talking about their friends and peers who were taking the same mathematics course, sometimes in different class periods. Tomas reported, "At lunchtime, I study with this girl, Katie, we do a problem set or whatever, review homework, or things like that."

Elizabeth noted that "[my friends are] all taking the same math as me, so we help each other. . . . We do homework together sometimes, and if one person, like, doesn't understand the answer, someone will, like, explain it." When Elizabeth was asked whether these friends were doing as well as she was in math and why, she responded, "Yeah, mostly. . . . We all work together." Other students described their conversations about mathematics homework and classwork outside of school.

> [My friends] help me with homework and stuff like that, if I need help. (Adriana)
>
> One of my friends called me the other night because she didn't understand her math homework. So we tried to come together and do it as best we can over the phone. (Anita)
>
> We'll ask each other like "What's on the test?" or "Do you know this?" Last week there was a new girl who came in who was like, "Can you please help me with math—I really don't get it." And I'm like, I'm not

> really that good but I can help people. I was like, "Where are you having a problem?" And she was like, "The whole thing is just confusing to me: factoring, factoring *x* this and *x* that, difference of two squares." So we exchanged numbers and I told her that she could call me if she had a problem. (Ellen)

As the following remarks indicate, many of these high-achieving students were committed to helping others and approaching each other for help if they themselves were having problems:

> Me and my friend Andrew—he sits next to me in math, we talk about math every day after class. Like when we have a test we talk about who got the higher grade, or "Why did you get that part wrong?" (Linus)

> The class I'm in helps each other. (Gabriela)

> Sometimes when [my friends in class] don't know they go and ask me or I go ask them if I don't get things. (Lourdes)

Lourdes described the common characteristics of students who do well in mathematics at Lowell: These students "go to every class that they have. They will participate in class and help out the students who do not understand."

Students also used time outside of the classroom and school to collaborate on mathematics work. They reported talking to friends who do not attend Lowell to review mathematics problems:

> A friend out of school . . . he sits with me, he tries to figure it out with me. [My classmates and I] go into the lunchroom, we talk about it. (Naomi)

> Friends who don't go to my school help me out. They're like—"Oh, I did this already at my school," so they explain to me what they have done. (Ana)

As Davis et al. (2002) found in their study, students reported that they admonished and were admonished by other students to do their mathematics work. This exemplifies the reciprocal nature of peer support for these high-achieving mathematics students at Lowell. Adriana reported: "Yeah, like, sometimes I tell my friend, because I like math and she doesn't try in class and everything, and I'm, like, you need math in the future because everything's math in this world." Yvette said that she has not always been a good mathematics student but that she wanted "to get good grades like her friends":

> It's just like seeing them going to class and seeing that, like, they prosper so much from going to class. I used to watch my friend go to class and I would do the same thing she did but I would never get the same grades. And it was like, well, "How come I'm not getting the same

> grades that she does?" But . . . she was actually doing all the work and I was just there, so I learned my lesson from that.

In addition to these collaborative activities within their peer intellectual communities, some students mentioned that elements of competition help students do well in mathematics.

> My friends are always competing with me, 'cause we're all smart in math or whatever, so they're always like, I'm better than you, I got higher than you, so that pushes you. . . . I like to show that I'm good in the subject. (John)
>
> Me and my friends are constantly competing so that makes me do better. . . . I compete with them, try to always be the best one. So I do good to beat them. (Ian)
>
> Two of my best friends who are really good in math compete all the time. (Elizabeth)
>
> We were in the top [classes] together, so we learned together . . . a lot of us would compete together to get the highest grade. (Linus)

These important academic conversations, activities, and behaviors in which students and their peers engaged helped these students perform well academically—whether their peers themselves were high achieving or not. Furthermore, they helped students maintain their high level of mathematics achievement.

Mechanisms of Familial Support

Much of the literature on high student achievement in underserved communities focuses on parents' contributions and expectations. Supporting this emphasis, all of the students mentioned that their parents were integral to their success in some way. They spoke about their parents' expectations that they would earn good grades and, in several cases, reported that their parents' approval was important to them and that they did not want to disappoint their parents.

