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AUTHOR Wilson, Kenneth M.
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ABSTRACT

A longitudinal analysis of the records of performance of cohorts of minority and nonminority students in two different undergraduate settings was used to determine the predictive validity of admissions tests and school rank in determining long range and short range outcomes for college students. It was also hypothesized that the performance of minority students would improve as the college record accumulates. The results showed that substantial across-cohort increases in average grades relative to average ability levels were greater for minority students in the college setting. Consequently, in later cohorts, minority and nonminority students were less sharply differentiated by their average grades than were their counterparts in earlier cohorts, and grade point average trends suggested the possibility of "late blooming." The report states that the results did not explain the increases in average grades across cohorts and suggest that increases in the average level of grades awarded across cohorts did not necessarily reflect increases or invariances in the average quality or quantity of academic achievement. The report also states that admissions variables were valid success predictors for both minority and nonminority students. The ambiguity of these findings are said to further point to the need for special consideration of problems involved in setting and maintaining standards for evaluation of student achievement in future, comparative across-cohort studies. (JCD)

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Kenneth M. Wilson

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PREDICTING THE LONG-TERM PERFORMANCE IN COLLEGE OF MINORITY AND NONMINORITY STUDENTS: A COMPARATIVE ANALYSIS IN TWO COLLEGIATE SETTINGS

Kenneth M. Wilson

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Educational Testing Service
Princeton, NJ 08541
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Abstract

In two undergraduate settings, data reflecting the cumulative records of cohorts of minority and nonminority students over from four to seven years following matriculation were analyzed to determine the correlational validity of admissions tests and school rank for predicting long-term cumulative GPA and nonGPA criteria (e.g., degree attainment), as well as short-term, first-year GPA, the criterion most often used in comparative validity studies. An analysis of trends in mean GPA from the first through the eighth semester and cumulatively was undertaken to explore the possibility of "late blooming" tendencies among minority students--i.e., the possibility that minority students may show relatively greater improvement in academic performance following the first year than their nonminority classmates.

The late bloomer hypothesis derives from the plausible argument that minority students face special problems of school-to-college transition that adversely affect their first year performance. After a period of adjustment, the argument continues, tendencies to perform at a first-year level no higher and frequently lower than expected from test scores may be halted or even reversed.

Data employed in the study were from two quite different settings, namely, Main Campus (of a complex State University System) and College (a selective, liberal arts college for men). Results of correlational analyses in both settings indicated that the admissions variables used were at least as valid for predicting longer term criteria of success (e.g., overall or four-year cumulative GPA, highest educational level attained) as they were for predicting short-term first-year GPA, and that this finding was consistent for minority as well as for nonminority students.

With respect to the novel question of late blooming, GPA trends at Main Campus were not consistent with the late-bloomer hypothesis--i.e., minority and nonminority students were somewhat more sharply differentiated by later semester and overall cumulative GPA than they were by the first-year or first-semester GPA. At College, which provided data for four successive entering classes (cohorts), results of GPA analysis were ambiguous, suggesting the possibility of late-blooming tendencies in data for later but not for earlier cohorts. Interpretation was complicated by substantial across-cohort (across Class) increases in average grades, greater for minority than for nonminority students, that could not be explained by increases in ability levels (test-score averages did not increase across classes). "Inflationary" and "emergent late blooming" rationales were offered for these findings, but they could not be rigorously evaluated due to lack of needed data.

According to the inflationary rationale, the extra across-cohort GPA increases for minority students could be accounted for by changes in the comparability of faculty grading standards and performance expectations for minority and nonminority students and shifts among minority students toward "less demanding" courses or curricula, etc. According to an emergent late blooming rationale, the extra minority GPA gains could be due to possible increases across successive entering cohorts, plausibly greater for minority students, in average levels of academic and social sophistication, general coping ability, self-confidence, etc. Such increases would not necessarily be reflected in test-score averages, but if present could be conducive to improved levels of academic productivity; improved institutional support systems for minority students could also be involved.

The concept of "emergent late blooming" focuses attention on the possibility of generational, developmental increases among minority students in average levels of academic intellectual and social sophistication, self-confidence, achievement motivation, and other noncognitive performance-related characteristics--increases that might reasonably be expected to occur over time as the more obvious barriers to full equality of opportunity for minorities are removed. The unexplained across-cohort increases in average grades and especially the interpretive problems introduced by differential rates of increase for minority and nonminority students point up limitations of the grade-point average as an index of academic performance in comparative validity studies generally, that should be given special consideration in future research concerned with across-cohort developmental trends in the comparative performance of minority and nonminority students.

Predicting the Long-term Performance in College of Minority and Nonminority Students: A Comparative Analysis in Two Collegiate Settings[1]

Kenneth M. Wilson

Over the past decade, a substantial research effort has been made to determine whether or not standardized admissions tests have comparable validity for predicting academic performance for minority and nonminority students. Much of this effort has been concerned with the possibility that, due to differences in the backgrounds of minority and nonminority students, standardized admissions tests (used in college, professional, and graduate school admissions) might be less effective predictors of performance--i.e., have lower correlational validity--for minority than for nonminority students and/or that predictions based on these tests might tend to underestimate the academic performance potential of minority students.

Comparative validity studies using first year grade point average (GPA) in samples of undergraduate and law school students typically have shown (a) that the correlational validity of standard admissions variables (e.g., SAT, LSAT) tends to be similar for minority and nonminority students and (b) that the first year grades of minority students, typically with substantially lower test-score means, tend to be either about the same as, or frequently lower than, those of nonminority students with comparable scores on the admissions tests.*

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[1]For their critical reviews of the manuscript and helpful comments and suggestions, the writer wishes to thank W. H. Angoff, S. M. Ivens, and J. R. Warren.

*For a review of studies in over 20 undergraduate schools see Linn (1973). See Linn (1975) for a review of evidence from studies in law school settings, including a series of studies by Schrader and Pitcher (1976 a,b,c). For a comprehensive examination of questions and issues regarding the use of standardized ability measures with minority students, as well as a review of comparative validity studies, see Cleary, Humphreys, Kendrick, and Wesman (1975).

Thus, if the criterion to be predicted is grade point average earned during the first year of study, there is ample evidence (a) that low scores on admissions tests, relative to the average for all students in a given academic context, presage relatively low performance whether those scores are presented by a minority or a nonminority student, and (b) that minority students should not be expected to perform at a level higher than predicted on the basis of their test scores, during their first year of study in an undergraduate or law school setting.

It is plausible to argue, however, that questions regarding the validity of admissions tests for predicting the performance of minority students have not been explored adequately in investigations that have used only short-term criteria of success, namely, first year grades. It is possible, for example, that the transition from school to college (or from undergraduate to professional school) poses greater problems of adjustment for minority than for nonminority students, and that these "problems of transition" lead to performance below the level predicted from admissions scores. After a year of "academic acculturation" minority students may show relatively greater improvement in performance than their nonminority classmates.

According to what may be termed a "late-bloomer" hypothesis, minority-group tendencies toward "underachievement" during the freshman year, where present, may be halted or possibly reversed as the college record accumulates in such a way as to provide a more comprehensive and representative sample of behavior. Accordingly, it is extremely important that research on the comparative validity of admissions tests for minority and nonminority students be extended in such a way as to include criteria that reflect a student's long-term record, not simply the first year GPA.

This study is a longitudinal comparative analysis of the cumulative records of cohorts of minority and nonminority students in two quite different undergraduate settings. It involves an assessment in each setting of the following aspects of the cumulative record:

1) overall performance as reflected in such non-GPA criteria as graduation versus nongraduation, highest educational level or status attained, etc.;

2) analysis of "grade profiles"--trends in the average level of grades earned semester by semester and cumulatively, from the first through the last semester of enrollment;

3) predictive validity of admissions variables (the Scholastic Aptitude Test or SAT, the CEEB Achievement Average, and school rank) versus selected short-term and long-term GPA criteria, as well as long-term non-GPA criteria such as those alluded to under 1) above.

Special consideration is given to the late-bloomer hypothesis--the possibility that the performance of minority students follows a different pattern or gradient than that of nonminority students, especially that minority students may show relatively greater improvement in performance as the college record accumulates.

Institutional Settings and Study Procedures: General

The study involves data from two quite different institutional settings. One is the Main Campus of a complex state university system (University) which includes, in addition to Main, a statewide network of Branch Campuses all but one of which offer bachelor's and one or more postgraduate programs. The other setting is a highly selective, independent liberal arts college for men (College, hereafter). Main Campus welcomes over 5,000 new freshmen each year while College enrolls slightly over 300 new freshmen annually.

College offers the usual arts and sciences majors leading to the A.B. degree. Students who complete Main's University Division (a generalized first year of study for all entering freshmen) choose programs in one of several schools, including Arts and Sciences, Public and Environmental Affairs, Business, Education, Art, Music, Allied Health Sciences, Nursing, Health, Physical Education and Recreation. Some programs initiated at Main must be completed at a Branch Campus.

Main Campus and College differ considerably with respect to level of selectivity The typical entering freshman at Main scores about 500 on the SAT-Verbal, while at College the mean score for entering freshmen is about 650. Mean scores on other admissions variables such as the SAT-Mathematical and high school rank follow a similar pattern. Most students entering College complete their degree programs and 85 to 90 percent are likely to graduate with their class or later. It is estimated that roughly 50 percent of each entering cohort at Main Campus will complete an undergraduate degree program at Main or at a University Branch Campus. (There is no available estimate of rate of degree completion for students who leave the University System.)

It is estimated that 6 to 8 percent of entering freshmen at Main Campus and about 10 percent of those at College are "minority" students (e.g., Black, American Indian, Mexican- or Spanish-American). In both settings, minority students enter at a competitive disadvantage academically, in the sense that their scores on the admissions batteries used are substantially lower, on the average, than those of their "nonminority" classmates, as indicated in the "Admissions Profiles," below, based on data submitted for the present study:

Two Admissions Profiles

	Main Campus				College			
	Minority		Nonminority		Minority		Nonminority	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
SAT-Verbal*	41.1	11.1	49.2	10.1	52.9	8.7	64.4	7.2
SAT-Mathematical	43.8	10.7	52.0	10.0	55.4	9.5	68.2	7.1
Converted Rank**	54.3	9.2	58.3	7.5	60.3	7.7	64.6	7.0
CEEB Achievement#					55.0	7.8	65.8	6.8

Note: Detail regarding these data is provided in subsequent sections of this report.

*In this study only the first two digits of the familiar three-digit scale for CEEB-SAT and Achievement tests are used.

**This is a standard scale conversion of a student's percentile rank in a high school graduating class, yielding a mean of 50 and a standard deviation of 10 within-class. A student at the 50th percentile standing has a Converted Rank of 50, a student at the 84th percentile has a Converted Rank of 60, one at the 16th percentile has a Converted Rank of 40, etc.

#This is the average of all CEEB Achievement Tests, typically three or more for College students. This variable is not a part of the admissions battery at Main Campus.

Differences in selectivity between the two campuses, alluded to earlier, are clearly evident in these admissions "profiles." For example, minority students at College have higher average scores on the admissions variables than nonminority students at Main. It is also evident that minority and nonminority students are more sharply differentiated by the admissions battery at College than at Main.

Samples and Data: General

The foregoing sketch was drawn from data submitted for the present study in Spring, 1977. College provided data reflecting the cumulative records of cohorts entering in 1970, 1971, 1972, and 1973 (their Classes of 1974, 1975, 1976, and 1977, respectively), including a total of 1,133 nonminority and 121 self-identified "minority" students (estimated 90 percent Black, Indian, Oriental-, or Spanish-American). Main Campus supplied data for the cohort entering in September, 1971. The study at Main is based on a 20 percent random sample (N = 1,003) of nonminority students and 272 self-identified "minority" students (Black, American Indian, or Latino) from this 1971 entering cohort.

The data included, as available for each student, (a) scores on the admissions battery, (b) longer-term cumulative GPA criteria (e.g., four-year or total cumulative through last period of study, regardless of duration), (c) independently computed GPA for the first eight semesters following matriculation, and (d) information regarding the highest level of progress attained by each individual in a cohort as observed from four to seven years after matriculation (e.g., graduation, sophomore status, freshman status, etc.).

While generally comparable, the data available for analysis at Main Campus and College differ in detail. Moreover, the two settings differ with respect to organizational complexity, variety of programmatic and curricular options, characteristic patterns of "student flow," degree of selectivity, and other variables that militate against strict parallelism in study procedures and methods. Accordingly the study at College and

the study at Main Campus will be described separately. Similarities and differences will be considered in a general summary and evaluation of study findings.

