

Bridging Multiple Worlds: How African American and Latino Youth in Academic Outreach Programs Navigate Math Pathways to College

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Universities have launched outreach programs to enhance their ethnic diversity, yet little developmental research examines students' pathways to college. This study compares capital models (highlighting family background) with challenge models (highlighting students' challenges and resources) in predicting pathways to college. The Bridging Multiple Worlds Model frames this longitudinal study of 120 African American and Latino youth in outreach programs. We examined students' family backgrounds; challenges and resources across family, school, peer, and community worlds; and high school math pathways as predictors of college eligibility and enrollment. African American students more typically had U. S. born, college-educated parents, and Latino students, immigrant parents with high school education or less. Second, students saw parents as greater resources than teachers, siblings, and themselves; peers and teachers were their greatest challenges. Youth distinguished resources and challenges more by their source than form. Third, high school math and English grades rose and fell together, with early math grades predicting college eligibility. Five math pathways emerged: steady, slowly declining, rapidly declining, increasing, and "back on track" toward college, but pathways did not always predict college choices. Fourth, although family background predicted few outcomes, parents' and teachers' help and siblings' challenges predicted grades, eligibility, and admission to prestigious colleges. Findings highlight both capital and challenge models for science, policy, and programs involving diversity and equity.

This investigation was supported by a Grant ### to C. R. Cooper, J. F. Jackson, and M. Azmitia from the University of California Linguistic Minority Research Institute. The project was also supported by the Institute of Human Development at the University of California, Berkeley; the Bilingual Research Center and the National Center for Research in Cultural Diversity and Second Language Learning at the University of California, Santa Cruz; and the John D. and Catherine T. MacArthur Foundation Research Network on Successful Pathways through Middle Childhood.

We thank our colleague Jacquelyne F. Jackson; our research staff, including Edward M. Lopez, Nora Dunbar, July Figueroa, Zena Mello, Teri Henson, Edna Rosales, Christine Smallwood, Jayme Barrett, David Cooper, Renee Ferigo Marshall, Lisa Fonseca, Conrad Amba, Christiane Gauthier, Karen Godfredsen-Gomez, Alma Lopez, Mary Lucero, Laura Mayorga, Kate Perry, and Jennifer Selke; consultants Diana Baumrind and William Meredith; and colleagues Ron Gallimore, Patricia Gándara, Bud Mehan, and Barbara Rogoff. We also thank the students, families, and outreach program leadership, including Ben Tucker, Liz Chavez, and Tara Henry.

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In the United States, as each cohort of students moves through secondary school to college, the percentage of African American and Latino adolescents shrinks, a pattern that has become known as the *academic pipeline problem* (Gándara, Larson, Mehan, & Rumberger, 1998; Geiser, 1996). A key indicator of college eligibility, revealed in studies of nationally representative samples, is the sequence of math classes students take in high school. Asian American students take more advanced college-preparatory math than European American students, and both groups take more college-prep math than African American or Latino students (Catsambis, 1994; Davenport, Davidson, Kuang, Ding, Kim, & Kwak, 1998). Research is moving beyond ethnic group differences to map variation within groups and similarities across them in conditions that enhance college and career choices of ethnically diverse students (Gándara, 1995).

California provides a key setting for investigating how African American and Latino youth navigate pathways to college. California law mandates that the top 12.5% of high school graduates be considered eligible for the University of California (UC), the top 33% eligible for the California State University System (CSU), and all 18-year-olds and all high school graduates eligible for the California Community College System. Yet in 1996, only 4.5% of African American and 3.5% of Latino high school graduates in California were eligible for UC, based on college-prep class grades and Scholastic Aptitude Test (SAT) scores (Edgert & Taylor, 1996). Moving beyond UC eligibility, the National Education Longitudinal Survey of 1988, based on nationally representative cohorts of eighth grade students, showed that among California students, African American and Latino students were underrepresented among those in 4-year colleges and overrepresented among those who did not finish high school (Carroll, 1996; cited in Gándara et al., 1998; NELS:88).

When the University of California Board of Regents removed race and ethnicity as considerations in the admission of undergraduate students in 1996, university outreach programs took on a key role in strengthening diversity in California higher education (Hayward, Brandes, Kirst, & Mazzeo, 1997). These range from *competitive* programs, whose graduates typically attend UC or CSU, to *selective* programs whose graduates attend community college, from which they may qualify for 4-year institutions. Despite 30 years of outreach programs, however, little developmental research exists about successful pathways to college among participants.

This article reports findings from an ongoing research partnership with outreach programs that seek to provide bridges through school into college and college-based occupations (Cooper, Jackson, Azmitia, Lopez, & Dunbar, 1995; Cooper, Jackson, Azmitia, & Lopez, 1998). The study focuses on four questions: What were the family backgrounds of youth participating in these programs in terms of immigration history and parents' education? What resources and challenges did students experience from their families, peers, school, and communities? What were students' pathways through math classes required for university eligibility? And how did students' family backgrounds, resources and challenges across worlds, and high school math pathways predict college eligibility and enrollment?

In addressing these questions, we drew on three related models that move beyond ethnic group differences to understand how ethnically diverse youth and their relationships, institutions, and cultural communities interact and change over time. The first is Ecocultural Theory, which integrates ecological and cultural perspectives (Gallimore, Goldenberg, &

Weisner, 1993; Rogoff, 1990; Weisner, Gallimore, & Jordan, 1988). This theory assumes families in all cultural communities work to adapt to changing ecologies through their routines of everyday life. Culture is seen in the dimensions of these routines or *activity settings*, including their typical participants or *personnel*; the *values and beliefs* that give meaning to their lives; and the *scripts* or recurring patterns of communication (Reese, Gallimore, Goldenberg, & Balzano, 1995). Our study built on Ecocultural Theory by tracing the personnel and scripts of ethnically diverse youth who shared the value of attending college.