> My mom would be the first person [that influences my success]. Her expectations of me are very high. I can do it, but if I don't put anything into it then she'll probably get mad 'cause she knows that I can do it. (Yvette)
>
> My parents, they encourage me to do well in math. . . . I don't know, I want to make my parents proud. (Lourdes)
>
> Like, my mom, she likes when I get good grades in math. (Lamont)
>
> I've been doing well since I was little, so I always try to keep it up. . . . So then, that way, I won't disappoint my mom. (Kayla)

> My father is big on school and stuff like that. So he's the one who pushes me the most. (Adriana)
>
> My pops, he was pretty smart in school or whatever. And then, you know, like he encourages me to do well, plus if I don't do well I get punishment. (Ian)

In addition to high expectations and consequences for low achievement, students also reported the ways in which their parents, particularly when the students were younger, helped them do well in mathematics. Isabel noted that a major reason for her success in math was her mother. "My mom likes math also, and she used to help me when I was young with my homework. And she gave me problems I hadn't seen at school." Ellen mentioned that her father did mathematics with her when she was younger:

> At a real young age he would teach me how to count. You know, like fun things for kids: count the cookies or count the eggs or stuff like that. So he would do things with me like that, and I really caught on fast, so I knew my times tables by the second grade. All of them. And he used to test me like 2 times 2, and I would say 4, and he would go 4 times 4, and I would go 16, and we'd go on like that.

Esteban mentioned his parents' high expectations in terms of grades, but when asked whether he ever talked to his parents about what he learned in math class, he laughed: "No, my mom, she'd just get a headache." Several students also mentioned that although their parents did not explicitly help them with their current mathematics work, they supported them in other ways, particularly by encouraging them to do their homework and schoolwork and by telling them to "take advantage" of opportunities that they themselves may not have had:

> My mom, she never went to school, but she loves math. She's like you should do well, and math helps you. My mom is like a role model, but she never helps me with math because she didn't go to school a lot. (Ana)
>
> I know that my pops messed up in school, you know, he used to hang out and all that and I learned from his mistakes . . . he told me about him messing up. Even though he got a GED he had like 80s or 90s. He was saying that he was good, but you know, [you have to] take advantage. (Ian)

Some of the students reported that other family adults, in addition to parents, contributed to their success in mathematics. For example, Lamont noted: "In fifth grade, I was in a really gifted class and the math was a lot harder than I usually had so it would be my uncle who helped me out a lot."

It should be noted that familial influences included those of "near peers," not just adults. Students' siblings and cousins also served as encouraging

models. On her map of influences, Lena wrote the following about Chris, her cousin: "My role model. I look up to him. Math is his favorite subject. He also pushes me."

Datnow and Cooper (1997) showed that high-achieving students served as models of academic behavior for their younger peers. As they did for some of their friends, Lowell students served as role models and tutors for their younger siblings. For example, according to Yvette: "My brothers and sisters look up to me, so if I do it well then they won't see it as so hard, and then I can help them. . . . I could help everyone else." Other Lowell students benefited from this model as well in that they were helped or advised by older siblings and cousins (notably, three students reported that they had siblings and cousins also attending Lowell).

> My brother and my family's in the same class as me. If you look outside right there he's tops on [Lowell's honor roll] all the time. . . . We're all good in math, we always have been. (John)
>
> My sister is also good in math and I want to be like her. (Lourdes)
>
> [My older brother] helps me with homework if I don't understand. (Elizabeth)
>
> I remember like in first grade I had problems with numbers, so [my big sister] started helping me with math . . . she is 18 and in college. (Gabriela)

While most students reported that their siblings were positive influences on their mathematics achievement or that they served as models for their younger siblings, a few saw their siblings as people who were not to be emulated. Kayla reported that she did not "want to be compared with [my siblings]; they messed up." This drove Kayla to achieve in school so that her mother would be proud of her.

Thus, in various cases, students' peers, classmates, close friends, parents, older adult relatives, siblings, and cousins contributed to their mathematics success, and sometimes these relationships existed within both family and school worlds. But certainly teachers are considered to be part of the "school world." How did school adults fit into these students' experiences? Were these students supported by teachers who affirmed their endorsement of academic achievement?

School Adults' Influences

Of the 21 students, 12 mentioned explicitly that their success in mathematics was due to the fact that many of their past and current Lowell teachers were good teachers. In particular, they liked "how [Lowell] teachers explained things." Noted Gabriela, "I love math, and the teacher makes it fun in the way he explains everything with details." Alicia mentioned that her Lowell teachers "don't just tell me the answer when I have a question. They stick with me

and they challenge me, and I like to be challenged. There's always something new to do in math class."

Several students mentioned other aspects of the teacher-student relationship, including the importance of feeling that the teacher cared about them (Ladson-Billings, 1997; Valenzuela, 1999) and how this caring contributed to their achievement. Yvette wrote on her influences map that "the school is very helpful as well as the caring teachers. They take the time to be patient and teach. If it weren't for them, I wouldn't know math!"