THE STUDY AT COLLEGE

In Spring, 1977, the Office of the Registrar supplied data, in roster format, for the Classes of 1974, 1975, 1976, and 1977, respectively (cohorts entering in 1970, 1971, 1972, 1973). The data included, as available for each student, observations on the following variables:

Admissions variables	Grade Point Averages (GPA)	
SAT-V	Year 1 (Semester 1,2) or 1-yr CUM	
SAT-M	Semester 3 GPA	
Converted Rank	Semester 4 GPA	2-yr CUM
CEEB Achievement Average	Semester 5 GPA	
	Semester 6 GPA	3-yr CUM
	Semester 7 GPA	
	Semester 8 GPA	4-yr CUM

The Class of 1977 was still enrolled at time of data submission and GPA for Semester 8 and the 4-yr CUM GPA were not available for this Class.

The grade scale for all GPA variables is as follows:

14 = A+	7 = C
13 = A	6 = C-
12 = A-	5 = (D+, not assigned)
11 = B+	4 = D
10 = B	3 = (D-, not assigned)
9 = B-	2 = (F+, not assigned)
8 = C+	1 = F

College does not record a semester GPA for course work completed at other institutions. Some students spend one or two semesters, typically during the junior year, at other institutions, but their cumulative GPA reflects only work completed at College.

As indicated earlier, the four Classes included a total of 121 self-identified minority (estimated approximately 90 percent Black) students and 1,133 nonminority students, distributed by Class as follows:

Class	Minority (N)	Nonminority (N)	Total (N)
1974	28	279	307
1975	25	288	313
1976	25	281	306
1977	43	285	328
Total	121	1133	1254

It was possible to classify each individual in the sample according to highest level of progress (i.e., graduated either on or behind schedule with the Class, or did not graduate), and to identify individuals who completed all their work at College and those who spent one or more semesters elsewhere. For members of the Class of 1977, level-of-progress classifications were based on the record as of the second semester of the 4th year of enrollment. Only those students identified as having officially withdrawn were so classified.

In line with the major concerns of the study, procedures were designed to accomplish the following objectives:

1) to compare minority and nonminority students with respect to overall level of progress and study patterns;

2) to analyze trends in the "GPA profiles" of minority and nonminority students; especially to generate evidence bearing on the "late-bloomer" hypothesis; and

3) to assess the correlational validity of admissions variables with respect to first-year grades and longer-term Cumulative GPA, and to assess overall comparability of prediction systems for minority and nonminority students through covariance analysis using short-term and longer-term CUM GPA criteria.

The specific procedures employed will be described in connection with presentation of findings regarding each of the major study objectives, above. Essentially all analyses were replicated by Class, despite the small number of minority students involved, in order to assess the degree of consistency in patterns of findings from Class to Class.

Analyses of Overall Patterns of Progress

Each individual in the sample was classified according to level of progress (graduated either on or behind schedule, or did not graduate) and pattern of study (all work at College versus some work elsewhere).

Results of this classification, summarized in Table C.1, indicate

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Insert Table C.1 about here

(a) that minority and nonminority students were essentially undifferentiated with respect to overall level of progress and study patterns, (b) that they were equally successful in completing degree requirements, and (c) that with respect to this important general criterion of "success in college"

Table C.1

General Record of Progress of Minority and Nonminority Students in the Classes of 1974, 1975, 1976, and 1977, Respectively: College Sample

Group	Graduated on schedule				Graduated behind schedule				Did not graduate		Total
	Work at College only*		Work at College & Other		Work at College only		Work at College & Other		Work at College & Other		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.
Class of 1974	220	71.7	16	5.2	36	11.7	77	2.3	28	9.1	307
Minority	16	57.2	3	10.7	5	17.9	2	7.1	2	7.1	28
Nonminority	204	73.1	13	4.7	31	11.1	5	1.8	26	9.3	279
Class of 1975	197	62.9	34	10.9	44	14.1	9	2.9	29	9.3	313
Minority	19	76.0	3	12.0	3	12.0	-	---	--	---	25
Nonminority	178	61.8	31	10.8	41	14.2	9	3.1	29	10.1	288
Class of 1976	208	68.0	22	7.2	35	11.4	5	1.6	36	11.8	306
Minority	16	64.0	1	4.0	6	24.0	-	---	2	8.0	25
Nonminority	192	68.3	21	7.5	29	10.3	5	1.8	34	12.1	281
Class of 1977	209	63.7	28	8.5	40	12.2	5	1.5	46	14.0	328
Minority	28	65.1	4	9.3	5	11.6	-	---	6	14.0	43
Nonminority	181	63.5	24	8.4	35	12.3	5	1.8	40	14.0	285
All Classes	834	66.5	100	8.0	155	12.4	26	2.1	139	11.1	1254
Minority	79	65.3	11	9.1	19	15.7	2	1.7	10	8.3	121
Nonminority	755	66.6	89	7.9	136	12.0	24	2.1	129	11.4	1133

Note. Classifications for the Class of 1977 are best estimates only since data were collected before this class graduated. Individuals enrolled in the second semester of the senior year were classified as graduates on or behind schedule as inferred from data included on the roster. Some individuals not enrolled were classified as graduates "behind schedule" if a change in class identification was indicated. Only those designated as "withdrawn" on the roster were classified as "nongraduates."

*Students did not take any courses at other institutions following matriculation; "College & Other" means that students spent one or more semesters elsewhere.

there is but limited variability among students in the sample. More specifically:

- With a high degree of consistency from Class to Class, almost nine in 10 students (88.9 percent in the combined sample) completed degree requirements either on schedule (74.5 percent) or behind schedule (14.5 percent); rates for minority and nonminority students were almost identical; only 10 of 121 minority students (about 8 percent) were "nongraduates";
- Some tendency toward increased "attrition" in later Classes is discernible. The nongraduation rate for the Class of 1977, estimated at about 14 percent for minority and nonminority students alike, is up from approximately 9 percent for the Class of 1974.
- About 10 percent of the students completed one or more semesters elsewhere; almost identical percentages of minority and nonminority students did so.

Given the basic lack of variability in persistence, it is understandable that within both minority and nonminority samples, nongraduates were essentially undifferentiated from graduates by scores on the admissions battery. Table C.2 shows profiles of scores for nongraduates, graduates who

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Insert Table C.2 about here

Table C.2

Performance of Graduates and Nongraduates on the Admissions Battery

Group/ Variable	Graduates: All work at College			Graduates: Some work elsewhere			Nongraduates		
	N	Mean	S.D.	N	Mean	S.D.	N	Mean	S.D.
Minority	(98)*			(13)			(10)		
SAT-Verbal	93	52.8	8.8	13	54.9	7.7	10	52.0	9.1
SAT-Math	93	55.4	9.7	13	54.1	9.2	10	57.6	8.2
Rank	86	61.0	7.3	12	57.2	8.5	5	57.2	11.3
Ach Av	90	55.6	7.7	13	52.6	7.7	10	52.7	8.6
Nonminority	(891)			(113)			(129)		
SAT-Verbal	873	64.4	7.2	110	64.6	7.9	120	64.6	7.1
SAT-Math	873	68.3	7.2	110	67.7	7.4	120	68.1	6.5
Rank	821	64.5	6.9	103	64.8	7.7	108	64.7	6.8
Ach Av	853	65.7	7.0	105	66.3	6.8	114	66.0	6.2
All students	(989)			(126)			(139)		
SAT-Verbal	960	63.3	8.1	123	63.6	8.4	130	63.7	8.0
SAT-Math	966	67.0	8.4	123	66.2	8.7	130	67.3	7.2
Rank	907	64.2	7.1	115	64.0	8.1	113	64.4	7.1
Ach Av	877	64.7	7.6	118	64.8	8.1	124	65.0	7.3

*The parenthesized N represents the total number of students in the respective categories, without regard to data availability. Discrepancies between these N's and those for the respective admissions variables reflect missing observations on the admissions variables.

completed all work at College, and graduates with one or more semesters elsewhere. These data suggest that in this highly-selective setting, students with lower scores on the admissions battery were no less likely to graduate or to opt for some study elsewhere than their higher scoring classmates. This conclusion applies to minority and nonminority students alike.

Analysis of Trends in GPA

The foregoing analysis indicates that minority and nonminority students were equally successful in completing their degree requirements. The analyses reported in this section were designed to assess trends in the performance of minority and nonminority students as reflected in the level of grades earned, semester-by-semester and cumulatively over four years of study.

Special consideration is given to the question of whether the observed trends are consistent with the late-bloomer hypothesis. Do minority students show relatively greater improvement in academic performance following the first year than their nonminority classmates? If so, the degree of separation of minority and nonminority students on GPA variables should tend to decrease from earlier to later semesters, and the two groups should be less sharply differentiated by longer-term Cumulative GPA, reflecting grades received in all courses completed, than they were by GPA based on only the first year of study.

Assessment of trends in degree of separation on the GPA and admissions variables was facilitated by the computation of point-biserial correlation coefficients for each continuous (GPA and ability) variable versus a dichoto-

mous group-membership criterion, namely, nonminority = 2 versus minority = 1. A positive coefficient thus indicates that the nonminority mean is higher than the minority mean, while a negative coefficient indicates the opposite. The higher the coefficient, the greater the degree of separation (the less the overlap) of the two groups on a given continuous variable. If trends in minority-nonminority performance are consistent with the late-bloomer hypothesis, point-biserial coefficients for GPA variables should tend to decrease in size from earlier to later semesters and to be smaller for longer-term cumulative GPA than for GPA based on the limited, first-year program of students.

Some Interpretive Considerations

First, it is important to recognize that minority-nonminority differences in GPA during given periods of study may be affected not only by differences in level of ability, motivation, and/or academic sophistication, but also by possible differences in patterns of course selection, choice of field of concentration, faculty attitudes-expectations-grading standards, and other factors. Due to lack of relevant data, it was not possible to control for variables other than measured ability in the GPA comparisons at College.

Second, minority-nonminority differences in level of academic ability (average scores on admissions variables) are roughly constant from earlier to later semesters due to comparability of persistence rates and the fact that persistence is largely unrelated to scores on the admissions variables within the respective groups, as shown in the previous section.

Finally, interpretation of GPA comparisons at College is especially complicated by the presence of "grade inflation" over the four Classes

for which data are available--i.e., the average level of grades awarded increased substantially from the Class of 1974 through the Class of 1977, considerably more so for minority than for nonminority students, while for each group, the average scores on admissions variables were essentially stable from Class to Class (and in some instances were actually lower for later than for earlier Classes).

Use of the term "grade inflation" to characterize these trends implies that increases in the average level of grades awarded to successive Classes under "steady state" (or declining) conditions with respect to the measured academic qualifications of entering students reflect a relaxation of "grading standards" rather than a real increase in the average amount or quality of student academic output. Conversely, the failure of a faculty to increase the level of grades awarded in the face of sharp increases in the level of academic qualifications of entering students is interpreted as reflecting a "hardening" of grading standards. This latter condition was common during the period 1955 through 1965 (Baird and Feister, 1972; Webb, 1959; Wilson, 1970).

Detailed evidence bearing on the inflationary trend across Classes will be provided in discussions of the analyses by Class, to be presented following examination of results of analyses using data for all four Classes combined.

Given the interpretive considerations and limitations outlined above, the analyses should be viewed as exploratory in nature.

Trends in GPA: All Classes Combined

Table C.3 shows means and standard deviations for the admissions variables,

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Insert Table C.3 about here

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the Cumulative GPA variables (i.e., Year 1, Two-year, Three-year, and Four-year CUM GPA), and independently computed Semester GPA for Semesters 3 through 8. It should be kept in mind throughout that Semester 8 and Four-year CUM GPA are not available for the Class of 1977 and that independently computed Semester GPA for Semester 1 and 2 were not reported. Also shown in Table C.3 is the point-biserial index of group separation for each admissions and GPA variable.

Statistics are based on all data-available cases in the four Classes, combined (i.e., all categories of students including graduates with all their work at College, graduates with some work elsewhere, and nongraduates). Generally speaking, trends observed for graduates who did all their work at College are basically comparable to those observed for all cases with data (as in Table C.3).

