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AUTHOR	Cabrera, Alberto F.; Prabhu, Radhika; Deil-Amen, Regina; Terenzini, Patrick T.; Lee, Chul; Franklin, Robert E., Jr.
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ABSTRACT

This study, first in a planned series, sought to examine the aggregate, or overall, impact of comprehensive intervention programs (CIPs) on students' preparedness for college, as reflected in their reading and mathematics abilities. All of the schools in the study were involved in GEAR UP, but it is important to be clear that GEAR UP is something of a prototype. The study focuses not on GEAR UP but on the outcomes associated with the kinds of activities and services it embodies. The analytical focal group was cohorts of seventh graders at 180 California public schools in fall 1999, followed from sixth grade. Of these schools, 47 were CIP schools and 133 were similar "peer" schools. The two dependent variables were the mean scaled scores in the Stanford-9 tests in reading and mathematics. A series of t-tests revealed no significant differences between CIP and peer schools in the benchmark year on a variety of measures of readiness and school characteristics with one exception: CIP school showed lower mean scaled scores in mathematics than peer schools. Any of several reasons might explain the lack of an effect of CIP on reading as well as by the lower than anticipated performance in both reading and mathematics displayed by CIP sixth graders. Results do suggest that in reading, CIP activities and services appear to have had some effect, but gains were modest and not statistically significant. (Contains 2 figures, 6 tables, and 28 references.) (SLD)

INCREASING THE COLLEGE PREPAREDNESS OF AT-RISK STUDENTS

Alberto F. Cabrera
Professor & WISCAPE Senior Researcher
Department of Educational Administration
University of Wisconsin - Madison
cabrera@education.wisc.edu

Radhika Prabhu
Doctoral Student
Center for the Study of Higher Education
The Pennsylvania State University

Regina Deil-Amen
Assistant Professor
Department of Education Policy Studies
The Pennsylvania State University

Patrick T. Terenzini
Professor of Education & Senior Scientist
Center for the Study of Higher Education
The Pennsylvania State University

Chul Lee
Doctoral Student
Department of Educational Administration
University of Wisconsin – Madison

Robert E. Franklin, Jr.
Doctoral Student
Department of Educational Leadership
Pennsylvania State University

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INCREASING THE COLLEGE PREPAREDNESS OF AT-RISK STUDENTS

Over the past thirty years, a number of private organizations and state- and federal-level agencies have implemented a variety of college preparation and outreach programs all intended to increase the likelihood that the children of low-income parents will be ready for college at rates comparable to those of their more affluent peers. The public and private financial commitment to this goal has been substantial, and yet low-income students' level of preparation for college and college-going rates remain substantially below those of their counterparts from middle- and upper-income families (Cabrera, La Nasa, & Burkum, 2001; Mortenson, 2001; Perna, 2002; Terenzini, Cabrera, & Bernal, 2001).

The atomistic nature of most of the intervention strategies is increasingly being recognized as a possible culprit for this disparity in college participation rates (e.g., Gándara & Bial, 2001; Perna, 2002; Perna & Swail, 1998). Mounting research indicates that a student's decision to go to college, and his/her eventual ability to secure some sort of a postsecondary degree, are the result of a complex process that begins at the 7th grade, if not earlier. This research also shows that students are more likely to become aware of and ready for college when parents, schoolteachers and administrators, peers, and the community itself work together with the students (e.g., Cabrera & La Nasa, 2001; Cabrera, La Nasa, & Burkum, 2001; Hossler, Schmit, & Vesper, 1999; McDonough, 1997; Venezia, Kirst & Antonio, 2003). In contrast to the systematic and longitudinal process students and their families go through when making college choice decisions, most of the intervention efforts target specific elements or phases of the search and selection process (e.g., after-school programs, tutoring in selected subjects, big brother/sister programs, parental involvement efforts, financial aid advising).