Our second theoretical perspective, the *Students' Multiple Worlds Model*, was proposed by educational anthropologists Phelan, Davidson, and Yu (1991) to learn how youth navigate across their family, peer, and school contexts. Phelan et al. used geographical metaphors of *world* to refer to the cultural knowledge and expectations held in each context and *navigation* to capture youth's experiences as they try moving across the borders between worlds. In a longitudinal study of California high school students selected to vary in ethnicity, gender, immigration history, and achievement, Phelan et al. found many students whose worlds differed in culture, ethnicity, social class, or religion. Some found crossing borders manageable while others found it difficult. The most vulnerable youth found borders between worlds impenetrable and became alienated from school. And crossing borders did not come without costs; students with bicultural identities were criticized by people in each world for being disloyal. Our study built on the Students' Multiple Worlds Model by adding outreach programs as a key world and a developmental focus to trace how experiences across worlds and high school grades predict college eligibility and enrollment.

Our Bridging Multiple Worlds Model focuses on how youth forge identities that coordinate their cultural and family traditions with those of their peers, schools, and communities; how relationships across worlds are both challenges and resources; and how institutions enhance or impede developmental pathways (Cooper, 1999; Cooper & Denner, 1998). In earlier research, we found that European American youth who experienced both individuality and connectedness in family communication showed greater exploration of their career identities and other domains. Conflict in the context of support, rather than support alone, was associated with adolescent development (for a review of this work, see Grotevant & Cooper, 1998). We also found evidence of continuity across family and peer worlds (Cooper & Cooper, 1992). Drawing on the Bridging Multiple Worlds model, this study examines whether African American and Latino youth who experienced both resources and challenges in their worlds would achieve higher grades and college eligibility.

The World of Outreach Programs

The university academic outreach programs that participated in this study, the Early Academic Outreach Program (EAOP) and Mathematics, Engineering, and Science Achievement (MESA), are known for their effectiveness (Edgert & Taylor, 1996). In earlier work, we observed program activities, interviewed program founders and staff, and conducted focus groups with parents and with junior high, high school, and college students in which we asked about students' *worlds, goals and values, personnel, and scripts* (Cooper et al., 1995; Cooper et al., 1998).

In these focus groups, students readily drew and discussed a wide array of *worlds*, including their families, countries of origin, friends' homes, churches, mosques, outreach programs, shopping malls, video arcades, school clubs, and sports. Rather than seeing their worlds as uniformly positive or negative, students perceived resources and challenges in each world. Resources were reflected in *brokering*, when parents, siblings, teachers, friends, and program staff spoke up for them in their homes, schools, or neighborhoods (Buriel, Perez, De Ment, Chavéz, & Moran, 1998; Weisner et al., 1988) and provided emotional support and instrumental guidance. Students saw challenges in *gatekeeping*, when parents kept students home from school to protect them from dangers or when teachers and counselors discouraged students from taking college-prep math and science classes or tried to track them into remedial classes (Erickson & Schultz, 1993). Some students recounted struggles to maintain both academic goals and ties to friends who were not in school or were in gangs (Phelan et al., 1991). Schools and particularly neighborhoods were worlds where people expected students to fail, become pregnant, leave school, or to engage in delinquent activities. Students stated that outreach programs fostered a sense of family while providing them with skills, information, high expectations, and a sense of moral purpose to "do something good for your people" and "give back", such as by working as engineers in their communities or helping their younger siblings attend college.

This article builds on these findings to investigate—by combining strengths of qualitative and quantitative methods—how experiences of African American and Latino youth participating in outreach programs predicted their pathways to college. First, we examined students' *family backgrounds*, particularly their families' immigration history and parents' education. Kao and Tienda (1995) proposed that the academic motivation of students from newly immigrated families is fueled by the optimism, determination, and agency required for families to immigrate in the first place. Thus, we hypothesized that children of recent immigrants would be more likely to participate in outreach programs than students from second- or

third-generation families. Research also indicates that African American college youth, compared to non-college youth, have more college and professional role models in their families (Coates, 1987; Duster, 1992; Taylor, 1991). Thus, we expected African American youth with college-educated parents to be more likely to participate in outreach programs. From the perspectives of these recent studies, recent family immigration and parents' college education can be both seen as social capital.

Second, we examined students' *resources and challenges* across their families, schools, peers, and community worlds. Research has shown how African American families draw on extended kin regardless of social class (MacAdoo, 1982), and how Latino and African American parents develop ties to community organizations, both for material support and help with children's future goals (Alva, 1991; Jarrett, 1995). Mexican American high school students in college-prep classes have reported more support and fewer difficulties than those in vocational tracks (Gibson, 1997). In another study, Chicano college students identified siblings as their primary influences, along with parents, outreach program staff, teachers, and counselors (León & McNeil, 1986). Finally, successful Chicana professionals have recalled how friendships with Anglo students helped them learn about college (Gándara & Osugi, 1994). Based on this research and the Ecocultural Students' Multiple Worlds, and Bridging Multiple Worlds models, we predicted that African American and Latino students would report both resources and challenges across their worlds and that both challenges and resources would in turn predict pathways through school.