Several aspects of the data in Table C.3 are noteworthy:

- Minority students received substantially lower average grades than nonminority students during the first and subsequent years of study and GPA distributions for minority students were generally somewhat more variable. The basic pattern is illustrated in the Year-1

Table C.3

Means and Standard Deviations on the Admissions and GPA Variables for Minority and Nonminority Students, and Indices of Group Separation on the Variables

Variable	Minority			Nonminority			Point-biserial correlation: Minority vs. Nonminority**
	N*	Mean	S.D.	N	Mean	S.D.	
SAT-Verbal	116	52.9	8.7	1103	64.4	7.2	.416
SAT-Mathematical	116	55.4	9.5	1103	68.2	7.1	.453
Converted Rank	103	60.3	7.7	1032	64.6	7.0	.170
Achievement Av	113	55.0	7.8	1072	65.8	6.8	.415
First-year GPA	120	8.77	1.47	1128	10.10	1.32	.282
Two-yr cum GPA	110	8.87	1.39	1048	10.28	1.19	.325
Three-yr cum GPA	97	9.02	1.35	916	10.44	1.14	.340
Four-yr cum GPA	72	9.14	1.27	738	10.56	1.04	.357
Semester 3 GPA	112	8.48	2.18	1073	10.26	1.54	.309
Semester 4 GPA	110	9.25	1.80	1044	10.59	1.39	.266
Semester 5 GPA	105	9.12	1.96	920	10.68	1.45	.299
Semester 6 GPA	97	9.59	1.95	911	10.87	1.41	.251
Semester 7 GPA	102	9.80	1.87	953	11.03	1.36	.248
Semester 8 GPA	72	9.86	1.71	724	10.98	1.32	.228

Note. Except for Semester 8 and Four-yr cum GPA, all data are for the Classes of 1974, 1975, and 1977, combined. The Four-yr cum and Semester 8 GPA were not available for the Class of 1977.

*Represents the total number of individuals with observations on a given variable.

**The point-biserial correlation coefficient indicates the relationship of each continuous variable to a group-membership criterion, namely, Nonminority = 2 and Minority = 1. Positive coefficients indicate that a Nonminority mean is higher; the higher the coefficient, the greater the degree of separation of Nonminority and Minority students on a variable.

GPA distributions for minority students and a small random sample of nonminority students from the Class of 1974, shown below:

First-year GPA (1974)	Minority Class of '74 (N)	Nonminority Class of '74 (N)
(A-) 11.5 plus	-	4
(B+) 10.5 - 11.4	-	10
(B) 9.5 - 10.4	6	9
(B-) 8.5 - 9.4	7	2
(C+) 7.5 - 8.4	8	3
(C) 6.5 - 7.4	3	-
(C-) 5.5 - 6.4	2	-
4.5 - 5.4	2	-
Total	28	28

The point-biserial coefficients for Cumulative GPA show a steady increase as grades accumulate over two, three, and four years of study, respectively. At the same time, it may be seen that coefficients for later-semester GPA are somewhat smaller than those for earlier-semester GPA indicating a slight decrease in degree of separation during the later semesters. <u>This particular pattern of findings indicates that modest relative gains in GPA were registered by minority students during the last two or three semesters, but that these gains were too slight to offset the accumulated GPA "deficit" of the earlier semesters</u>.

Trends evident in the point-biserial analysis are portrayed graphically in Figure C.1. Mean GPA profiles are plotted for "graduates and nongraduates"

Insert Figure C.1 about here

(from Table C.1) and for a sample consisting only of graduates who completed all their work at College (see Table AC.2 in the Appendix). It may be seen that trends are comparable in the two samples.

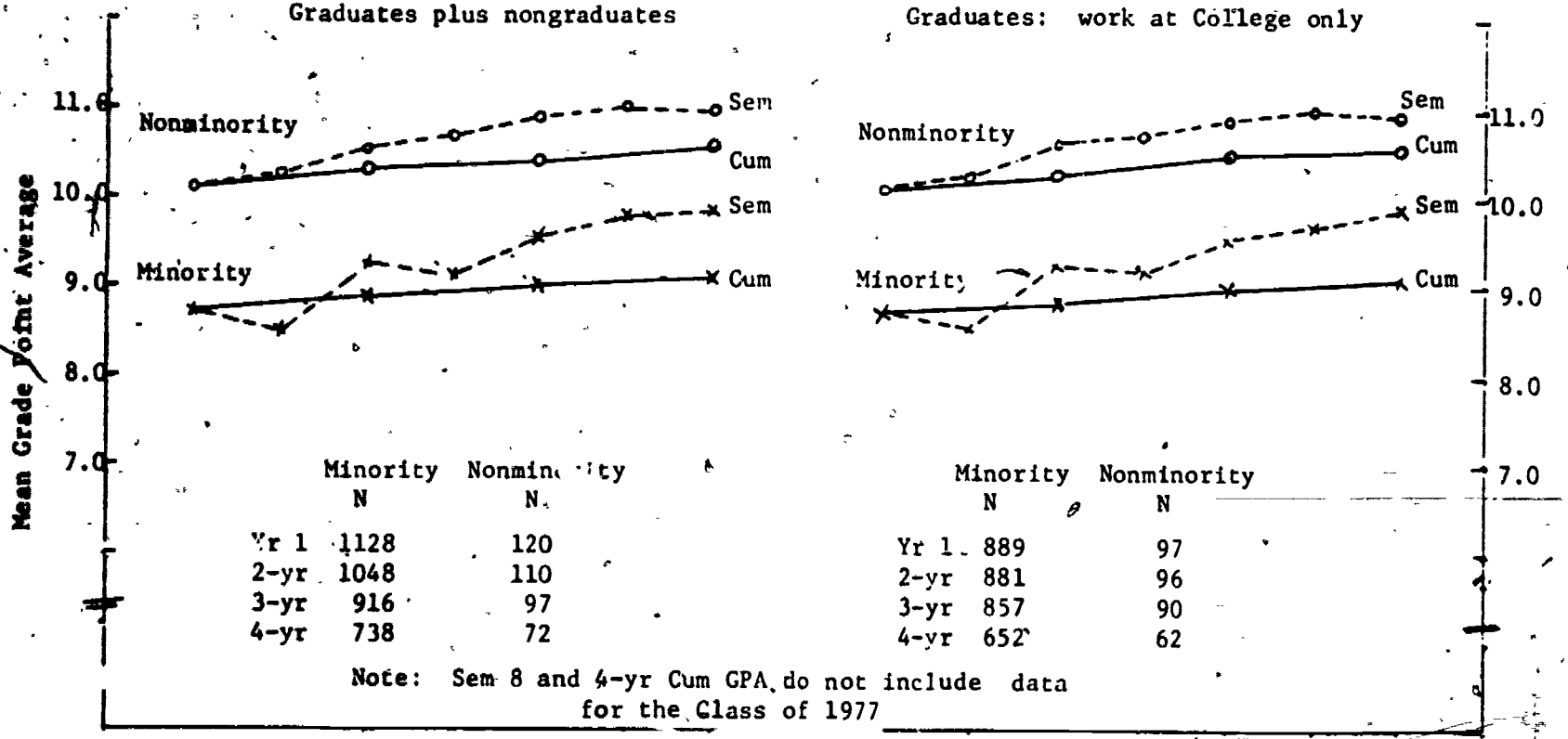
Figure C.1 points up the fact that while the semester-by-semester profiles of minority students are generally parallel, they tend to converge slightly during Semesters 6, 7, and 8 (the latter based on data for three Classes only), as suggested previously by results of the point-biserial analysis. Lack of convergence with respect to the Cumulative GPA profiles is also discernible.

- Additional perspective on these GPA trends is gained by noting that with respect to GPA at the end of Year 1, the minority mean was roughly 1.0 standard deviations below the nonminority mean, but when Four-year CUM GPA is considered, the minority mean is roughly 1.4 standard deviations below the nonminority mean.

- Related tabulations indicate that 25 of 120 minority students (about 22 percent) equalled or exceeded the nonminority Year 1 GPA mean, while 7 of 72 (about 10 percent) equalled or exceeded the nonminority mean with respect to Four-Year CUM GPA.

- That the degree of convergence of the semester-by-semester GPA during later semesters was slight is suggested by the fact

Figure C.1. Trends in mean semester GPA and end-of-year cumulative GPA for minority and nonminority students, all Classes: Graduates plus nongraduates, and graduates with work at College only



during Semesters 6, 7, and 8, minority GPA means were about 0.9 standard deviation units below the comparable nonminority means as compared to the disparity of about 1.0 standard deviations noted above for Year 1 GPA.

Thus, both the point-biserial analysis and the profile analysis suggest general parallelism in the GPA trends for minority and nonminority students with some tendencies toward convergence during later semesters. These findings for all four Classes combined suggest that only relatively slight GPA gains were recorded by minority students during later semesters and thus lend little support to the late-blooming hypothesis. As will be seen, however, interpretation of these results is complicated by across-Class increases in GPA that are obscured in the all-Classes analysis.

Analyses by Class

The basic program of analysis was carried out within each of the four Classes, to explore the effects of a tendency noted earlier toward grade inflation over the study period, beginning in 1970 for the Class of 1974 and extending through the fall term of the 1976-77 academic year (for the Class of 1977).

Evidence of an inflationary trend is provided in Table C.4 which also

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Insert Table C.4 about here

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shows results of the program of point-biserial analysis for the respective Classes. To facilitate the evaluation of trends, point-biserial analyses

Table C.4

Minority and Nonminority Means on the Admissions and GPA Variables, and Associated Indices of Group Separation: By Class, 1974 through 1977

Variable	Minority mean					Nonminority mean					Index of group separation: r.bis*						
	1974	1975	1976	1977	All Classes	1974	1975	1976	1977	All Classes	1974	1975	1976	1977	All Classes	1974 & 1975	1976 & 1977
SAT-V	56.5	51.8	52.0	52.0	(52.9)	65.7	64.6	64.2	63.1	(64.4)	.33	.42	.42	.47	(.42)	[.37	.45]
SAT-M	57.7	53.5	55.0	55.3	(55.4)	68.4	68.6	68.0	67.8	(68.2)	.37	.47	.44	.50	(.45)	[.42	.48]
Rank	58.8	60.1	62.3	60.6	(60.3)	64.4	64.6	64.6	64.8	(64.6)	.22	.17	.09	.19	(.17)	[.20	.14]
Ach Av	55.5	54.2	54.1	55.6	(55.0)	65.4	65.7	66.2	65.8	(65.8)	.37	.39	.45	.45	(.42)	[.38	.45]
Yr-1 CUM	8.2	8.5	9.2	9.1	(8.8)	9.8	10.0	10.2	10.3	(10.1)	.33	.30	.21	.32	(.28)	[.32	.26]
2-yr CUM	8.3	8.8	9.0	9.2	(8.9)	10.0	10.3	10.4	10.4	(10.3)	.37	.32	.31	.33	(.32)	[.34	.32]
3-yr CUM	8.5	8.8	9.3	9.5	(9.0)	10.2	10.4	10.6	10.6	(10.4)	.41	.38	.30	.30	(.34)	[.39	.30]
4-yr-CUM**	8.8	9.2	9.6	**	(9.1)**	10.4	10.6	10.7	**	(10.6)**	.42	.36	.27	**	(.36)**	[.39	.27]**
Sem 1, 2	8.2	8.5	9.2	9.1	(8.8)	9.8	10.0	10.2	10.3	(10.1)	.33	.30	.21	.32	(.28)	[.32	.26]
Sem 3 GPA	8.2	8.8	8.2	8.6	(8.5)	10.0	10.3	10.3	10.4	(10.3)	.31	.26	.33	.35	(.31)	[.28	.34]
Sem 4 GPA	8.6	9.5	8.9	9.7	(9.2)	10.4	10.6	10.7	10.7	(10.6)	.33	.22	.34	.20	(.27)	[.28	.26]
Sem 5 GPA	8.9	8.6	9.4	9.5	(9.1)	10.7	10.5	10.7	10.7	(10.7)	.39	.35	.23	.23	(.30)	[.36	.24]
Sem 6 GPA	9.2	8.8	9.8	10.4	(9.6)	10 8	10.8	11.1	10.9	(10.9)	.32	.35	.27	.10	(.25)	[.33	.17]
Sem 7 GPA	8.9	10.0	9.8	10.4	(9.8)	11.0	11.0	11.1	11.0	(11.1)	.39	.21	.16	.14	(.25)	[.31	.19]
Sem 8 GPA**	9.5	10.2	9.8	**	(9.9)**	10.8	11.1	11.0	**	(11.0)**	.27	.17	.24	**	(.23)**	[.22	.24]**
Yr-1 CUM (N)	28	25	25	42	(120)	277	283	260	283	(1128)	305	313	305	325	(1248)	[618	630]
4-yr CUM (N)	27	25	29	29#	(72)**	252	259	225	106#	(736)**	279	284	245	235#	(808)**	[563	480]**

Note: Each value in the table is based on data for all students with observations on the given variable. Results of analyses based on complete-data samples differ in detail but show similar trends (cf., Tables C.6, C.7, and related discussion).