This lack of alignment between outreach programs and research has been dramatically documented by two recent studies. Perna (2002), for instance, examined the extent to which 1,110 pre-college outreach programs, aimed at four groups of students, reflect 11 known predictors of college enrollment. She found that only about 25% of the programs targeting low-income, first-generation, and historically underrepresented groups contained components that addressed 5 of the most critical predictors of college enrollment. Less than 6 percent of the programs she examined contained all 11 predictors of success. Gándara and Bial (2001) note that the lack of evaluation sharply limits assessment of these outreach programs' effectiveness. After reviewing 33 precollege programs, they concluded that attrition, lack of evidence on academic achievement, and the absence of longitudinal data on the students served severely limit our understanding of what works and what does not.

More recent outreach programs have attempted to bring together the critical players and resources in comprehensive, integrated, and coordinated efforts aligned with empirically based recommendations (e.g., Gándara & Bial, 2001; Perna, 2001; Perna & Swail, 1998; Rendón, 2002; Venezia, Kirst & Antonio, 2003). One of these comprehensive intervention programs (CIP) is the U.S. Department of Education's "Gaining Early Awareness and Readiness for Undergraduate Programs" (GEAR UP). This CIP outreach program is intended to enable nearly 1 million low-income, middle school students and their families to learn about, plan for, and prepare for college. The program was designed in large measure to incorporate what the available research literature suggests are successful precollege interventions. The program funds partnerships of high-poverty middle schools, colleges and universities, community organizations, and businesses to work with entire grade-levels of students, beginning not later than the 6th grade and staying with these students through high school. Other projects have some of these same goals and programmatic components, but GEAR UP is unique in working with entire grade cohorts of students, rather than individuals, as the focus of the intervention. In addressing grade-cohorts, the program's strategy is *systemic*, integrating multiple partners in efforts to elevate youngsters' and parents' awareness of college as an option, their college aspirations, and their level of preparedness for college, both academically and financially. Thus, GEAR UP incorporates most of the elements of other interventions, but it does so theoretically, at least, in an integrated, collaborative, systemic, and very large national effort. As such, it represents one of a very small handful of comprehensive intervention programs (CIPs) and, thus, is the organizational focus of this research project.

Theoretical Framework

Cultural and social capital development provides a conceptual basis to support the expectation that CIP-based initiatives will have a positive effect on readiness for college by addressing elements within the school environment known to foster the development of cultural and social capital. Various writers have drawn attention to the importance of social and cultural capital within the school context. According to Bourdieu (1977a), cultural capital derives from one's *habitus*, "a system of lasting, transposable dispositions which, integrating past experiences, functions at every moment as a matrix of perceptions, appreciations, and actions" (pp. 82-83). A child's cultural capital, therefore, consists of those cultural signals, dispositions, attitudes, skills, preferences, formal knowledge, behaviors, goals, and competencies that are both required and rewarded within particular contexts, such as school, to achieve particular outcomes, such as high achievement or high aspirations (Bourdieu, 1977b). A child's social group or class of origin necessarily influences their *habitus*, shaping their approach to schooling and educational aspirations.

According to this framework, students of lower socioeconomic status are disadvantaged in the competition for academic rewards because their *habitus*, or sociocultural environment, may not provide the types of cultural capital required for success in school, such as academic attention, certain linguistic patterns, behavioral traits, orientation toward schooling, high expectations, or encouragement of college aspirations. Lamont and Lareau (1988) contend that lack of access to such cultural capital results in "social and cultural exclusion" (p. 156). Bourdieu emphasizes that schools reproduce existing inequalities by essentially failing to teach students the valued cultural capital necessary to succeed. He acknowledges that by not teaching cultural capital, schools make it "difficult to break the circle in which cultural capital is added to cultural capital" (Bourdieu & Passeron, 1977, p. 493).

Lower income students also lack access to social capital, what Bourdieu defines as a set of durable, deliberate, institutionalized relationships and the benefits that accrue to individuals as a result of the existence of such social bonds (Bordieu, 2001). Disadvantaged students are thus excluded from the benefits of such relationships and social networks and the kinds of social capital that lead to school success and eventual college enrollment. These networks shape college aspirations and provide information and guidance on what it means to be academically ready for college, what behavioral strategies to employ to get ready, how to prepare for college socially and financially, and how to apply for and make choices about college.