Students believed that their previous teachers were an important part of their mathematics success and how they viewed themselves in terms of their mathematics ability.

> They [former mathematics teachers] always told me that I was really good in math. (Nicholas)
>
> Mr. Lopez . . . the way he taught, made you interested in math. He just made me feel that, not to give up, that you can do it. That's the only way to solv[e] problems. (Naomi)

Sometimes the expectations of students' teachers were greater than those of the students. For example, according to John, "The teachers recommended me [for an advanced class. We] were supposed to take a test, but I didn't think to myself that I was up there, so I didn't take the test." When students questioned their own competence in academic matters or lacked knowledge about options open to them, current teachers and counselors helped them make important academic choices:

> [The guidance counselor] said it would look better when I'm applying for college [to take an advanced class]. (Lamont)
>
> They asked if the 9th-grade math was a little too slow, and I said yes, and they gave me the test and I passed it, so they moved me up into the 10th-grade [math]. (Yvette)

Lowell teachers were attentive and aware of students who exhibited potential for high mathematics achievement. Teachers contributed to the intellectual milieu of students in ways that extended beyond their classrooms.

> Some of my friends ask to study with me, especially now since Mr. Quigley [her mathematics teacher] announced, "Yvette has the highest grade!" (Yvette)
>
> [My math teacher] challenges me; he gives me puzzles, math puzzles to do. Like, to exercise my mind or something. (Ian)

One Lowell teacher in particular, Mr. Lewis, was well regarded by his students. Linus noted:

> He knows how to communicate with students good. Like he's a great teacher, even after school, it's like the students and him, we play basketball after school. You usually don't hear of students and teachers hanging out. . . . He talks about interesting facts that have to do with math. Like, for example, the other week, he told us something about soda . . . and they did a test on kids who drink soda, and like how much grams of sugar it has and how much weight they gained every week. And that is really interesting.

Furthermore, Linus wrote on his influences map that "Mr. Lewis . . . always encourage[s] me to be even smarter."

For the most part, these students seemed to consider their school, family, and peer worlds to be congruent, although they recognized that this might not be the case for their fellow students, especially those who were struggling with mathematics. In at least one case, a Lowell teacher intervened with a student who was "slacking off" in his mathematics schoolwork: John stated that his teacher "threatened to call my pops, so I do my homework now." This was the only instance in which a student reported the possibility of interaction between his teacher and his parents. It may be that the teacher had already made contact with John's parent about his work, but this is unclear.

Despite the lack of student reports about established contact between the home (in particular, parents) and the school, students noted that school adults at Lowell intervened in course placement, encouraged them to do homework and classwork, provided enriching mathematics work, and were good teachers. Students also described additional school policies at Lowell that they viewed as helpful to their success in mathematics. For example, three students mentioned that the school provided free tutoring to help students pass the regents mathematics examination, which is necessary to earn the prestigious regents-endorsed diploma. One student mentioned that the small size of the school and the math classes made it easier for teachers to help students individually. However, two students mentioned that advanced mathematics classes were not offered at Lowell beyond the regents-prescribed Math A and Math B courses. Said Tomas, "[My friends and I] always talk about college and math. We're trying to get a pre-calc or calculus [class] for next year here [a t Lowell]."

Discussion and Conclusion

Challenging notions of discrete, static student "worlds," Lowell's high-achieving students' worlds were more dynamic and connected than one might surmise. While these connections were not immediately visible, they existed in ways that supported academic achievement. For example, these students' relationships with their peers were fluid. It appears that some of their peers were close friends who shared their interests and achievement goals in mathematics, whether or not they attended Lowell, while for others peers were classmates who served as resources to help them study or understand mathematics content.

One gets the sense that if these students had not shared the same mathematics class, some might not have known each other. Some of the students' peers were higher achieving than they were, while others were lower achieving. Yet, according to these high-achieving students, they were not targets of ridicule at school. They were not loners, nor did they feel that they were socially ostracized. There were no reports of challenges to their ethnic identities.[8] Furthermore, they were able to do academic work without suffering harsh social penalties (Flores-Gonzalez, 1999). Although they were sometimes teased, and they sometimes observed that classmates and friends were "slacking off" in their mathematics work, they may have been adept at resisting engaging in nonacademic behaviors because of their parents' (and their own) strong academic values and, in some cases, the active encouragement of teachers.