*Positive coefficients indicate that the nonminority mean on a variable is higher than the minority mean; the higher the coefficient the greater the degree of separation of the groups on a variable.

**Neither Sem 8 GPA nor 4-yr CUM GPA is available for the Class of 1977. The "all classes" values for these variables reflect data for the Classes of 1974, 1975, and 1976 only.

#Ns for Sem 7 GPA.

were conducted for the two earlier Classes combined (i.e., "1974 and 1977" in Table C.4), and for the two later Classes combined ("1976 and 1977") as well as for each of the Classes, separately.

It may be seen in the table that for minority and nonminority students alike, the level of scores on admissions variables was essentially stable across Classes. However, it is quite evident that:

(a) students in the later Classes received substantially higher grades than those in earlier Classes,

(b) the increase from Class to Class was considerably greater for minority than for nonminority students,

(c) among nonminority students there was essentially no <u>across-Class</u> increase in Semester GPA following the 4th semester, but

(d) for minority students, <u>across-Class</u> increases in Semester GPA after the 4th semester were fully as great and in some instances greater than those observed for the first four semesters.

These trends are pointed up in the summary, below, of 1974 to 1977 increases in mean GPA; similar trends are present for the CUM GPA variables.

GPA variable	Increase in Mean GPA '74 to '77	
	Minority	Nonminority
Year 1 GPA (Sem 1,2)	0.9	0.5
Sem 3 GPA	0.4	0.4
Sem 4 GPA	1.1	0.3
Sem 5 GPA	0.6	0.0
Sem 6 GPA	1.2	0.1
Sem 7 GPA	1.5	0.0
Sem 8 GPA ('74 to '76 only)	(0.3)	(0.2)

The effects of the across-Class trends discernible in results of the point-biserial analyses by Class, are epitomized in point-biserial results for 1974 and 1975, combined, and 1976 and 1977, combined:

- First, in the two earlier Classes, minority and nonminority students were differentiated more sharply by longer-term CUM GPA than by shorter-term CUM GPA, and were as sharply differentiated by later-semester GPA (except for Semester 8) as by earlier-semester GPA.
- Second, in the two later Classes, point-biserial coefficients for Semester GPA following the 4th semester tend to be smaller than those for earlier-Semester GPA, indicating decreasing group separation during the later semesters; and
- Third, in the later Classes, minority and nonminority students were less sharply differentiated by GPA at every level (but not by admissions test variables) than they were in the earlier Classes (note the smaller size of the point-biserial coefficients for GPA variables in 1976 and 1977, combined, than in 1974 and 1975, combined).

Additional perspective is provided in Figure C.2 which shows semester-

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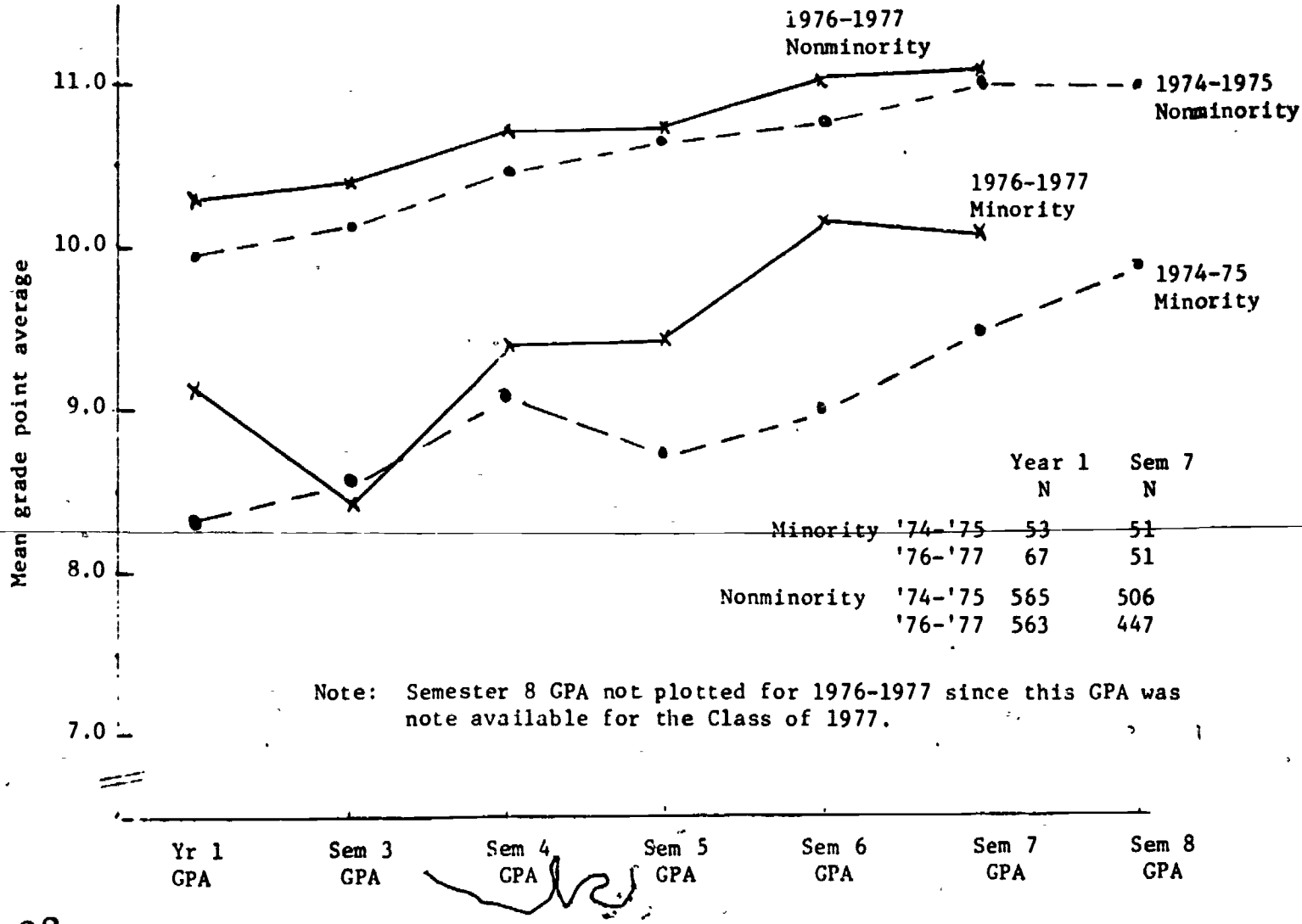
Insert Figure C.2 about here

GPA profiles for minority and nonminority students in the two earlier and the two later Classes. The principal effect of the differential rates of increase in GPA across Classes is evident, namely, that minority and

Figure C.2. Comparative GPA profiles for minority and nonminority students in two earlier and two later Classes



		Year 1 N	Sem 7 N
Minority	'74-'75	53	51
	'76-'77	67	51
Nonminority	'74-'75	565	506
	'76-'77	563	447

Note: Semester 8 GPA not plotted for 1976-1977 since this GPA was note available for the Class of 1977.

nonminority students in 1976-1977 tended to be less sharply differentiated by GPA variables, particularly later-semester GPA, than were their 1974-1975 counterparts.

Discussion of GPA Trends

Findings based on data for all Classes combined tend to obscure certain important across-Class trends in the data. Briefly, GPA trends in the two earlier Classes (1974 and 1975, combined) did not conform to a late-blooming pattern--minority-nonminority differences in GPA were as great, on the average, during later as during earlier semesters; however, in the two later Classes (1976 and 1977), a late-blooming trend was discernible--minority-nonminority differences were somewhat less pronounced, on the average, for GPA over later than over earlier semesters. Such a pattern of findings suggests the need to consider the possibility of, and develop an explanatory rationale for, "emergent late-blooming"--i.e., the findings suggest that late-blooming tendencies were not present in earlier cohorts but might be present in more recent (and perhaps in subsequent) cohorts of minority students.

Interpretation of the observed trends must necessarily be tentative. The samples of minority students in the respective Classes are small. Further interpretive complications are due to lack of data required to introduce some measure of control for possible across-Class changes in course selection patterns, choice of major field, incidence of pass/fail versus credit options, and other variables. It is known, for example, that course and distribution requirements in effect for the two earlier Classes were replaced by a system of free course-election, a factor that may have

contributed somewhat to the increases in grades for the two later Classes, with possibly greater effect for minority than for nonminority students (personal communication from liaison official at College).

A major interpretive complication is introduced by the presence of large across-Class increases in average grades, much larger for minority than for nonminority students, that cannot be accounted for by increases in measured ability and achievement at entry--average scores on admissions variables did not increase for either group across Classes. A strong case exists for arguing that the observed trends, perhaps in large measure, reflect the effects of differential rates of grade inflation (greater for minority than for nonminority students) marked by gradual, unplanned faculty adjustments in grading standards and performance expectations.

However, it is extremely important that possible bases for an emergent late-blooming rationale for these findings, especially the greater across-Class increases in GPA for minority students, be recognized and considered carefully. Briefly, it is possible that there may have been across-Class increases, plausibly greater for minority than for nonminority students, in average entry-levels of academic motivation and sophistication, academic and social coping-skills, self-esteem and self-confidence, and other attributes logically conducive to improved academic and social adjustment, but not necessarily reflected in scores on standard admissions tests. Moreover, over the study period there may have been some improvements in the learning environment for minority students and in patterns of institutional intervention (guidance, counseling, tutoring) supportive of them.

Factors such as the foregoing, if present, could contribute to improved academic performance and help account, in part, for the observed GPA gains across-Classes. The extent to which such factors may have been involved, if at all, in the observed gains cannot of course be determined on the basis of the available data. However, it is possible that, in a variety of ways not reflected in their test-score averages, minority students in the later cohorts may have been somewhat "better equipped" intellectually and emotionally than those in earlier cohorts to deal with problems of adjustment at College, and that College's support-systems for minority students may have improved over time.

The possibility of across-cohort changes in the attributes of minority students and in the academic-social environment at College--changes conducive to gains in performance relative to ability--should not be discounted in evaluating the across-Class GPA gains of minority students even though the magnitude of the gains suggests a considerable inflationary component. More important, the possibility of "emergent late-blooming," marked by significant <u>across-cohort</u> (generational) improvement in the performance of minority students relative to ability, should be recognized and considered in future investigations of minority student performance. Such improvement might be due to increases in levels of academic and intellectual sophistication, self-confidence, motivation or general coping-ability and other attributes, as well as to improved institutional support-systems. It is important that some of these investigations be planned and designed in such a way as to make it possible to monitor trends in performance and in the relationship of cognitive, noncognitive and situational variables to

performance, across- as well as within-cohorts of minority and nonminority students.

In the context of the present study, it is possible to adduce both inflationary and emergent late-blooming rationales to help "explain" observed trends, but the data clearly do not permit rigorous evaluations. The only firm conclusion appears to be that the observed across-Class increases in GPA are not due to increases in entry ability-levels and that continuation of the observed trends into subsequent Classes would result in the continued gradual reduction of differences in the level of grades awarded to minority and nonminority students despite continued sharp disparities in average scores on admissions variables.

Considering the serious implications of "college grades," both for individuals and for institutions, the large unexplained shifts in GPA-levels would seem to call for active faculty consideration of factors that are involved in the assignment of grades, and direct faculty involvement in the design and development of procedures that would enable them to set and monitor "grading standards."

Analyses of Correlational Validity

The analyses reported in this section are concerned primarily with the correlational validity of the admissions variables with respect to Cumulative GPA criteria based on one, two, three, and four-years of study, respectively, with special reference to the degree of similarity observed for minority and nonminority students.

Admissions Variables versus Cumulative GPA Criteria

Missing data correlation matrices were computed for all variables (V, M, Rank, Ach Av, Yr 1 GPA, 2-yr CUM GPA, 3-yr CUM GPA, 4-yr CUM GPA, and Sem GPA for Semesters 3 through 8). Results for minority, nonminority all students, in the combined-class sample (graduates and nongraduates) are shown in Table AC.1 in the Appendix. Appendix Table AC.2 shows results for "graduates who completed all their work at College." Inspection of these two summary tables will reveal that the general patterns of relationships in the sample which includes all students (graduates and nongraduates) are quite similar to those in the sample which includes only graduates.

Table C.5 summarizes missing data validity coefficients for SAT-V, SAT-M, Rank, and Achievement Average versus the respective CUM GPA criteria (combined classes, all students, excerpted from Table AC.1, in the Appendix).

Insert Table C.5 about here

Several trends are noteworthy.