McDonough (1997) applies Bourdieu's concepts to highlight the important influence that the organizational structure and normative culture of the high school context can exert on a student's decision-making about their future. She suggests that schools can make a difference by exposing disadvantaged students to an alternate organizational "*habitus*," one that provides students and their parents, inside the school context, with the kinds of cultural and social capital that is often experienced by higher SES students both inside and outside the school setting.

By providing a network of services and associated benefits, GEAR UP and similar CIP-based programs enhance low-income students' access to the types of social and cultural capital that may otherwise be unavailable to working class and racial minority students. Given that prior research clearly suggests that college readiness begins to take shape in the early middle-school years, GEAR UP represents a CIP model that aims to facilitate the acquisition of important cultural and social capital across whole grades by enabling low SES students and their families to become more aware of and ready for college. Previous research highlights the multiple and intersecting ways that middle and upper class students and white students benefit from family-based resources as well as their similar and mutually reinforcing school and home environments (Bourdieu & Passeron, 1977; Lareau, 1987; Lareau & Horvat, 1999; Lewis, 2003; McDonough, 1997). GEAR UP tries to develop systemic relationships between and among students, parents, and school staff, to change the *habitus*, both inside and outside school, so as to promote academic readiness and college awareness.

Purpose of the Study

This study, the first in a series of planned analyses, seeks to examine the aggregate, or *overall*, impact of CIP on students' preparedness for college, as reflected in their reading and mathematics abilities. In so doing, this project seeks to advance current knowledge about the educational attainment process that will benefit all parties concerned – students and parents, schoolteachers and administrators, colleges and universities, and communities, and policy makers, as well as help guide future program and policy planning and implementation. While the schools offering CIP are all part of GEAR UP, it is important to be clear that GEAR UP is something of a prototype. This study focuses not on GEAR UP *per se*, but rather on the outcomes associated with the philosophical, policy, and structural concepts and kinds of activities and services that it embodies.

Methodology

Sample selection. The original research design called for the selection of states with a large concentration of CIP partnerships. Particular attention was placed on the availability of school characteristics and readiness indicators in a format that would allow following-up the performance of grades on those indicators within each school across time. After all, the effort of CIP partnerships is directed to cohorts of students as they move from one grade to the next (e.g., from 6^{th} grade to 7^{th} grade). Of the five states considered[1], California met our selection criteria most clearly. Between 1999 and 2000,

[1] California (34 partnerships), Texas (19), Florida (18), New York (13), Oklahoma (13), and Kansas (10) were our prime candidates.

34 out of 237 partnership awarded went to California. The California Department of Public Instruction's website is also rich in indicators of school and students' readiness for college.

Databases. Analyses draw on two data sources maintained by the California Department of Public Instruction (CADPI) and are publicly available on the Department's website (**www.cde.ca.gov**). The first data source is the Standardized Testing and Reporting (STAR) system. Since 1998, STAR databases contain information at the grade-within-school level on student performance on the *Stanford-9* tests administered in all public schools statewide. The specific test areas for which we have data include reading, mathematics, language arts, and spelling. The second database is California's Academic Performance Index (API), which contains a rich array of student and school personnel characteristics at the school level. API databases are available since 1999. School-specific identifying codes allow for merging information from both databases.

Unit of analysis. The analytical focal group in this study is cohorts of 7th graders attending 180 California public schools in the fall of 1999, the year most GU partnerships began. Our research plan called for following cohorts from grade 6, a year before the GU partnerships began operation, to grade 12. It was assumed this strategy would allow us to partition long- and short-term effects associated with CIP-based activities. The vast majority of GU schools, however, were middle schools, serving only grades 6, 7, and 8. Consequently, our target GU population was narrowed to those schools that served 6th to 8th graders from 1998 to 2000.

Of the 180 Californian public schools in this study, 47 are CIP schools and 133 are "peer" schools selected to be similar to the GU schools with respect to both school and student characteristics. The selection of the 'peer' schools was the product of a three-stage process, involving: 1) retrieval of a list of 100 "similar schools" [2] for each GU schools, 2) selecting the five schools with an API score closest to that of the target GU school, and 3) elimination of duplicates, GU schools (i.e., no GU school could be peer for another GU school), and schools that did not appear on the target school's 100 similar school list in each of the years under study.