Third, we traced students' longitudinal *pathways through math classes* required for university eligibility (Catsambis, 1994). We used math as an indicator of academic competence based on the role of math grades in admission to outreach programs and college and on the widespread concern about math as a barrier to academic success for women and ethnic minority students (America Association of University Women [AAUW], 1994). We also examined college-prep English grades and overall college-prep grade point average (GPA). In our sample, the range of math classes was restricted to college-prep courses, because the university outreach programs selected students who were likely to meet University eligibility requirements. In our earlier work, we traced longitudinal patterns of African American and Latino youth in these programs in high school math classes and grades (Cooper, Cooper et al., 1998). Some students stayed on track towards university eligibility with consistently high grades, most began on track, but slowly declined, and still others declined rapidly. As a group, the sample declined on average .21 of a grade point per semester. In this study, we traced students' math pathways across four years of

high school as well as their subsequent college eligibility and enrollment.

Finally, we asked what factors in students' family backgrounds and in their resources and challenges across family, school, peer, and community worlds predicted their pathways to college eligibility and enrollment. A "capital" hypothesis, based on social capital models, suggests that students with more capital (such as high levels of parental education and recent immigration) would achieve at higher levels (Coleman, 1988; Cooper & Denner, 1998). A "challenge" hypothesis, based on the Bridging Multiple Worlds model, suggests that challenges can motivate students to succeed on behalf of their families and prove gatekeepers wrong, and that challenges in the context of support may foster career and college identity formation (Cooper, 1999). According to this hypothesis, students who coordinate resources with challenges would be more successful navigating personal, relational, and institutional pathways to college.

In sum, this study examined the family backgrounds of African American and Latino youth who participate in outreach programs; challenges and resources across their family, school, peer, and community worlds; longitudinal pathways through college-prep math classes; and the role of these three factors in students' later college eligibility and enrollment. We framed these questions to examine both capital and challenge models and to address issues for developmental science, youth policy, and programs that foster access to college for ethnically diverse youth.

Method

Participants

The sample was selected from a larger database to comprise equal numbers of men and women, equally divided among African American and Latino-Latina students. Wave 1 included 60 African American students (30 men, 30 women) and 60 Latino-Latina students (30 men, 30 women) in grades 6-11 ($M = 15$ years old, tenth grade), living in California. Students participated in the EAOP and MESA, both sponsored by the University of California.

Wave 1 data collection took place in 1994, when we recruited students attending jointly held academic enrichment activities of the programs. At Wave 1, data on student and parent ethnicities, education, and immigration were drawn from students' responses to open-ended questions on the Multiple Worlds Survey described below. Analyses of family education and immigration appear with results because of their relevance to the core questions of the study. Wave 2 included 66 of the original 120 students for whom follow-up data were available in 1999.

Academic outreach programs. The EAOP was designed to increase the numbers of underrepresented ethnic minority high school students eligible for the University of California (Hayward et al., 1997). In 1994, when our study began, it focused recruitment on African American, Latino, and Native American students; Asian students from low-income families also participated. Economic backgrounds of students varied, with substantial numbers from low-income families. It conducted summer school at UC for students (on a fee basis with scholarships available) and Saturday schools at community colleges without charge to students enrolling through their schools. Ethnic distributions of students at Saturday schools reflected areas around each community college.

MESA was designed to increase the numbers of ethnic minority students who are prepared for math-based college majors and professions. In 1994, it focused recruitment on African American, Latino, Native American, and Puerto Rican students (Smith, 1985). According to staff and published accounts (Edgert & Taylor, 1996), African American students included those from middle-income families who paid to participate because EAOP was not offered in their schools, whereas participating Latino students more often came from low-income families receiving scholarships and recruited through schools. At Wave 1, EAOP and MESA jointly sponsored summer academies, where we conducted our data collection.

Measures

The Multiple Worlds Survey was developed from focus group interviews with African American and Latino junior high, high school, and college students participating in the two programs (Cooper, Jackson, Azmitia, Lopez, & Dunbar, 1994). Some questions were adapted from Ecocultural Theory (Gallimore et al., 1993) and Students' Multiple Worlds Theory (Phelan et al., 1991). The survey asks students to describe their worlds and expectations held by people in each world. It taps challenges and resources across worlds by asking students who helps them and who causes them difficulties (*personnel*) for *instrumental scripts* (who helps you with school work; who helps you with math; who helps keep up with your responsibilities and stay organized; who helps you stay on track to college); and *emotional scripts* (who encourages you in math, who helps you feel confident; and who helps you with sexism or racism). The survey asks students to list up to three people who help or cause difficulties for each script rather than asking them to rate standardized lists of personnel. Questions about difficulties take the same form. To learn about diverse family forms, students are asked to list members of their family, where they were born, their education and job, their ethnicity or ethnicities, and the languages spoken

with this person, among other questions. This open-ended response format enhances rapport with students, who routinely express appreciation for being asked about the realities of their lives rather than to respond to items based on assumed standard family structures and to "please check one box".

Academic achievement. At Wave 1, students brought copies of their report cards or transcripts and reported math and English grades. Official and self-reported grades were highly correlated for English, $r = .79$, and math, $r = .87$, and did not differ significantly in either subject. If report cards were unavailable, self-reported grades were used in analyses. Additional evidence of reliability was reflected in the correlation between student-reported grades from Wave 1 and grades in the same classes from the program database used for Wave 2 ($r = .87$).

For students in Wave 1, we assessed achievement by computing the following variables: junior high math GPA to assess competence entering high school and grades in Pre-algebra, Algebra 1, Geometry, and Algebra 2. For students remaining in Wave 2, we assessed achievement from program records of grades in math and English each semester from ninth to twelfth grade and college-prep GPA. In California, the 15 required college-prep courses are known as the "a through f" courses from their listing as (a) history or social science, 2 years; (b) English, 4 years; (c) math, 3 years, 4 recommended (covering algebra, geometry, and advanced algebra); (d) laboratory science, 2 years required, 3 recommended; (e) language other than English, 2 years required, 3 recommended; and (f) college-prep electives, 2 required.