- For the combined sample and for nonminority students, zero-order validity coefficients show a definite tendency to increase as longer-term cumulative GPA criteria are introduced--test variables tend to show increased validities from Year 1 to 4-yr Cumulative, while validities for Converted Rank are stable; among minority students validity coefficients tend to be roughly as high when longer-term Cumulative GPA are involved as when First-year GPA is used.

Table C.5

Correlation of Admissions Variables with Cumulative GPA at the End of One, Two, Three, and Four Years

Group/ Variable	Correlation of variable with CUM GPA at end of year				Number of cases used for correlation*			
	1	2	3	4	1-yr	2-yr	3-yr	4-yr
Minority					(121)	(121)	(121)	(78)
SAT-V	236	246	179	235	115	105	93	67
SAT-M	191	142	127	181	115	105	93	67
Rank	236	190	260	153	103	95	86	64
Ach Av	357	322	318	325	112	103	91	66
Year 1 GPA	---	882	832	763	120	110	97	72
GPA Mean	8.77	8.87	9.02	9.14				
S.D.	1.47	1.39	1.35	1.27				
Nonminority					(1133)	(1133)	(1133)	(828)
SAT-V	338	385	408	452	1102	1025	899	728
SAT-M	301	324	322	326	1102	1025	899	728
Rank	315	341	333	325	1031	961	845	695
Ach Av	449	480	478	487	1071	997	874	711
Year 1 GPA	---	918	869	835	1128	1040	976	738
GPA Mean	10.10	10.28	10.44	10.56				
S.D.	1.32	1.19	1.14	1.04				
All Students					(1254)	(1254)	(1254)	(906)
SAT-V	398	446	461	500	1217	1130	992	795
SAT-M	368	392	394	402	1217	1130	992	795
Rank	336	353	354	339	1134	1056	931	760
Ach Av	500	527	531	539	1183	1100	965	777
Year 1 GPA	---	921	877	841	1241	1158	1013	810
GPA Mean	9.97	10.14	10.30	10.54				
S.D.	1.39	1.27	1.23	1.14				

Note. Data in left portion of table are correlation coefficients with leading decimals omitted. Missing data procedures were used in the combined class sample, all categories (graduates plus nongraduates). Data for 4-yr Cum GPA are for the Classes of 1974, 1975, and 1976 only.

*Numbers opposite group designations represent total number of individuals in the combined-class sample. N's for 4-yr Cum GPA are for 1974, 1975, and 1976 only. Other N's include Class of 1977.

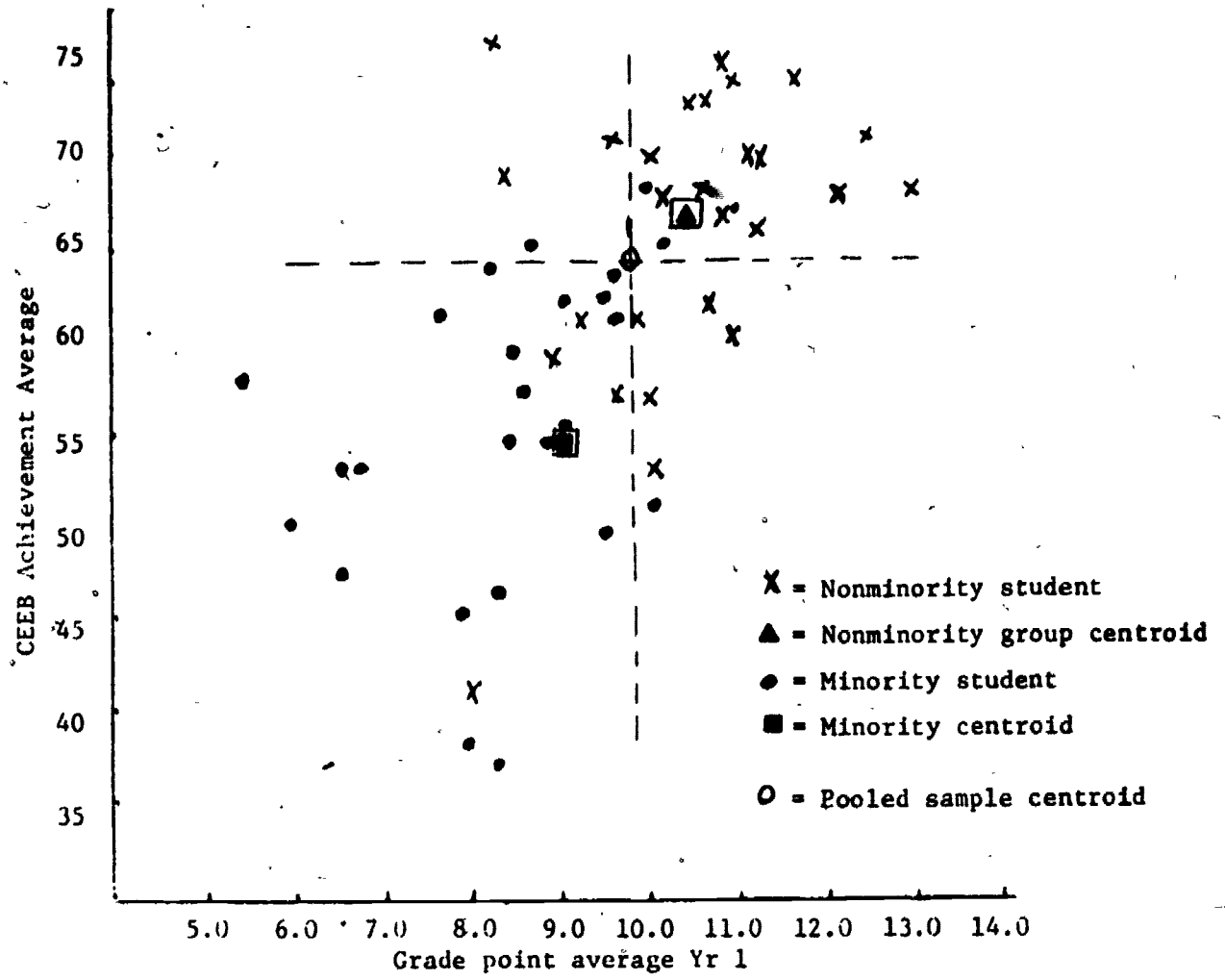
°Note that, typically, for each admissions variable and each criterion the validity coefficients for nonminority students are higher than those for minority students and, when data for the two groups are pooled, in every case validity coefficients are higher in the pooled sample than within either subgroup. This reflects the fact that means for minority students are consistently and substantially lower than those for nonminority students on both GPA and admissions variables.

The effect of pooling data in such samples is illustrated in Figure C.3 which is a two dimensional plot of CEEB Achievement Average scores versus First-year GPA for minority and a small random sample of nonminority students in the Class of 1974.

Insert Figure C.3 about here

Results of multiple correlational analysis are not shown in Table C.5. However, improvement in validity accrues from employing the entire admissions battery at each GPA level. Data not tabled indicate that the Achievement Average and Converted Rank tend to contribute most to the multiple correlation in each subgroup, for each criterion; the relative weighting of the admissions variables is similar in predictive composites for both Cumulative and Yr-1 GPA. Generally speaking, the most effective single predictor is the CEEB Achievement Average, a variable that has been shown to be an important predictor in other selective colleges (Wilson, 1974).

Figure C.3. Plot of Achievement Average scores versus First-yr GPA for minority students and a sample of nonminority students in the Class of 1974



Cumulative GPA for the full four years of study clearly is highly predictable from First-year GPA in the combined-classes sample (r = .841), and only slightly less so in the minority sample (r = .763) than in the nonminority sample (r = .835). A high element of self-correlation is involved in this relationship, of course. However, the magnitude of these coefficients indicates that relative standing attained after one year of study provides a strong indication of final relative standing based on grades earned over four full years of study (or some lesser period).

In assessing the lower correlation between Year 1 and 4-yr CUM GPA for minority students, it may be noted that the averag intercorrelation of adjacent semester GPA (from Table AC-1) for minority students (mean r = .559 for Semester 3 through Semester 8) is somewhat lower than that for nonminority students (mean r = .603) suggesting somewhat lower within-group GPA reliability for minority than for nonminority students.

Tests for Comparability of Regression

Evidence already reviewed suggests that patterns of correlational validity for the admission variables with respect to the Cumulative GPA criteria tend to be similar for minority and nonminority students. Formal analyses of comparability of regression systems, using the method of covariance analysis developed by Gulliksen and Wilks (1950) were conducted with respect to two GPA criteria, namely. Year 1 GPA and Three-year CUM GPA (the longest-term GPA criterion available for students in all four classes). Covariance tests were conducted only in the combined-classes samples due to the fact that the size of the minority student sample in each Class was below the minimum required for strict applicability of the

Gulliksen-Wilks procedure. However, selected results of the regression analyses, per se, are included in Tables C.6 and C.7 to document the consistency of certain findings across Classes.

Insert Tables C.6 and C.7 about here

Before considering the results of the tests, attention is directed to the fact that in the Class of 1976 for the small sample (N=16) of minority students, anomalous negative predictor-criterion covariation was present. In the other Classes, patterns of predictor-criterion covariation were positive and quite similar for minority and nonminority students. However, in the Class of 1976, at least two of four zero-order coefficients were negative with respect to Year 1 and/or 3-year CUM GPA, and no predictor had a positive relationship with both criteria. Accordingly, no multiple correlation coefficient is shown in either analysis for this Class. Data for the nonminority and pooled samples are included to indicate consistency of findings. It is important to note that the pooled-sample coefficient for 1976 is slightly higher than the nonminority coefficient <u>despite</u> the presence of negative predictor-criterion covariance within the minority sample in that Class.

Results of Covariance Analysis

Results of tests in the combined Class samples may be summarized as follows: (a) with respect to Year 1 GPA (Table C.6), results indicate equality of errors of estimate and slopes, but inequality of intercepts (overprediction of Year 1 GPA for minority students); (b) with respect to

Table C.6

Tests for Comparability of Prediction Systems for Minority and Nonminority Students: First-Year GPA vs. the Admissions Battery, By Class

Variable	Classes				Combined Classes
	1974	1975	1976	1977	
Mean Yr-1 GPA (Actual)					
Minority	8.36	8.50	9.12	9.02	8.74
Nonminority	9.80	10.02	10.18	10.21	10.06
Total	9.67	9.92	10.14	10.19	9.96
Mean Yr-1 GPA (Expected)*					
Minority	8.99	8.87	8.91	8.99	8.95
Nonminority	10.05	10.07	10.06	10.05	10.06
Total	9.96	9.97	9.98	9.92	9.96
Multiple Correlation: Yr-1 GPA vs. Battery					
Minority	.553	.464	(**)	.626	.410
Nonminority	.494	.560	.469	.577	.506
Total	.499	.600	.473	.632	.548
Gulliksen-Wilks tests					Value of χ^2
Equal errors (df = 1)					3.754
Equal slopes (df = 4)					1.242
Equal intercepts (df = 1)					4.263[a]
No. of cases					
Minority	26	24	18	31	99
Nonminority	273	258	237	223	991
Total	299	282	255	254	1080

*Mean estimated by applying regression equation developed in the pooled minority-nonminority sample, all classes combined, to mean scores on the admissions battery, Class by Class.

**No multiple reported due to anomalous negative within-groups covariation in this small sample of minority students.

[a]Intercepts not equal, .05 level of confidence of higher; equality of errors and slopes indicated.

Table C.7

Tests for Comparability of Prediction Systems for Minority and Nonminority Students: Three Year Cum GPA vs. the Admissions Battery, by Class

Variable	Classes				Combined Classes
	1974	1975	1976	1977	
Mean 3-yr Cum (Actual)					
Minority	8.73	8.79	9.11	9.45	9.02
Nonminority	10.20	10.34	10.54	10.59	10.40
Total	10.07	10.19	10.44	10.45	10.27
Mean 3-yr Cum (Expected)*					
Minority	9.29	9.24	9.28	9.35	9.29
Nonminority	10.37	10.33	10.38	10.36	10.36
Total	10.28	10.22	10.30	10.23	10.27
Multiple Correlation: 3-yr Cum vs. Battery					
Minority	.577	.615	(**)	.512	.417
Nonminority	.505	.557	.606	.568	.543
Total	.570	.628	.611	.603	.591
Gulliksen-Wilks tests					Value of χ^2
Equal errors (df = 1)					6.376[a]
Equal slopes (df = 4)					4.267
Equal intercepts (df = 1)					10.276
No. of cases					
Minority	22	23	15	24	84
Nonminority	230	215	200	169	814
Total	252	238	215	193	898

*Mean estimated by applying regression equation developed in the pooled minority-nonminority, all classes sample, to mean scores on the admissions battery, Class by Class.