Variables. The two dependent variables in this study are the mean scaled scores on the Stanford-9 tests in reading and mathematics when these cohorts of students were in the 6th, 7th, and 8th grades. The mean scale scores take into account item difficulty and are recommended by the Californian Department of Public Instruction for assessing changes in academic performance across time (see 1998 California's STAR report[3]).

Schools in CIP programs were coded as "1." Peer schools were coded as "0." The percentage of teachers fully certified (% Teachers Certified), percentage of students participating in the free-or-reduced lunch programs (% Students in Lunch Programs), and percentage of Parents College educated or with some college (% Parents College Educated) were used as control variables for school characteristics. Teacher certification, a measure of teacher quality (Kaplan & Owin, 2001), has been found to be the most

[2] This list, available at the California Department of Education website, is based on the School Characteristics Index (SCI), a composite measure of schools' demographic characteristics, grade-levels served, pupil characteristics, teachers' credentials, average class sizes at each grade level, and selected curricular characteristics. This list for any school year also reports the Academic Performance Index (API), a measure of student academic abilities, for each of the 100 similar schools.

[3] Source: http://star.cde.ca.gov/star2000f/reporthelp_b.html

consistent and best predictor of student achievement in math and reading next to students' levels of poverty, minority status, and English proficiency (Darling-Hammond, 2000). While examining determinants of the path to college followed by members of the 1988 8th cohort, Cabrera and La Nasa (2001) found that children of college-educated parents were more likely to acquire higher levels of academic preparation. Poor performance in standardized tests is also significantly associated with the percentage of students receiving subsidized lunches (National Research Council, 1999). All school-based characteristics were extracted from the 1999 API database. Table 1 reports the descriptive statistics for the variables employed in this study.

Table 1. Descriptive statistics

Factors	1998		1999		2000	
	Mean	***SD***	**Mean**	***SD***	**Mean**	***SD***
Readiness						
Mean scaled reading scores	636.25	10.11	653.55	11.33	671.14	10.13
Mean Scaled math scores	634.84	9.56	654.10	8.88	666.37	9.67
School Characteristics						
% Parents college educated	N/A	N/A	35.20	14.49		
% Teachers Fully Certified	N/A	N/A	80.64	12.14		
% Students with free or subsidized lunches	N/A	N/A	72.56	16.85		

Research design. This study employs a multilevel, repeated-measures design and analytical procedures to examine the effects of exposure to CIP programs and activities on two measures of readiness for college. This analytical strategy is highly suited to examining the effects attributable to different levels of data aggregation, in this case grades nested within schools (Hox, 2002; Little, Schnabel & Baumert, 2000; Raudenbush & Bryk, 2002; Snijders & Bosker, 1999). At Level 1, changes in readiness are assumed to be the by-product of individual growth trajectories due to transitions from 6th to 7th grade and from 7^{th} to 8^{th} grade. At Level 2, changes in readiness across grade levels are presumed to be the result of school characteristics, including participation in CIP programs. In short, this model simultaneously takes into account both time and school effects on readiness for college (see Hox, 2002; Little, Schnabel & Baumert, 2000; Raudenbush & Bryk, 2002; Snijders & Bosker, 1999). All statistical analyses are based on Hierarchical Linear Modeling (HLM) procedures for Windows, Version 5.05 (Raudenbush, Bryk, Cheong & Congon, 2001).

Following recommendations by Sniders and Bosker (1999), a three-stage procedure was used in estimating the effect of both growth trajectories and school characteristics. A model assuming that changes in readiness scores could be accounted for only by changes in grades from 6^{th} through 8^{th} was first estimated. This model provides a baseline for assessing whether the remaining, unexplained variation in readiness scores that exists across schools could be explained by school characteristics and participation in CIP-programs. The second model views changes in readiness as the by-product of both changes in grades from 6^{th} to 8^{th} and school characteristics. This model, known as a fixed occasions or compound symmetry model (see Sniders & Bosker, 1999), also presumes that the effects of each grade do not vary across schools. The third model, known as a random slopes model, assumes that the effect of each of the three grades under consideration varies across school. Tests of changes in scaled deviances were conducted to assess each competing model. HLM, with the full maximum likelihood option, was employed for all models. Table 2 displays the equations for each model.