Finally, to assess students' transition to college, we used the UC *eligibility index* computed by programs, based on college-prep GPA, SAT scores, and submitting all required materials, and we used the *college type* each student chose to attend (UC, CSU, California Community College, or other college).

Procedure

Recruiting participants began at the annual outreach program orientation, when the research staff explained the study and distributed flyers in English and Spanish. We mailed a letter, also in English and Spanish, to each family inviting them to participate. Students completed the Multiple Worlds Survey during Saturday or summer sessions, where we served pizza. Students were asked to bring copies of their report cards or transcripts and paid \$5 for participating. A newsletter mailed to students' families reported preliminary findings to them.

All Wave 2 data were obtained from program records. As part of their ongoing record-keeping and formative evaluation, the programs gathered follow-up

data on each graduate, with students' files including parents' education as well as students' grades, UC eligibility, college acceptance, and enrollment, indicated by students filing an official "Statement of Intent to Register". To maintain their records, programs mailed a survey to each home and made two attempts to reach the family and obtain data by telephone if families did not return the survey.

Results

The analyses were designed to help illuminate relationships among factors that might play a role in African American and Latino students' successful progress through the academic pipeline as they move through high school and into college. Three broad groups of variables were assessed: (a) *demographic variables*, to address the family backgrounds of program participants; (b) *helps and difficulties*, to address students' challenges and resources across their worlds; and (c) *academic variables*, including high school grades and college eligibility and enrollment, to map students' academic pathways to college. The analysis strategy was first to examine variables in each of these three groups to produce a descriptive picture of our sample and develop summary variables for further analyses. Then we systematically examined relationships among the three groups of variables to assess the role of family background and resources and challenges in predicting pathways to college. First we used multivariate analysis of variances (MANOVAs) to test ethnic and gender differences among each group of variables, followed by analysis of variances (ANOVAs) and tests for differences between means when appropriate. To assess other relations among variables, we used correlation, chi-square, and *t*-tests as appropriate.

Who Participates?

The participants were self-selected by their participation in the outreach programs and for this study by ethnicity, gender, and their parents' willingness for them to participate. The 60 African American students in the sample were primarily born in the United States (97% men, all women). For parents from whom we had data, 98% of the 47 African American fathers were born in the United States, as were 87% of the 55 mothers. A very different pattern was present for the 60 Latino-Latina students: 23% of Latinas and 20% of Latinos were born outside the United States, most in Mexico. Of parents from whom we had data, 68% of the 59 mothers and 78% of the 54 fathers were born outside the United States; of these, 85% were born in Mexico.

We obtained two measures of parental education. One, gathered on the entire sample in Wave 1 as part of

the Multiple Worlds Survey, was based on students categorizing their parents' education as: less than elementary, elementary or junior high, high school, 2-year or community college, 4-year college, or master's degree or higher. The second measure, from Wave 2 students, was on the survey programs sent to parents; it asked for the highest grade each parent had completed. The two measures were moderately correlated for mothers and fathers, r 's = .59 and .51, and showed similar patterns of relationships to other measures throughout the analyses. Parents' education based on Wave 2 surveys ranged from none to Ph.D. ($M = 12.1$ years). United States born parents had higher educational levels than immigrants ($M = 13.6$ vs. 10.1 years); this difference was significant for both mothers and fathers, $t(61) = 4.46, p < .001$, and $t(53) = 2.25, p < .03$, respectively.

Using MANOVAs on both Wave 1 and Wave 2 measures of parental education as a function of students' gender and ethnicity consistently revealed an effect of ethnicity, with African American parents having more education than Latino parents. From the Wave 2 survey, African American mothers had more education than Latino and Latinas' mothers ($M = 14.63$ vs. 12.18 years), $F(1, 92) = 21.18, p < .001$, and African American fathers had more education than Latino fathers ($M = 13.87$ vs. 11.01 years), $F(1, 92) = 42.22, p < .001$, with no gender or interaction effects. Comparing only parents born in the United States revealed no significant ethnic group differences for fathers, but African American mothers still had higher educational levels than Latina mothers ($t(64) = 2.67, p < .01$) based on Wave 1 data. The effect in Wave 2 data was in the same direction, but not significant.

Thus, the African American and Latino students in this study, although matched for program participation and gender distribution, differed in the educational levels of their parents and immigration experiences of their families, with African American students more likely to have college-educated parents born in the United States and Latino students to have parents with high school education or less who immigrated to the United States.

Resources and Challenges across Students' Worlds

Students' reports of who helped and caused them difficulties from the Multiple Worlds Survey were compared in two ways. To create *personnel* scores, the number of times each person was mentioned (e.g., peer, mother) was summed across each kind of help and difficulty. Because there were eight kinds of help and six kinds of difficulties, the maximum score for each kind of personnel was 8 and 6 for help and difficulties, respectively. The mean scores for each of the personnel categories mentioned by more than four students were as follows: mothers (3.78), fathers (2.54),

teachers (1.09), siblings (.82), self (.59), peers (.18), and programs (.05). A repeated measures ANOVA for amount of help across personnel was significant, $F(6, 714) = 86.83, p < .001$, and a series of F -tests was used to examine this effect. Students list mothers more than fathers as giving them help overall ($p < .001$), and fathers more than teachers ($p < .001$). Their listing teachers, siblings, and themselves did not differ, although each was listed more frequently than outreach programs and peers ($p < .01$). A similar repeated measures ANOVA for difficulties was significant, $F(6, 714) = 13.13, p < .001$. Students reported peers causing difficulties more than teachers (M 's = .53 and .42, respectively, $p < .05$), who in turn were listed more than other personnel (M 's range from .00 to .14, all p 's < .05).