**No multiple reported due to anomalous negative within-groups covariation in this small sample of minority students.

[a]Errors of estimate not equal (.05 level); results of remaining tests are therefore ambiguous.

3-year CUM GPA (Table C.7), the program of tests yielded ambiguous results (i.e., inequality of errors of estimate creates ambiguity in the interpretation of tests for equality of slopes and intercepts). It is important to note, however, that with respect to both Year 1 and 3-Year CUM GPA, the actual means for minority students (8.74 and 9.02, respectively) were lower than those expected based on total-sample regression equations (8.95 and 9.29, respectively), as shown in Tables C.6 and C.7 for all-Classes combined.

Monitoring GPA Increases

To assess further the across-class increases in GPA over the study period, regression equations based on the combined-classes pooled sample were developed for estimating Year 1 GPA and 3-yr CUM GPA, respectively. These equations were applied to the mean scores on the admissions battery for minority and nonminority students respectively and the resulting estimated mean values are shown in Table C.6 for Yr-1 and Table C.7 for 3-yr CUM GPA. The following trends are noteworthy:

- The estimated means, both Year-1 and 3-yr CUM, clearly do not vary materially from Class to Class. This is true for minority and for nonminority students alike. This reflects the fact noted earlier that the level of academic qualifications remained constant over the four Classes. If grading "standards" (grades awarded relative to ability) had remained constant across the four Classes, the actual mean GPAs would not have varied greatly for either minority or nonminority students.

- The rising gradient in actual GPA means, both Year 1 and 3-yr CUM, indicates the operation of an inflationary tendency for both minority and nonminority groups.
- The 1977 minority Year 1 mean of 9.02 is .66 GPA units higher than the 1974 mean of 8.36, an increase of approximately .48 standard deviations; for nonminority students the increase from 1974 to 1977 amounted to .51 GPA units, or approximately .37 (combined-classes) standard deviation units.
- In the case of 3-yr CUM GPA, the 1974 to 1977 increase in mean GPA for minority students was .72 (.55 standard deviations); for nonminority students the comparable increase amounted to .32 (combined-classes) standard deviation units.

These findings (based on "complete data" cases) are consistent with those reported earlier in suggesting that the across-Class GPA increase was greater for minority than for nonminority students, especially with respect to later-semester GPA (cf. Figure C.2 and related discussion).

Comparative Validity of Predictive Composites

To explore further the comparative validity of the admissions battery for minority and nonminority students, using a variety of GPA criteria, four regression-based composites of SAT-V, SAT-M, Rank, and Achievement Average were computed for each individual, as follows:

1) Predicted Yr 1 GPA based on the combined-classes minority group regression equation (Pr. 1-Yr GPA-Min);

2) Predicted 3-yr CUM GPA similarly based (Pr. 3-yr CUM-Min);

3) Predicted Yr 1 GPA based on the combined-class s nonminority group regression equation (Pr. 1-yr GPA-Non);

4) Predicted 3-yr CUM, similarly base. (Pr. 3-Yr CUM-Non).

These predictive composites were highly intercorrelated as indicated below:

Intercorrelations: Pooled sample
All Classes, All Students

Composite	Pr. Yr 1 Min	Pr. 3-Yr Min	Pr. 1-Yr Non	Pr. 3-Yr Non
Pr. Yr 1 GPA-Min	1.000	.992	.998	.977
Pr. 3-Yr CUM-Min		1.000	.974	.961
Pr. 1-Yr GPA-Non			1.000	.993
Pr. 3-Yr CUM-Non				1.000

Table C.8 shows the relationship of these composites to each GPA criterion available for all four Classes, namely, Yr 1 GPA, independently computed GPA for semesters 3 through 7, and 2- and 3-yr CUM GPA, respectively.

Insert Table C.8 about here

Several aspects of the data in Table C.8 are noteworthy:

- As expected from their high intercorrelations, each composite shows a similar, almost identical pattern of validity with respect to GPA criteria. In the pooled sample, validities for minority-based composites are very slightly lower than validities for nonminority-based composites.

Table C.8

Validity of Selected Composites of Admissions Scores for Predicting Cumulative and Independently Computed Semester GPA: All Classes

Group/Predictive composite*	Yr 1 GPA	Independently computed GPA by semester: Sem 3 GPA	Sem 4 GPA	Sem 5 GPA	Sem 6 GPA	Sem 7 GPA	2-yr CUM GPA	3-yr CUM GPA
All Minority	(99)	(92)	(92)	(89)	(84)	(87)	(92)	(84)
Pr. 1 Yr GPA-Min	.41	.32	.27	.34	.32	.25	.38	.42
Pr. 3 Yr CUM-Min	.40	.33	.29	.34	.32	.25	.38	.42
Minority graduates	(82)	(82)	(82)	(81)	(77)	(75)	(82)	(77)
Pr. 1 Yr GPA-Min	.40	.27	.30	.34	.34	.32	.41	.43
Pr. 3 Yr CUM-Min	.39	.27	.32	.35	.34	.33	.41	.44
All Nonminority	(991)	(947)	(921)	(814)	(809)	(853)	(925)	(814)
Pr. 1 Yr GPA-Non	.50	.46	.39	.40	.37	.38	.55	.54
Pr. 3 Yr CUM-Non	.50	.46	.39	.41	.37	.38	.54	.54
Nonminority grad	(792)	(790)	(784)	(758)	(765)	(764)	(785)	(768)
Pr. 1 Yr GPA-Non	.54	.46	.40	.42	.39	.38	.54	.56
Pr. 3 Yr CUM-Non	.54	.47	.40	.43	.39	.38	.54	.56
Pooled (Total)	(1090)	(1039)	(1013)	(903)	(893)	(940)	(1017)	(898)
Pr. 1 Yr GPA-Min	.54	.50	.42	.45	.41	.40	.58	.58
Pr. 3 Yr CUM-Min	.54	.49	.42	.44	.40	.38	.57	.57
Pr. 1 Yr GPA-Non	.54	.50	.43	.46	.42	.41	.58	.59
Pr. 3 Yr CUM-Non	.54	.50	.43	.46	.42	.41	.58	.59
Pooled (Graduate)	(874)	(872)	(866)	(839)	(842)	(839)	(867)	(845)
Pr. 1 Yr GPA-Min	.57	.49	.45	.46	.42	.40	.58	.59
Pr. 3 Yr CUM-Min	.56	.48	.44	.45	.41	.39	.57	.58
Pr. 1 Yr GPA-Non	.56	.50	.45	.47	.43	.41	.59	.60
Pr. 3 Yr CUM-Non	.56	.50	.45	.47	.44	.42	.59	.60

Note: Only Semesters 1, 2 (Yr 1) through 7, 2-yr and 3-yr CUM are included in this analysis since these are the only GPA available for all Classes. The numbers in parentheses indicate the number of cases on which coefficients are based.

*Pr. 1 Yr GPA-Min(ority), Pr. 1 Yr GPA-Non(minority), Pr. 3 Yr CUM-Min(ority), and Pr. 3 Yr GPA-Non(minority), respectively, are predicted GPA values from the admissions battery (SAT-V, SAT-M, Rank, and Ach Av), based on regression equations developed in the combined-classes samples for minority and nonminority students, respectively.

°Analyses not tabled indicate that minority-based composites were slightly more valid in minority samples, while nonminority-based composites were slightly more valid in nonminority samples. The magnitude of differences was of about the same order as that shown for the pooled sample analysis, namely, very small.

°Validities for longer-term GPA criteria tend to be greater than validities for Yr 1 GPA.

°When independently computed Semester GPA are considered, validity coefficients tend to be somewhat lower than when Cumulative GPA are involved--the latter tend to be more reliable, comprehensive, and predictable general measures of performance. Validities for Semester 7 are lower than those for Semester 3 in all analyses except those for minority students who graduated. However, over Semesters 4, 5, 6, and 7, validities are relatively stable.

°Humphreys (1968) has called attention to evidence that the zero-order validities of admissions variables versus independently computed Semester GPA tend to decline steadily from the first through the eighth semester, or from earlier to later semesters. The trends based on composites of predictors, shown in Table C.8, are not strictly parallel to those reported by Humphreys for zero-order validities. The relevance of independently computed semester GPA as criteria for the validation of

admissions variables is a question that requires further examination, but consideration of this question is beyond the scope of the present study. Validities for individual predictors are shown in Tables AC.1 and AC.2 in the Appendix.

THE STUDY AT MAIN CAMPUS

In Spring, 1977, the Office of Admissions supplied copies of official transcripts for the cohort of freshmen entering in Fall, 1971-72. The transcripts provided a consolidated cumulative record of all work completed during each matriculant's career as a student at Main Campus and any Branch Campus(es) attended during the study period--i.e., between Fall, 1971-72 and Fall, 1976-77--including periods of postgraduate or professional study following completion of an undergraduate program.

Samples, Data, and General Procedures

The study at Main Campus is a comparative analysis of selected aspects of the cumulative records of a 20 percent random sample (N = 1,003) of nonminority students and a total of 272 minority students from the 1971 cohort. The minority sample included 125 men and 147 women while the nonminority sample included 510 women and 493 men.

Classification of minority students was based on replies to a self-report form completed by students during registration in Fall, 1971. The Director of Admissions compiled a list of 322 names of students, self-identified as Black, Latino, or American Indian. Transcripts were available for 311 of these individuals. Of this number, 39 were not classifiable as

"first time enrolled freshmen" (i.e., had prior credits from work elsewhere). The remaining 272 students comprise the minority sample which includes 161 Black, 78 Latino, and 33 American Indian students.

Given the self-report nature of the information regarding minority status, it is not assumed that the classification includes all minority students in the cohort or that the within-sample classifications by ethnicity are completely reliable.

After identifying and removing the transcripts of minority students, every fifth transcript was selected from those remaining. This sample of nonminority students included a total of 103 students with prior credit, students identified as foreign or as "irregular" with respect to school-to-college transition pattern. These students were not included in the study. The remaining 1,003 records constituted the nonminority sample employed in this study.

The comparative analysis involved the following aspects of the cumulative record for minority and nonminority students:

1) rates and levels of progress; status at the end of the study period; amount of work successfully completed; broad patterns of curricular elections and incidence of transfer from Main to Branch Campus;
2) trends in Main Campus GPA, semester by semester, during the first eight semesters of the study period--i.e., between Fall 1971-72 and Spring 1974-75 inclusive;
3) validity of SAT-V, SAT-M, and Converted Secondary School Rank for predicting short term GPA criteria (i.e., Sem 1 and Year 1 GPA), a

long-term cumulative GPA based on all undergraduate work completed during the study period, and selected non-GPA long term criteria (Progress, Hours Completed, Hours Passed).

Findings with respect to the foregoing areas are reported in the sections which follow. The specific procedures employed and related considerations will be described in connection with the presentation of relevant findings.

No weighting procedures are employed to compensate for the 20 percent sampling of nonminority students. Due to the fact that minority students constitute a relatively small fraction of the total entering cohort of over 5,000 students, statistics for the 20 percent nonminority sample may be thought as approximating very closely the actual population values for the entering cohort (within sampling limits, of course).

An Overview of Progress and Study Patterns

At College, almost 90 percent of each entering class graduated. At Main Campus, on the other hand, there was wide variability among individuals in the sample with respect to the amount of progress made during a study period covering some six academic years, as reflected in such variables as graduation vs. nongraduation, highest educational level attained, number of hours of course work attempted, and number of hours passed.

A summary index of overall progress is provided in Table M.1. This index reflects highest educational level attained by the end of the study

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Insert Table M.1 about here

Table M.1

Progress of Minority and Nonminority Students During the Study Period: September 1971 through Spring 1976-77

Progress Code	Highest level attained	Minority		Nonminority		All students	
		No.	%	No.	%	No.	%
7	Postgraduate enrollment*	41	15.1	160	16.0	201	15.8
6	Bachelor's (on schedule)[a]	54	19.8	268	26.8	322	25.2
5	Bachelor's (delayed)[b]	27	9.9	100	10.0	127	10.0
4	Senior status	32	11.8	108	10.8	140	11.0
3	Junior status	32	11.8	75	7.5	107	8.4
2	Sophomore status	50	18.4	151	15.0	201	15.8
1	Freshman status	36	13.2	141	14.0	177	13.9
	Total	272	100.0	1003	100.1	1275	100.1

*Includes enrollees at University only; rates of enrollment elsewhere are not known.

[a]Degree attained before Sept. 1, 1975.