Table 2. Models tested

Baseline Model	Fixed occasions model	Random slopes model
Level-1 $Y = \beta_0 + \beta_1 \cdot 7thGrade + \beta_2 \cdot 8thGrade + \gamma$ Level-2 $\beta_0 = \gamma_{00} + \mu_0$ $\beta_1 = \gamma_{10}$ $\beta_2 = \gamma_{20}$	Level-1 $Y = \beta_0 + \beta_1 \cdot 7thGrade + \beta_2 \cdot 8thGrade + \gamma$ Level-2 $\beta_0 = \gamma_{00} + \gamma_{01} \cdot CIP + \gamma_{02} \cdot PARENT +$ $\gamma_{03} \cdot TEACHER + \gamma_{04} \cdot LUNCH + \mu_0$ $\beta_1 = \gamma_{10} + \gamma_{11} \cdot CIP$ $\beta_2 = \gamma_{20} + \gamma_{21} \cdot CIP$	Level-1 $Y = \beta_0 + \beta_1 \cdot 7thGrade + \beta_2 \cdot 8thGrade + \gamma$ Level-2 $\beta_0 = \gamma_{00} + \gamma_{01} \cdot CIP + \gamma_{02} \cdot PARENT +$ $\gamma_{03} \cdot TEACHER + \gamma_{04} \cdot LUNCH + \mu_0$ $\beta_1 = \gamma_{10} + \gamma_{11} \cdot CIP$ $\beta_2 = \gamma_{20} + \gamma_{21} \cdot CIP + \mu_2$

Results

A series of *t*-tests revealed no significant difference between CIP and peer schools in the benchmark year on a variety of measures of readiness and school characteristics with one exception: CIP schools showed lower mean scaled scores in mathematics than did non-CIP schools. All data, including the Stanford-9 reading and math test scores (the dependent variables) come from the website of the Policy and Evaluation Division of the California Department of Education. Tables 3 and 4 show the results of testing alternative models for mean scaled scores in reading and math.

Table 3. Results of alternative models for mean scaled reading scores

Parameters	Baseline Model	Fixed occasions model	Random slopes model
School-Level Variance (τ^2)	100.76	32.91	37.44
Grade-Level Variance (σ^2)	11.55	11.52	10.16
Deviance, *df*	2861.2, 5	2690.6, 11	2689.0, 13

Table 4. Results of alternative models for mean scaled math scores

Parameters	Baseline Model	Fixed occasions model	Random slopes model
School-Level Variance (τ^2)	73.03	37.49	35.68
Grade-Level Variance (σ^2)	14.13	13.65	13.54
Deviance, *df*	2869.5,5	2760.2,11	2758.1, 13

Under the baseline model, the intraclass correlations for reading and math are large ($\hat{\rho}_{\text{READING}} = 0.89$ and $\hat{\rho}_{\text{MATH}} = 0.84$). About 90% and 80% of the variance in scaled reading and math scores can be attributed to school characteristics. These two large intraclass correlations argue on behalf of including variables that can capture the contribution of the school itself in changes in math and reading across grades.

The chi-square tests for the difference between the fixed occasions model and the baseline model shows a significant improvement of fit of the fixed model relative to the baseline model for both reading ($\chi^2_{reading}$ = 2,691- 2,689 = 2, *df* = 11-5 =6, $p < .00$) and math (χ^2_{math} = 2,760 – 2,759 = 1, *df* = 11-5 =6, $p <.00$). Furthermore, the amount of unexplained variance across schools went down from 100.8 to 32.9, in the case of reading and from 73.3 to 37.5, in the case of math, once school characteristics variables were taken into account. In other words, school characteristics and CIP-based programs explained around 68% and about 50% of the variance in reading and math scores across schools.