To create summary scores by *script*, data were summed across personnel within each kind of help and difficulty (range 0–3). The mean scores for each help script category were as follows: stay on track to college (1.76), plan for future (1.19), meet responsibilities (1.13), help with sexism and racism (1.09), encourage in math (1.08), school work (1.08), help with math (1.00), and feel special (.99). A repeated measures ANOVA was significant, $F(7, 833) = 34.39, p < .001$, with students receiving significantly more help staying on track to college than on other scripts.

The effects of gender and ethnicity on personnel and scripts were examined with MANOVAs. For help from different personnel, the only significant effect was for gender, the result of help from peers, $F(1, 115) = 6.11, p < .02$, with girls reporting more help from peers than boys. For help for different scripts, the only significant effect was for ethnicity, accounted for by staying on track to college, $F(1, 115) = 13.60, p < .001$, with African American students reporting more help than Latino students. For difficulties, the only significant effects were for personnel, where a significant ethnicity × gender interaction was accounted for by difficulties from fathers, $F(1, 116) = 4.97, p < .03$; Latinas reported more difficulties than African American women. There was also a significant gender effect accounted for by difficulties from siblings, $F(1, 116), p < .05$, with women reporting more difficulties than men.

Finally, relations among measures were evaluated with correlations. Those for help and for difficulty by personnel are given in Table 1. Help from fathers correlated positively with help from mothers and negatively with students' citing themselves as their source of help. Help from peers correlated with help from teachers. Difficulty from mothers correlated with difficulty from fathers and siblings. The relatively small number of significant correlations suggests that students saw help and difficulties from different personnel quite differently, and that individual personnel scores provided relatively independent information.

Table 2 provides similar correlations for help and difficulties by script. For help, almost all correlations

Table 1. *Correlations among Measures of Help and Difficulty With Personnel*

	Fathers	Mothers	Siblings	Self	Peers	Teachers
Help						
Mothers	.38***					
Siblings	-.01	.12				
Self	-.24**	-.15	-.07			
Peers	-.11	-.01	-.11	.06		
Teachers	.01	.04	.02	-.10	.19*	
Programs	-.17	-.07	-.12	.14	-.06	-.04
Difficulties						
Mothers	.41***					
Siblings	.01	.26**				
Self	-.08	-.02	-.01			
Peers	-.04	-.03	.01	-.02		
Teachers	-.11	.05	.16	.11	.01	
Program	(insufficient observations)					

Note: $N = 120$ for all correlations.

* $p < .05$. ** $p < .01$. *** $p < .001$.

Table 2. *Correlations Among Measures of Help and Difficulty With Scripts*

	Stay on Track to College	Encourage Math	Math	Feel Special	Plan Future	Meet Responsibilities	Racism or Sexism
Help							
Encourage Math	.20*						
Help With Math	.21*	.56***					
Feel Special	.16	.27**	.39***				
Plan Future	.23*	.34***	.40***	.42***			
Meet Responsibilities	.15	.41***	.43***	.27**	.49***		
Sexism or Racism	.11	.30***	.32***	.33***	.27**	.35**	
School Work	.15	.45***	.59***	.34***	.45***	.42***	.23*
	Discourages With Math	Difficulties With Math		Plan Future		Meet Responsibilities	Racism or Sexism
Difficulties							
Difficulties With Math	.36***						
Plan Future	.09	.06					
Meet Responsibilities	.03	.14		.22*			
Racism or Sexism	.26**	.16		.30***		.26**	
School Work	.38***	.44***		.10		.25**	.23**

Note: $N = 120$ for all correlations.

* $p < .05$. ** $p < .01$. *** $p < .001$.

were significant. Although there are some plausible patterns such as help with math correlating more highly with help with school work ($r = .59$) than with help with sexism or racism ($r = .31$), $t(117) = 3.11$, $p < .01$, the overall pattern suggests that students did not differentiate the help they received on the topics surveyed. A similar pattern is shown among difficulties. In this case, over half the correlations are significant. Again, this suggests a lack of differentiation in the types of difficulties students reported. Either students experienced similar kinds of help from several people or they did not differentiate how specific people helped them.

In sum, the students reported substantially more help than difficulties, indicating more resources than

challenges for this group of students. The analyses show they saw help coming particularly from their parents and to a lesser extent from teachers, peers, and themselves, whereas difficulties came particularly from peers and teachers. For the scripts of help and difficulties (e.g., helps with math, causes difficulties with math), students appeared to make much less differentiation. Notably, both personnel and scripts for help and difficulties showed only minimal differences as a function of students' gender and ethnicity.

Students' Academic Pathways

Academic performance was assessed with four measures: grades or GPA, change in GPA over time, an

index of college eligibility, and the type of college selected. Grades for any specific course were not available for all participants, and several measures, including the eligibility index, were available only for Wave 2 participants.

The overall academic performance for the sample was quite good, with GPA in college-prep courses averaging 2.95. Students' GPA in English was higher than in math (3.11 vs. 2.66), $t(59) = 5.30, p < .001$. Ethnic and gender effects were assessed with separate MANOVAs on Wave 1 and Wave 2 samples. For Wave 1, the dependent variables were math GPA in junior high, pre-algebra, algebra, and geometry. For Wave 2, the dependent variables were math GPA, English GPA, and college-prep GPA. No significant effects were found for either wave.