[b]Degree attained after Sept. 1, 1975.

period on a seven-point scale, ranging from postgraduate or professional school enrollment at one extreme (7), to failure to advance beyond official freshman status at the other (1). [Data not shown in Table M.1 (cf. Table M.5) indicate that minority students had a slightly lower mean (4.05) than nonminority students (4.33) on this index.] The Progress index constitutes a long-term criterion of performance that reflects both persistence and level of accomplishment.

Relevant aspects of the overall record are outlined below:

- Approximately 45 percent of minority and 53 percent of nonminority students graduated during the study period. Graduation rates were higher for women than for men--some 47 percent of minority women and 42 percent of minority men graduated, while for nonminority women and men, graduation rates were 55 and 50 percent, respectively.
- At one extreme, about 16 percent of the 1971 entrants, minority and nonminority alike, had entered a Main or Branch Campus graduate or professional program; at the other extreme, some 14 percent had not advanced beyond freshman standing.

In terms of the amount of undergraduate course work completed at Main and any Branch Campus during the study period, the range among individuals was correspondingly great, though average differences between minority and nonminority students were relatively small.

- Among minority students, the number of semester hours in which a grade was received (A, B, C, D, or

F, but not incomplete or withdrawn) ranged from three to 176; while for nonminority students, the range was from three to 186 semester hours.

- Hours passed (including graded hours, above, plus credit in ungraded courses (e.g., practice teaching for Education majors) and credit by examination, ranged from zero to 168 for minority and 189 for nonminority students, respectively.

- Minority and nonminority students had almost identical means for hours of graded course work completed (89.1 and 89.5 semester hours, respectively); nonminority students had a higher mean for number of hours passed (94.5 as compared to 89.6 for minority students).

These three variables, namely, Progress (on a seven-point scale), Cumulative Hours Attempted or CUM Hrs (number of graded hours completed), and hours passed or Hrs Pass, constitute criteria reflecting the amount of course work completed, the amount passed (i.e., for which credit was received), and the ultimate level attained during the study period. The validity of admissions variables versus these criteria as well as GPA criteria will be examined in a subsequent section.

School Election Patterns

Upon completion of a generalized program of studies in the University Division, students at Main elect programs in one of several Schools, including Arts and Sciences, Business and Education (the three largest Schools) as well as a number of others. Certain specialized programs in

fields such as Nursing or Health Sciences are offered jointly by Main and a designated Branch Campus. These programs require students to transfer for specialized work at a Branch Campus.

Table M.2 shows the distribution of students according to the school in

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Insert Table M.2 about here

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which they were last enrolled as an undergraduate--i.e., the school of last-stay undergraduate enrollment. The overall distribution is generally similar for minority and nonminority students.

- Arts and Sciences was the most frequent choice for both minority (33 percent) and nonminority students (37 percent of the entering cohort).
- Business, Education, and Physical Education collectively accounted for roughly 28 percent of minority and nonminority students; the distribution of minority and nonminority students among these schools was similar.
- A slightly higher proportion of minority students (about 22 percent) than of nonminority students (18 percent) were not identified with a school when last enrolled (i.e., were in the University Division).

Data not tabled indicate that for approximately 73 percent of nonminority and 80 percent of minority students the last undergraduate enrollment was at Main Campus; for the remainder, the last enrollment was at a Branch

Table M.2

Distribution of the Cohort According to School or Division in which Last Enrolled as an Undergraduate

School or division	Minority		Nonminority		All Students	
	No.	%	No.	%	No.	%
University division*	58	21.3	183	18.2	241	18.8
Arts and Sciences*	89	32.7	367	36.6	456	35.8
Business*	32	11.8	132	13.2	164	12.9
Education*	31	11.4	121	12.1	152	11.9
Health, Phys. Ed. & Rec.*	12	4.4	31	3.1	43	3.4
Public Affairs*	1	0.4	11	1.1	12	0.9
Music*	5	1.8	43	4.3	48	3.8
Art*	0	0.0	2	0.2	2	0.2
Allied Health Sci**	10	3.7	43	4.3	53	4.2
Nursing**	7	2.6	24	2.4	31	2.4
Technical**	8	2.9	17	1.7	25	2.0
All other**	19	7.0	29	2.9	48	3.8
Total	272	100.0	1003	100.1	1275	100.1

*These are largely Main Campus last-stay undergraduate enrollments. Of 228 minority students in these Schools, 188 (or 82 percent) were last enrolled at Main Campus as opposed to a Branch Campus, while 789 of 890 nonminority students, or about 89 percent of those in these Schools were last-stay Main Campus enrollees.

**These are largely Branch Campus enrollments at last-stay; 73 percent of minority students (32 of 44) and 75 percent of nonminority students in these (85 of 113) were Branch Campus enrollees at last stay.

Campus. Incidence of transfer to a Branch Campus, as indicated in the notes to Table M.2, varied according to choice of program (School), and was generally similar among minority and nonminority students.

Analysis of Trends in GPA

The consolidated transcript included a GPA for each semester or summer session in which a graded course was completed. A single cumulative GPA was posted, based on all graded course work completed during the study period. A Cumulative Undergraduate GPA (CUM UGPA) was obtained for each individual in the sample. For individuals whose transcript included periods of graduate or professional study, a revised Cumulative GPA was computed, reflecting only work completed in undergraduate courses. A Year 1 GPA was computed for each individual having a Semester 1 and a Semester 2 GPA. All grade averages were scaled as follows: A = 4, B = 3, C = 2, D = 1, F = 0.

The GPA trend analysis, semester by semester, was focussed exclusively on the first eight semesters, i.e., from fall 1971-72 through Spring 1974-75, and only on work completed at Main Campus during that period. Restriction of the semester GPA analysis to Main Campus data only was designed to eliminate potential sources of variation due to possible differences in grading standards from one campus to another even though the general pattern of transfer from Main to Branch Campuses was similar for minority and nonminority students.

It is important to keep in mind, however, that the CUM UGPA is based on all work completed during the entire study period, not simply the eight semester period involved in the GPA trend analysis, and that the CUM UGPA

reflects work completed at Branch Campuses in all applicable cases.

Table M.3 shows profiles of means and standard deviations on the

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Insert Table M.3 about here

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admissions variables, the respective Semester GPA, Year 1 and CUM UGPA. Also shown is the mean number of consecutive semesters of uninterrupted attendance following matriculation and the total number of semesters during the eight-semester period in which a Main Campus GPA was earned.

As for College, an index of group separation on each of the variables is shown, namely, the point biserial correlation coefficient (r.bis) for the designated variable versus group membership (minority = 1, nonminority = 2). Positive coefficients indicate higher means for nonminority students on a variable and negative coefficients indicate the opposite; the higher the coefficient, the greater the degree of separation of the groups.

Generally speaking we are interested in whether or not the GPAs of minority students tend to show relatively greater improvement in performance than that shown by nonminority students over the first eight semesters, and cumulatively over the entire study period. If so, the biserial coefficents should tend to decrease in size from the first to the eighth semester and, if the trend is systematic, the coefficient for CUM UGPA should be smaller than those for earlier (shorter-term) GPA for the 1st semester or first year.

The data in Table M.3 are noteworthy in a number of respects:

TABLE M.3

Profiles of Minority and Nonminority Groups on the Admissions Variables and Selected Performance Variables, with Indices of Group Differentiation on Each Variable

Variable	Minority			Nonminority			Index of group difference (r.bis)*
	N	Mean	S.D.	N.	Mean	S.D.	
SAT-V	272	41.1	11.0	969	49.2	10.1	.308
SAT-M	272	43.9	10.7	969	52.0	10.0	.315
Rank	270	54.3	9.2	961	58.3	7.5	.204
Consec Semesters**	272	4.7	2.5	997	5.1	2.5	.066
Total Semesters **	272	5.1	2.4	1002	5.5	2.4	.061
YR 1 GPA	250	2.54	0.71	923	2.79	0.75	.150
Cum UGPA	272	2.45	0.72	1003	2.77	0.74	.175
Sem 1 GPA	269	2.52	0.82	997	2.74	0.75	.119
Sem 2 GPA	250	2.50	0.85	926	2.79	0.78	.148
Sem 3 GPA	195	2.45	0.88	764	2.75	0.83	.142
Sem 4 GPA	177	2.54	0.86	715	2.88	0.77	.170
Sem 5 GPA	140	2.44	0.97	576	2.94	0.76	.238
Sem 6 GPA	135	2.63	0.92	576	3.03	0.76	.197
Sem 7 GPA	109	2.67	0.89	484	3.04	0.79	.174
Sem 8 GPA	97	2.72	0.87	434	3.08	0.77	.175

*This is the point biserial correlation coefficient for the variable designated versus the group-membership criterion, namely, Nonminority = 2, Minority = 1, Positive coefficients indicate that nonminority students have higher means on a variable while negative coefficients indicate the opposite. Higher coefficients indicate greater separation of the two groups while lower coefficients indicate the opposite.

**Number of consecutive semesters in which a Main Campus GPA was recorded during the first eight semesters, and total number of Main Campus semester GPA of record during that period.

- In all semesters the mean GPA of minority students was lower than that for nonminority students;
- Minority and nonminority students were more sharply separated by GPA during the last four semesters than during the first four semesters (see point biserials);
- The point biserial coefficient for Undergraduate Cumulative GPA vs. group membership is greater than that for either the first semester or the first year GPA.

Figure M.1 portrays graphically the trends in Table M.3; the figure shows

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Insert Figure M.1 about here

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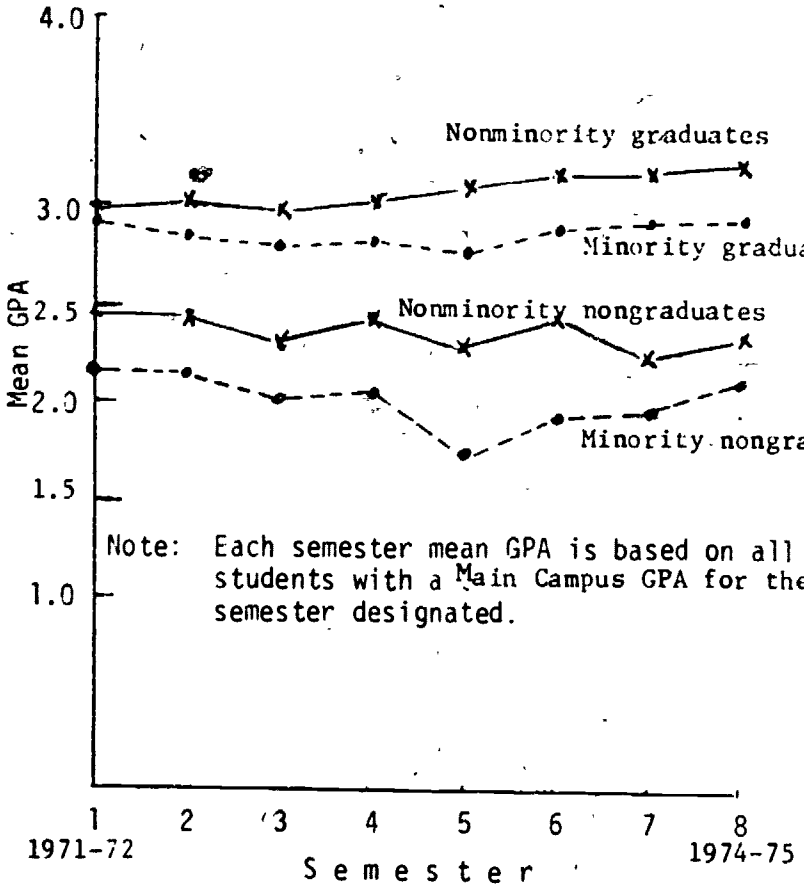
trends in GPA for all graduates and nongraduates (data are shown in Table AM.1 in the Appendix) as well. The basic picture is one of increasing rather than decreasing differentiation of minority and nonminority students with respect to level of grades earned from the first through the eighth semester.

To determine the consistency of these trends, analyses similar to those in Table M.3 were made by sex and by school (for Arts and Sciences, Business, and Education plus Health and Physical Education, the largest schools). Similar analyses were also made for individuals who continued into graduate or profe sional study (those in Progress group 7), and for classifications of graduates and nongraduates that incorporate the number of consecutive semesters during which a Main Campus GPA was earned.