The hypothesis stating that grade levels have a differential effect across schools is not tenable. No significant change in chi-square tests was observed between the fixed occasions model and the random slopes model across both reading ($\chi^2_{reading}$ = 2, 861-

2,691 = 170, df = 11-5 =6, p >.5) and math (χ^2_{math} 2,869- 2,760 = 109, df = 11-5 =6, p >.5). Consequently, the fixed slope model was retained in examining the impact of CIP-programs on the two measures of readiness across grades.

Tables 5 and 6 present the results of the multilevel repeated measures. On average, and across all schools, students' reading and math scores improved significantly from grades 6 through 8. By the end of the 7th grade, students irrespective of participating in CIP programs had increased their reading scores by 16.5 points. By the end of the 8th grade, all students displayed a significant gain of 34.05 points in relation to their corresponding scores in the 6th grade. By the end of the 7th grade, students increased their math scores by 17.8 points. One grade later, all students displayed a significant gain of 30.4 points in relation to their corresponding scores in the 6th grade. In other words, holding constant school characteristics and participation in CIP-programs, students, on the average, increased their readiness levels as they moved from grades 6 through 8.

Table 5. Effects of time, participation in CIP and school measures on students' reading scaled scores on the Stanford-9 test

	Coefficient	**S.E.**	***p*-value**
6th Grade MEAN for Non-CIP, γ_{00}	616.90	6.56	0.00
CIP vs. Non-CIP, γ_{01}	-3.38	1.29	0.01
% Parents college educated γ_{02}	0.32	0.06	0.00
%Teachers Certified γ_{03}	0.27	0.04	0.00
%Students in Lunch Programs, γ_{04}	-0.17	0.05	0.00
Growth in 7th Grade, γ_{10}	16.50	0.48	0.00
CIP vs. Non-CIP, γ_{11}	0.48	0.90	0.59
Growth in 8th Grade, γ_{20}	34.05	0.48	0.00
CIP vs. Non-CIP, γ_{21}	0.90	1.12	0.42

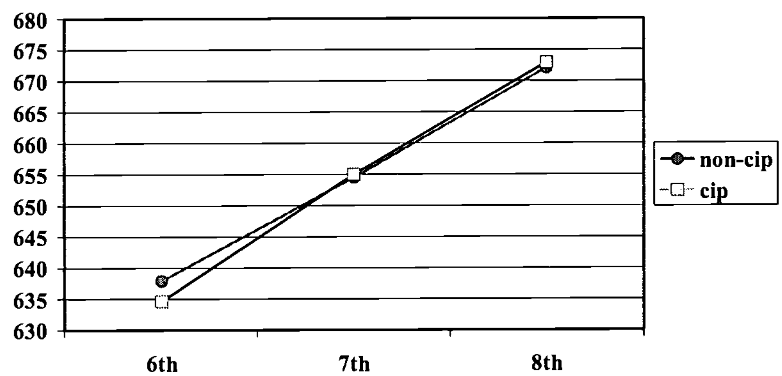
Table 6. Effects of time, participation in CIP and school measures on students' math scaled scores on the Stanford-9 test

	Coefficient	S.E.	*p*-value
6th Grade MEAN for Non-CIP, γ_{00}	619.90	6.74	0.00
CIP vs. Non-CIP, γ_{01}	-4.44	1.52	0.04
% Parents college educated γ_{02}	0.16	0.06	0.01
%Teachers Certified, γ_{03}	0.26	0.04	0.00
%Students in Lunch Programs, γ_{04}	-0.139	0.052	0.01
Growth in 7th Grade, γ_{10}	17.84	0.55	0.00
CIP vs. Non-CIP, γ_{11}	3.06	1.21	0.01
Growth in 8th Grade, γ_{20}	30.36	0.60	0.00
CIP vs. Non-CIP, γ_{21}	2.44	1.25	0.05

Consistent with the school effectiveness literature, the percentage of teachers fully certified and the percentage of students participating in subsidized lunch both had a significant effect on the study's two measures of college readiness. In general, cohorts tend to perform lower in reading and math when the proportion of students receiving subsidized lunches increases, while the opposite is true when the proportion of fully certified teachers in their schools increases (see Tables 5 & 6). Figures 1 and 2 display the growth trajectories for both math and reading across grades while holding constant school characteristics at their mean value across all Californian schools.