Change in performance over time was examined by looking both at whether math and English courses were taken in a given semester and at change in math and English GPA as students progressed through school. The most salient findings for this analysis of Wave 2 were that the numbers of students taking math and of students getting A's and B's declined from ninth to twelfth grade. The pattern for English was very different, with no systematic decrease in students enrolled in English or their GPA. Consistent with these patterns, students took more English than math courses, $t(65) = 2.76, p < .01$. The number of math courses taken correlated significantly with math GPA $r(65) = .34, p < .05$, but the same was not true for English. It appears that students continued in higher-level math classes only if they were succeeding. There were no gender or ethnic differences in the number of math and English courses taken.

To look at individual students' pathways through college-prep math, a slope score was computed for each student by assuming equal intervals between these courses in this order: Pre-algebra, Algebra 1A, Algebra 1B, Geometry, and Algebra 2. (The task of analyzing math pathways for Wave 1 was made complicated by different data being available for different students. If a student reported only grades for Algebra 1A and Algebra 2, which are three class intervals apart, the calculated slope would be $[\text{Algebra 2 GPA} - \text{Algebra 1A GPA}]/3$, not $[\text{Algebra 2 GPA} - \text{Algebra 1A GPA}]/2$.) The typical math pathway was one of slowly declining grades, with an average slope of $-.19$ of a grade point per class, which differed significantly from a 0 slope, $t(87) = 3.42, p < .01$. No significant ethnic or gender differences were found in this pattern.

To assess the pattern of performance through high school, slope scores were used to assess the degree to which students improved over time (positive slope), performed similarly across time (near zero slope), or performed more poorly over time (negative slope). The slope for Wave 2 data, calculated more directly by using grade in math each semester, averaged $-.11$, (i.e.,

an average decline of .11 GPA per semester). Again the slope was significantly less than zero, $t(65) = 2.39, p < .01$, with no significant gender or ethnicity effects. Each individual's slope can be used to classify them into one of four patterns. The patterns, slope criteria, and number of students exhibiting the pattern from Wave 2 are as follows: *increasers* (slope $> .1$), $n = 9$; *steady* (slope $-.1$ to $+.1$), $n = 20$; *slow decliners* (slope $-.1$ to $-.2$), $n = 12$; and *fast decliners* (slope $< -.2$), $n = 17$. The underlying assumptions of a consistent linear trend in individuals' grades over time seems to characterize patterns for most students, but some students showed a rapid decline followed by recovery that we call *back on track*. Although the overall slope for these students may be close to zero, the category *steady* is not fully accurate. Examples of each of these five patterns will be presented as case studies after group-level findings.

College eligibility information, available on 49 students, was coded as follows: 3 = fully eligible ($n = 23$); 2 = students submitted all materials, but were not eligible because of at least one indicator below threshold ($n = 7$); and 1 = not all materials in and of those materials provided, at least one below threshold ($n = 19$). Two methods were used for coding the college in which each student ($n = 52$) enrolled. The first was used to create an ordinal scale reflecting the hierarchy in California higher education (3 = University of California; 2 = California State University; 1 = Community College). The second treated each of these as categorical and added a category for private or out-of-state 4-year colleges and universities. Gender and ethnicity effects were examined with a MANOVA on eligibility and college type ordinal scores. Only the ethnicity effect was significant; univariate analyses showed this resulted from college type $F(1,48) = 5.00, p < .05$, with African American students scoring higher than Latino students. A chi-square analysis of the four college types' ethnicity revealed equal numbers of students in each ethnic group going to UC, more Latinos and Latinas going to state universities and community colleges, and more African Americans going to private and out-of-state institutions, $\chi^2(3) = 7.83, p < .05, n = 52$. A number of historically Black colleges and universities were among this latter group, including Howard University, Morehouse College, Hampton University, and Spelman College. Thus, effects of ethnicity on the ordinal scale of college type appeared to reflect differential choices in type of institution rather than differences in prestige of institutions.

Correlations among academic performance variables are presented in Table 3. The majority showed moderate to strong correlations with other measures. College-prep GPA correlated significantly with all the others, and as did English GPA and college eligibility except English slope. English slope did not correlate with any other variable except math slope, but this corre-

Table 3. *Correlations Among Academic Measures*

	Algebra	Math GPA	Math Slope	English GPA	English Slope	Eligibility	College Type
College-prep GPA	0.50*** (49)	0.75*** (58)	0.47*** (58)	0.87*** (59)	0.36** (60)	0.79*** (52)	0.44*** (58)
Algebra	1.00 (71)	0.73*** (50)	0.26 (49)	0.42** (50)	0.17 (50)	0.65*** (44)	0.21 (51)
Math GPA	0.73*** (50)	1.00 (62)	0.33** (60)	0.57*** (60)	0.08 (60)	0.68*** (51)	0.15 (54)
Math slope	0.26 (49)	0.33** (60)	1.00 (60)	0.38** (60)	0.40** (60)	0.32* (51)	0.33* (54)
English GPA	0.42** (50)	0.57*** (60)	0.38** (60)	1.00 (61)	0.24 (61)	0.73*** (52)	0.38** (58)
English slope	0.17 (50)	0.09 (60)	0.40 ** (60)	0.24 (61)	1.00 (62)	0.23 (53)	0.10 (59)
Eligibility	0.65*** (44)	0.68*** (51)	0.32* (51)	0.73*** (52)	0.23 (53)	1.00 (53)	0.30* (50)

Note: Coefficient appears with *n* of cases in parentheses.