Most of these students' school and family worlds were similar with regard to achievement norms, and they found it easy to move between them. Parents' high expectations were shared by teachers in most cases, as evidenced by Lowell teachers' interventions. While some students had high expectations of themselves in terms of doing well in mathematics, occasionally this was despite their feeling less confident in their mathematics ability than their parents or teachers thought they should. For example, Ellen repeatedly mentioned in her interview that she was not good in mathematics, although she acknowledged that her peers and teachers said that she was. According to Ellen, she was sought after by other students and classmates who needed help with mathematics. Her own expressed lack of confidence in her mathematics ability did not seem to affect her contributions to the academic communities at Lowell.

Students wanted to emulate people in their lives they saw as strong, smart, and supportive, even if these people had not graduated from high school. Others, particularly school adults, might not understand why students would choose to emulate these people. However, students whose parents had not received much formal schooling did not necessarily see this as negative. Even though these parents might not be able to help them with specific mathematics work, their encouragement, expectations, and "lost dreams" were powerful motivators. Students reported that they did not want to repeat the missed opportunities of their parents or the mistakes of parents or siblings. This was true of Latino/a students in particular, similar to Auerbach's (2002) finding that Latino parents provide "counterexamples" for their children in terms of the types of futures they want their children to avoid (Romo & Falbo, 1996).

It is important to note that these high-achieving students were influenced by family members other than their parents. Their "near peers" within the family—cousins and siblings were frequently mentioned—were important contributors to their mathematics success. In turn, the Lowell students influenced other family members, often younger siblings or cousins. Furthermore, many of these students described their interactions with others in ways suggesting that they modeled good academic behavior for other students not related to them, learning from their own out-of-school role models. These find-

ings suggest that students may have benefited from the behaviors of members of their own academic communities—including parents and other family members, previous teachers, and "near peers" outside of school—and dispersed their behaviors through relationships, conversations, and behaviors with their own intellectual communities, comprising fellow students, siblings, and cousins. Thus, there may be ways in which positive academic behaviors can be dispersed throughout Lowell via the fluid relationships that students have with close friends, peers, and classmates, and these relationships can be integral in improving the overall academic climate and achievement of the school.

The roles of adults (parents, family members, teachers, and counselors) in supporting students' networks initially seemed to be peripheral, in that students did not often mention adults as primary contributors to their mathematics success; however, these roles were critical. All of the students reported that their parents had higher expectations in terms of their grades than did their peers. Yet, the present results show that the parents of secondary school students may indeed value education but may not know how to provide help or guidance (Stanton-Salazar, 2001). This further underscores why students' connections and networks in and out of school are critically important. For example, during her interview, one student noted that her mother's employer gave her advice about doing mathematics.

Where students' peer and family worlds seem to be disjointed is in the area of mathematics expectations. Parents' expectations of mathematics grades were often higher than students', and students' expectations of their grades were often much higher than their friends'. Most students reported that their parents wanted them to earn a grade of A or B at the lowest. No student reported that a C was an acceptable grade in mathematics, although most reported that their friends thought this was an acceptable grade. This could have been due to students' differing beliefs about mathematics; it should be noted that several students talked about how "all of their family members" were good in mathematics, suggesting that they might attribute their mathematics success to ability (Bempechat, 1998; Middleton & Spanias, 1999).

Other students talked about the effort and hard work it took to do mathematics, thus attributing their success to effort (Bempechat, 1998; Middleton & Spanias, 1999). It is unclear how their lower achieving peers might view mathematics and whether this would affect their thinking about what would constitute a good grade. It is also unclear whether the peers of these high-achieving students knew what the high achievers thought about grades and academics. It seems that their peers knew these students were high achieving, but it is unclear whether they knew what drove these students to earn good grades or what behaviors they engaged in to earn them. In at least one case in this study, a student reported that she studied her counterpart and changed her behaviors so that she, too, would do well in mathematics.

That intellectual collaboration and study in mathematics are important for student achievement is evident from these students' experiences. What is particularly noteworthy is the extent to which collaboration and mathematical talk occur outside of formalized mathematics classroom spaces, without

teacher intervention. These students shared mathematical ideas and helped their fellow students who were struggling in mathematics. Their efforts to tutor their peers may very well have supported their own mathematical understanding, as suggested by many mathematics education researchers (Hiebert et al., 1997). Even when students spoke about competing for the highest grade, it is clear that this was within a context of providing motivation to do mathematics at a high level.