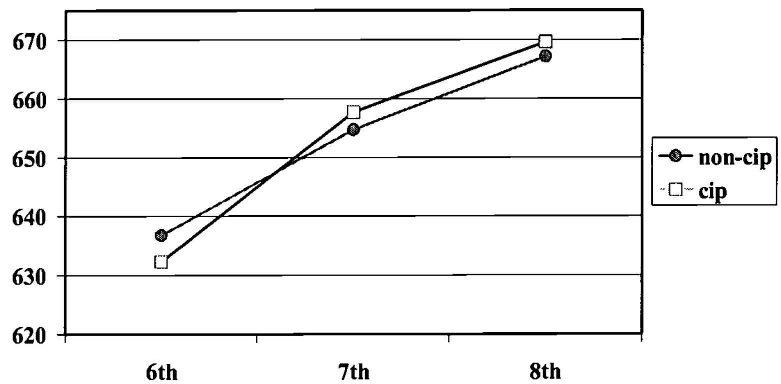
In the case of reading, non-CIP schools slightly outperformed CIP schools at the 6th grade, just before CIP funding began (see Table 5 & Figures 1). By the end of the 7th grade, no significant differences were noted between CIP and non-CIP schools. As can be seen in Figure 1, the growth trajectories for both types of schools were similar starting at grade 7, although the trend line for CIP programs from 6th to 7th grade, in comparison with the non-CIP peer schools, is in the hypothesized direction.

Figure 1. Mean Reading Scaled Scores across Grades



In 1998, a year before GU funding started, CIP schools performed at significantly lower levels than their peer schools in math. By the end of the 7th grade, the year in which CIP had begun, CIP schools started to slightly outperform their non-CIP counterparts. School cohorts participating in both CIP and peer classes increased their performance in reading and math from grades 6 through 8 (see Table 6). By the end of the 7th grade, students participating in CIP programs outperformed their counterparts by 3.06 mean scaled math scores. By the end of the 8th grade, the magnitude of growth favored CIP schools by 2.44 mean scaled math scores (see Figure 2).

Figure 2. Mean Math Scaled Scores across Grades



Discussion

Any of several reasons might account for the findings regarding the lack of an effect of CIP on reading as well as by the lower than anticipated performance in both reading and math displayed by 6^{th} CIP graders. To begin, the small number of cases, particularly CIP schools, in each grade level can produce statistical power attenuation. Also, the effects of CIP programs may well be cumulative, and the two-year CIP-effects period studied here may not be long enough for small (if real) effects to manifest themselves. Finally, in this study only the *overall* impact of CIP activities at the school level was possible to estimate. The potential differential effects of the number, kinds, and intensities of CIP programs and activities are unexamined in this study. Thus, the *relative* impact of the CIP's different programmatic components at the school and partnership levels remains to be explored

Given the CIP's holistic and sustained approach to readiness for college, we anticipated that students participating in CIP schools might show a higher rate of growth in both their reading and math test scores. The results suggest that, in reading, the CIP activities and services appear to have had some effect, but the gains are modest and not statistically significant, at least over the two years studied here. We note, however, that the trend is in the hypothesized direction and that the lag in reading performance, favoring non-CIP versus CIP schools, disappeared once the schools' participation in GU programs began. In math, however, the CIP students appear to be gaining at a higher rate in both grades 7 and 8 than did their peers not exposed to CIP interventions. The gains are small but nonetheless statistically significant.

Does participation in CIP programs enhance students' college readiness in reading and math across school grades? While the results of this study are more suggestive than conclusive in answering that policy question, they provide clear evidence that comprehensive and coordinated intervention programs may, indeed, be more effective than traditional approaches to promoting the reading and math skills of low-income students as they progress toward college entry.

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