* $p < .05$. ** $p < .01$. *** $p < .001$.

lation suggests consistent differentiation between students who were succeeding academically and those who were declining. Algebra 1 grades were correlated significantly with math GPA, English GPA, and eligibility; this course was typically taken in ninth grade and the grade not used to compute eligibility. Math slope in the first two years also correlated with math GPA, $r(28) = .37, p < .05$, and eligibility, $r(27) = .43, p < .05$, suggesting moderate predictability from early math grades to overall academic success in high school.

In sum, the overall pattern of academic pathways in our sample was one of substantial variability, but relatively high average performance. During high school, students' decreases or improvements in math and English tended to occur together in time, but changes in math were better predictors of college-prep GPA, eligibility, and college type. Finally, there was surprising predictability of these variables from students' math performance early in high school.

Do Family Background and Students' Resources and Challenges Predict Academic Pathways?

In examining interrelationships among variables, we first considered possible non-random selection of those remaining in Wave 2. A series of *t*-tests comparing those students only in Wave 1 and those in Wave 2 revealed no significant differences, either in their parents' education or on most help and difficulties variables. Wave 2 students showed a marginally significant advantage in total help, $t(118) = 1.95, p = .05$. Wave 2 students also reported more total help from teachers than the Wave 1 cohort, $t(118) = 2.89, p < .01$. No academic variables available only from Wave 1 showed even marginally significant differences between groups. Given the likelihood of some spuriously significant differences with the large number of comparisons, these results lessen our concern about selection factors in attrition, and the results of data from both waves are treated as validly characterizing students in the programs.

From the social capital perspective, we expected parents' education to be correlated with their providing

academic help and their children's academic success and progress toward college. Fathers' education did correlate with total help they provided, $r(63) = .31, p < .05$, but fathers' education also correlated negatively with students' college-prep GPA, $r(58) = -.32, p < .05$, and their eligibility, $r(51) = -.38, p < .05$. None of the correlations between mothers' education and either help and difficulties or academic measures was significant. Thus, there was little support for the social capital perspective for this sample.

The correlations among the help personnel and scripts and the academic variables are presented in Table 4 and similar correlations for difficulties in Table 5. The relatively small numbers of significant correlations lead to caution in interpreting those that are significant. It is only partially reassuring that correlations involving help are generally positive and those with difficulties, generally negative. Nevertheless, there are some interesting patterns. The correlations reported in the text are all significant at $p < .05$ (see the tables for *n*). Helping stay on track to college and encouraging in math predicted college type ($r = .24$ and $r = .30$, respectively). English GPA was correlated with total help ($r = .26$), helping feel special ($r = .26$), plan for the future ($r = .25$), and with sexism or racism ($r = .27$). For help by personnel category, fathers seemed to help with academic performance, as seen in English GPA ($r = .25$), math GPA ($r = .26$), and overall college-prep GPA ($r = .29$), whereas mothers appeared to contribute to successful transitions from high school to college, as reflected in eligibility ($r = .26$) and college type ($r = .25$). Finally, total help from siblings was related to English GPA ($r = .32$). Thus, although not powerful predictors help, particularly from parents, did correlate with academic performance and successful transition to college.

No difficulties script was significantly correlated with academic variables. Total difficulty was negatively related only with college type ($r = -.24$). The only other significant correlations were positive, between difficulties with siblings and English GPA ($r = .32$), math GPA ($r = .36$), and math slope ($r = .27$). Thus, among students with relatively high levels of help and low levels of difficulties, differences in the amount of difficulties did not predict their academic

Table 4. *Correlations Between Help and Academic Measures*

Type of Help	College Type ^a	Eligibility ^b	College-prep GPA ^c	English GPA ^d	English Slope ^e	Math GPA ^e	Math Slope ^e
Total Help	.19	.21	.21	.26*	.16	.07	.10
Script							
Stay on Track to College	.24*	-.08	.04	-.04	.05	-.01	.16
Encourages in Math	.30*	.17	.14	.17	.04	.05	.13
Feel Special	.12	.19	.20	.26*	.10	.10	.00
Helps With Math	.05	.04	.04	.03	-.01	.03	.00
Plan Future	.20	.12	.23	.25*	.19	.08	.24
Meet Responsibilities	.11	.10	.13	.20	.23	-.01	.03
With Racism or Sexism	-.09	.20	.18	.27*	.09	.15	.02
School Work	.07	.02	.07	.09	.11	-.08	-.04
Personnel							
Fathers	.16	.24	.29*	.25*	.06	.26*	.14
Mothers	.25*	.26*	.06	.07	.11	-.09	-.05
Siblings	.15	.13	.20	.32*	.12	.05	.03
Self	.06	-.02	-.01	-.04	-.17	.07	.18
Peers	-.12	-.06	.00	.02	.11	-.19	-.07
Teachers	.00	-.21	.01	.11	.14	.05	-.02
Program	.12	-.10	.09	.03	-.01	.06	.18

^a*n* = 65. ^b*n* = 53. ^c*n* = 60. ^d*n* = 61. ^e*n* = 62.