Thus, for these students, there was not a dialectical relationship between collaboration and competition. Students helped each other in several ways and in several mediums: with academic work (tests, homework), with advice about problem solving and course taking, and with encouragement. Also, they helped each other in multiple settings: in class, out of school, on the phone, and in the cafeteria (as well as other "school" spaces). Several students reported competition among high-achieving students, and some reported that this competition was important for their own mathematics success. It is unclear whether this competition occurred solely within the mathematics content domain.

Exploring how academically supportive peer groups and their academic activities outside of the mathematics classroom can be used as models to promote higher mathematics achievement among underserved students should be more prominent on the mathematics education research agenda (Walker, 2003). What we know about high-achieving students and the institutions that facilitate achievement can and should inform interventions designed to address the underachievement of certain populations.

Refuting the prevailing and persistent myths that Black and Latino/a students do not value education and that their parents and families do not support high academic achievement, this study provides evidence that these students have extensive academic communities that are effective in promoting academic achievement. While this may come to no surprise to those researchers and educators who study the positive effects of cultural influences on educational outcomes, that high-achieving students create and sustain their own academic communities among their peers is a finding that may be leveraged to improve outcomes among underachieving students of color. The interrelated factors that students highlighted as being integral to their mathematics success do not exist in a cultural vacuum. Rather, this study demonstrates that these factors reflect the endorsement of education by students and their families and exist as part of the intergenerational values these students bring with them to school.

It is certainly true that Black and Latino/a students, along with schools, districts, parents, and families, share the responsibility for their academic performance. But without an understanding of the depth of students' academic communities and the ways in which students and their peers foster intellectual communities among themselves, schools may continue to undervalue the cultural contributions that students bring with them to school. By continuing to explore African American and Latino/a academic success, we can build

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on historical—and, indeed, current—traditions of community support and engagement for academic excellence in our quest to improve urban students' mathematics achievement.

Notes

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[1]Literature on the historical educational efforts of Latino/a communities in the United States is smaller than that detailing those of African Americans, but it is growing substantially.

[2]Lowell High School and all names of students are pseudonyms.

[3]From the Lowell High School annual report, 2002–2003.

[4]The four Lowell mathematics teachers mentioned throughout this article are all identified as male and with pseudonyms.

[5]One limitation of this study is that additional information about students' ethnic heritage and that of their parents was not collected. Students who identified themselves as "Black" or "Latino/a" were not asked for further description of whether they were members of the first, second, or a later generation in terms of their family's length of residence in the United States. Those who identified themselves as, for example, Dominican or West Indian did so without prompting from the interviewer. Also, the study involved a small sample of 21 high-achieving students. While the findings about their academic communities may be illuminating, they are not generalizable to other high-achieving students at Lowell. Furthermore, it is not possible to suggest that low-achieving students at Lowell High do not have similar academic communities, since I focused solely on high-achieving students. This issue merits further study. In addition, because of the small sample size, interesting patterns related to student ethnicity or gender might exist but did not emerge from these data.

[6]I designed this map to elicit information on the individuals students felt (in addition to the students themselves) were most responsible for their mathematics success. Using the map in addition to the interview questions helped to elicit additional supporters students may not have mentioned in their interview. Also, students were asked to provide additional information about topics mentioned during the interview and descriptive information about the influences listed.

[7]Damon was not interviewed for this study.

[8]The present data did not permit an analysis of the relationship between the multidimensional nature of peer support for academic achievement and students' ethnic identity development and how these elements are shaped in different school settings. Students of color who attend predominantly Black and Latino/a schools such as Lowell may have more freedom to develop an academic identity than they do in predominantly White schools, where the ethnic image of the academically or mathematically successful student may not be African American or Latino/a. For example, Steinberg et al. (1992) found that, in predominantly White schools, peer groups are not seen to be differentiated for Black students in the same way as for White students (e.g., the nerds, the jocks, the popular students); there is a single "Black group" to which all Black students are perceived to belong. Ford et al. (1994) noted that "acting White" or being "raceless" may manifest differently in predominantly ethnic minority and predominantly White educational settings. Despite Fordham's (1988) and Ogbu's (1988) implicit contentions that their theories about intellectual engagement and peer influences hold similarly in predominantly minority urban schools and multiracial, suburban ones, subsequent work (Ferguson, 2002; Flores-Gonzalez, 1999; Ogbu, 2003; Yonezawa et al., 2002) reveals that there may be important nuances in the development of Latino/a and Black achievement in different types of settings.

SHORT

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