**p* < .05.

Table 5. *Correlations Between Difficulties and Academic Measures*

Type of Difficulties	College Type ^a	Eligibility ^b	College-prep GPA ^c	English GPA ^d	English Slope ^e	Math GPA ^e	Math Slope ^e
Total Difficulties	-.24*	.14	-.09	-.02	-.05	.07	.11
Personnel							
Father	.02	.10	-.15	-.14	-.16	.01	.10
Mother	.00	.14	-.09	.15	-.06	.12	.20
Sibling	.01	-.08	.20	.32*	.01	.36*	.27*
Self	-.20	.17	-.23	-.23	-.17	-.12	.04
Peer	-.15	.06	-.04	-.07	.17	-.11	-.05
Teacher	-.15	.06	-.04	.08	-.15	.19	.10
Script							
Discourages With Math	-.15	.03	.09	.09	.14	.17	.06
Difficulties With Math	-.14	-.25	-.16	-.07	-.14	-.11	.08
Plan Future	-.25*	.13	-.04	.05	.11	.04	.02
Meet Responsibilities	-.06	.09	-.17	-.11	-.15	-.14	-.02
Racism or Sexism	-.05	-.07	.10	.03	-.02	.17	.05
School Work	-.24*	.11	-.13	-.05	-.08	.13	.20

^a*n* = 65. ^b*n* = 53. ^c*n* = 60. ^d*n* = 61. ^e*n* = 62.

**p* < .05.

outcomes, except perhaps when difficulties from siblings functioned as a challenge. These findings provide some support for the challenge hypothesis.

Mapping Students' Pathways Through School with Longitudinal Case Studies

Five prototypic pathways in math grades—steady, slowly declining, rapidly declining, increasing, and back on track—are now illustrated with longitudinal case studies. These show how group-level findings occur in individual lives and how the broad array and dis-

tinctive patterns of resources and challenges across worlds make each student's experience moving along pathways through school unique.

The most common math pathway was a *steady* one, seen in a Latina student whose parents immigrated to the United States having attended elementary school in Mexico. She saw her family world as her primary source of both help and difficulties. Her mother, father, and sister helped her across a broad range of scripts, and her older brother caused her difficulties with schoolwork and discouraged her in math. This case provides an example of a student with high math grades experiencing help from one sibling and difficul-

ties from another. She was admitted to UC campus and enrolled there.

The *slowly declining* pathway was seen in an African American woman, a student from a two-parent household with two siblings. Both her parents had attended college. The group-level finding of parents specializing in the help they provided was seen in her mother helping her stay on track to college, keep up with responsibilities, and plan her future and her father helping with schoolwork and math. Her cousin and godmother helped her feel special, her English and science teachers helped her stay on track to college and plan her future and encouraged her in math, and her friends helped her feel special and with school work, math, and her responsibilities. She did not list any difficulties. She was admitted to a UC campus and enrolled there.

A student showing *rapidly declining* math grades was an African American student from a two-parent family whose parents had post-graduate college education. He drew resources from his family, school, peer, and community worlds. His mother helped him stay on track to college and plan the future and encouraged him in math, and his grandmother helped him feel special. His coaches helped him stay on track to college and with responsibilities, and his friends helped him with math, stay on track to college, and feel special. Yet, he also listed peers on a sports team giving him difficulty feeling confident and a friend making it hard to keep up with responsibilities. This case illustrates how students having difficulty may be receiving help, but that help does not ensure high grades. No data were available for his college admission or enrollment.

The *increasing* pathway was seen in the case of an African American student from a two-parent family with one brother and two sisters. His experiences illustrate continuity in help across worlds. Both parents had attended college. His parents, sister, and play sister helped him with his schoolwork and his parents, sister, and a teacher helped him stay on track to college. His principal, counselor, and grandparents helped him feel special. His parents and outreach program staff helped him plan the future. He saw difficulties coming from peers at school in schoolwork and racism in the broader society. He was admitted to UC, but chose to enroll in a private out-of-state university.

Finally, the *back on track* pathway was seen in the case of a Latino man, a student from a two-parent family. His parents were born in Mexico, his mother a high school graduate and his father completing three years of elementary school. All his resources were from his family world, and he primarily experienced challenges in his family and peer worlds. Both parents encouraged him in math and helped him stay on track to college and with sexism and racism. He listed his older brother as a resource for all forms of help. His difficulties came from his father with schoolwork and his peers with sexism and racism. This case shows how an older sibling

can play a key role in helping a student navigate across family, school, and peer worlds. The student was accepted and enrolled at a UC campus.

Discussion

We first summarize the most salient findings with respect to the four questions that organized the study and then examine them with respect to current scholarly debates. We conclude by discussing the implications of this work in the broader context of integrating research, policy, and practice for the academic pipeline problem facing ethnically diverse youth.

Amid their resources and challenges—personal, relational, institutional, and cultural, a remarkable number of students in this study were successful in completing high school and gaining admission to colleges and universities. The African American participants more typically had U. S. born, college-educated parents and Latino students, immigrant parents with a high school education or less. As a group, students reported substantial help from a variety of sources, particularly their parents and teachers. Compared to their resources, students reported fewer difficulties, primarily from their peers and teachers. Students' academic performance showed substantial stability, although math grades tended to drift downward. Early math grades predicted overall academic performance, and changes in math and English tended to occur together, with decreases in math particularly linked to poorer academic outcomes. Despite the range of parental education and immigration histories, these family background variables played only a modest role in predicting students' academic performance. Surprisingly, fathers' educational level was negatively related to college-prep GPA and college eligibility. Although mothers' and fathers' help correlated positively with more than one academic outcome, as did siblings causing difficulty, overall levels of help and difficulties were not strong predictors of academic performance.

Who are the Students?

The demographic profiles of students participating in the outreach programs revealed very different patterns for African Americans and Latinos. The African American students in the sample, all but one born in the United States, were likely to have college-educated parents also born in the United States. The Latino students, more than 20% of whom were born outside the United States, were likely to have immigrant parents with a high school education or less. Thus, African American youth in the sample were more likely to be following their parents' pathways to college and Latino youth, beginning to exceed their parents' education. These demographic profiles raise questions of self-se-