Figure M.1. Trends in mean semester GPA for graduates, nongraduates, and all students in the entering cohort, classified according to minority versus nonminority status



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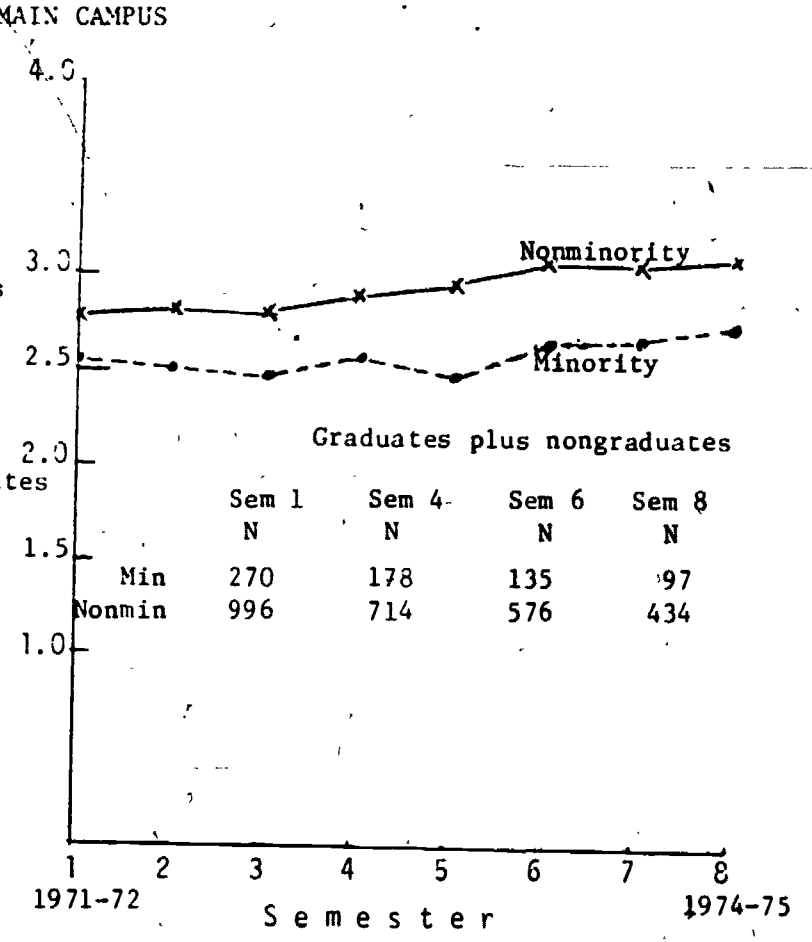

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Results of these analyses are summarized in Table M.4.

Insert Table M.4 about here

It is evident that trends were remarkably consistent regardless of the frame of reference involved in the comparative analysis of GPA, semester by semester.

- In every case, indices of group separation were greater for long-term Cumulative GPA than for the first semester GPA.
- Generally speaking, the average degree of separation was greater for GPA in semesters five through eight than for GPA in semesters one through four.
- The second semester GPA for minority students tends to be lower than the first in almost every comparison, while the opposite tendency was present for nonminority students.

Thus, in this series of analyses that provided some control over variables that might affect differences in the level of minority and nonminority student grades (e.g., sex, choice of school, etc.) there is no evidence to suggest a late-blooming tendency among minority students.

Validity of the Admissions Variables

The grades earned by minority students tend to be lower, on the average, than those earned by their nonminority classmates, and we have

Table M.4

Trends in Mean GPA, Semester by Semester and Cumulatively, for Minority and Nonminority Groups, and Indices of Group Separation by the GPA Variables (Point Biserial Correlation, GPA Variable Versus Group Membership Criterion), by Sex, School, and Various Progress Classifications

Classification	Group	Ns	Grade Point Average (GPA): Group means. Sem 1	Sem 2	Sem 3	Sem 4	Sem 5	Sem 6	Sem 7	Sem 8	Cumulative GPA (total)
ALL STUDENTS	Min = 1	272	2.52	2.50	2.45	2.54	2.44	2.63	2.67	2.72	2.45
	Non = 2	1003	2.74	2.79	2.75	2.88	2.94	3.03	3.03	3.08	2.77
	r.bis**		.118	.148	.142	.170	.238	.197	.171	.175	.174
MALE	Min = 1	125	2.45	2.39	2.37	2.38	2.16	2.44	2.46	2.48	2.29
	Non = 2	494	2.66	2.70	2.64	2.79	2.84	2.94	2.92	2.94	2.64
	r.bis		.105	.150	.119	.193	.297	.229	.216	.200	.182
FEMALE	Min = 1	147	2.57	2.59	2.50	2.68	2.68	2.81	2.91	2.95	2.59
	Non = 2	510	2.81	2.87	2.87	2.97	3.06	3.15	3.18	3.28	2.89
	r .bis		.137	.154	.176	.152	.206	.180	.132	.194	.182
ARTS & SCIENCES	Min = 1	89	2.83	2.78	2.74	2.70	2.67	2.79	2.81	2.80	2.79
	Non = 2	367	2.98	3.01	2.89	2.99	3.03	3.03	3.03	3.12	3.01
	r.bis		.093	.135	.081	.152	.174	.117	.108	.169	.152
BUSINESS	Min = 1	32	2.68	2.54	2.09	2.11	1.92	2.16	2.18	2.48	2.36
	Non = 2	132	2.75	2.83	2.62	2.63	2.72	2.87	2.81	2.83	2.74
	r.bis		.042	.188	.260	.237	.368	.309	.275	.158	.252
EDUC & HPER	Min = 1	43	2.70	2.64	2.53	2.61	2.53	2.87	2.93	2.83	2.71
	Non = 2	152	2.62	2.75	2.76	2.86	2.96	3.14	3.19	3.15	2.89
	r.bis		-.050	.075	.147	.164	.263	.161	.139	.169	.168
POSTGRADUATE STUDY Prog. 7	Min = 1	41	3.13	3.01	3.01	2.98	3.01	3.11	3.07	3.23	3.09
	= 2	160	3.08	3.22	3.18	3.27	3.29	3.38	3.36	3.35	3.27
	r.bis		-.033	.150	.106	.191	.188	.179	.186	.075	.170
GRADUATES with 5-8 Consec Sem GPA	Min = 1	87	2.98	2.86	2.80	2.83	2.75	2.90	2.99	2.97	2.92
	Non = 2	431	3.00	3.05	2.99	3.08	3.13	3.22	3.24	3.24	3.13
	r.bis		.017	.119	.110	.149	.218	.193	.144	.158	.165
NONGRADUATES with 5-8 Consec Sem GPA	Min = 1	40	2.45	2.21	2.08	2.02	1.68	1.98	1.90	1.97	2.11
	Non = 2	102	2.54	2.64	2.40	2.52	2.29	2.46	2.21	2.25	2.48
	r.bis		.059	.316	.179	.292	.292	.217	.156	.132	.308
NONGRADUATES with 1-4 Consec Sem	Min = 1	108	2.08	2.14	1.96	2.14					2.04
	=2	366	2.44	2.39	2.21	2.35					2.36
	r.bis		.172	.113	.103	.086					.163

*Generally speaking, Ns are not constant across semesters. Ns for Sem 1 GPA and Cumulative Undergraduate GPA typically are equal to N designated in this column, although Sem 1 GPA is missing for a total of nine of 1,275 individuals in the sample, all of whom have a Cumulative UGPA.

**Entries in this row are point biserial correlation coefficients for the respective GPA variables versus the group membership criterion, i.e., Nonminority = 2, Minority = 1. Positive coefficients indicate nonminority means are higher, while negative coefficients indicate the opposite. Higher coefficients indicate greater separation of groups.

seen that minority students also have lower scores on the admissions battery. In this section evidence is presented regarding the comparative validity of the admissions variables. Several lines of analysis are followed:

1) simple correlational analysis of the relationship of SAT-V, SAT-M, and Rank to short-term (Sem-1 and Yr-1) GPA and long-term Cumulative UGPA as well as to several non-GPA long-term criteria, namely,
   a) total hours passed (for which credit was received)
   b) total hours in which a grade was earned
   c) progress during the study period on a seven-point scale, as follows:
      7 = postgraduate status
      6 = BA/BS on or ahead of schedule
      5 = BA/BS behind schedule
      4 = attained senior status only
      3 = attained junior status only
      2 = attained sophomore status only
      1 = attained freshman status only
2) tests for comparability of prediction (regression) systems for minority and nonminority students using Year-1 GPA and CUM UGPA, respectively, versus the admissions battery, and
3) analysis of trends in validity, with respect to various criteria, of predictive composites of SAT-V, SAT-M, and Rank, based on minority and nonminority regression equations for predicting Cumulative UGPA.

Validity versus Short- and Long-term Criteria

Table M.5 summarizes zero-order validity coefficients for the admissions variables versus various criteria. Several important trends are evident:

Insert Table M.5 about here

- Especially among minority students, the validity of admissions variables is greater with respect to long-term Cumulative GPA than with respect to short-term GPA criteria.
- In general this trend is true for nonGPA as well as for GPA criteria. Note that the Progress variable is considerably more "predictable" from the admissions variables among minority students than among nonminority students.
- For both minority and nonminority students, the total cumulative Undergraduate GPA is highly correlated with the First-Year and Sem-1 GPA. Self-correlation notwithstanding, this indicates that the GPA based on all work completed is highly predictable from the first-year GPA, based exclusively on work completed in the Main Campus University Division.

These results leave little room for doubt that in this particular context, the long-term performance of minority students is somewhat more predictable from standard admissions variables than is the long-term

Table M.5

Correlation of Preadmissions Variables with Selected Short- and Long-term Criteria, and Intercorrelation of the Criterion Variables at Main

Variable/ Group		GPA Sem 1	GPA Yr 1	GPA Cum Total	Progress*	Total hrs** passed	Total hrs***	N	Mean	S.D.
SAT-V	Min	371	437	556	402	347	292	(273)	41.1	11.1
	Nonmin	392	413	421	159	153	114	(968)	49.2	10.1
	Total	402	443	480	225	207	153	(1241)	47.4	10.8
SAT-M	Min	410	442	547	388	302	233	(273)	43.8	10.7
	Nonmin	388	403	393	209	199	172	(968)	52.0	10.0
	Total	39	437	452	257	231	181	(1241)	50.2	10.7
Rank	Min	504	555	593	473	435	350	(270)	54.3	9.2
	Nonmin	499	530	528	298	278	218	(961)	58.3	7.5
	Total	510	548	559	344	321	249	(1231)	57.4	8.1
GPA Sem 1	Min		872	718	522	555	501	(270)	2.52	0.82
	Nonmin		884	817	395	416	359	(996)	2.74	0.75
	Total		883	797	426	449	388	(1266)	2.69	0.77
GPA Yr 1	Min			809	543	560	474	(251)	2.54	0.71
	Nonmin			877	458	451	378	(922)	2.79	0.65
	Total			864	480	478	396	(1173)	2.74	0.67
GPA Cum Total	Min				654	626	497	(273)	2.45	0.72
	Nonmin				554	579	487	(1002)	2.77	0.74
	Total				575	587	482	(1275)	2.70	0.75
Progress	Min					886	826	(273)	4.05	2.07
	Nonmin					895	818	(1002)	4.33	2.11
	Total					893	842	(1275)	4.27	2.11
Total hrs pass	Min						960	(273)	89.8	45.8
	Nonmin						972	(1002)	94.5	45.0
	Total						969	(1275	93.4	45.2
Total hrs cum	Min						--	(273)	89.1	41.3
	Nonmin						--	(1002)	89.5	40.0
	Total						--	(1275)	89.4	40.2

Note: Entries in body of table are correlation coefficients; leading decimals have been omitted.

*Progress on a 7 point scale ranging from 7 = Completed bachelor's program and enrolled in a postgraduate program at the University to 1 = did not advance beyond freshman standing. Cf. Table M.1 for detail.

**Hours for which credit was received (e.g., including work in ungraded courses, credit by examination, etc.)

***Hours for which a grade was received (does not include hours passed in ungraded courses, withdrawals, etc.)

In the analyses reported in this table and in Table AM.2 (Appendix) one nonminority student was inadvertently included in the minority sample, thus accounting for the minority N of 273 rather than 272 and the nonminority N of 968 rather than 969.

performance of nonminority students. In both cases, however, especially with respect to GPA criteria, trends in validity are generally similar.

Following procedures developed by Gulliksen and Wilks (1950) tests for comparability of regression were conducted, for the regression of First-Year and Cumulative UGPA, respectively, on these admissions variables. Results of the regression analyses and tests are summarized in Table M.6.

Insert Table M.6 about here

- For the first-year GPA analysis, results of the tests indicate equality of errors of estimate, slopes, and intercepts;
- For the CUM UGPA, analysis of covariance results suggest unequal errors of estimate (smaller for minority than for nonminority students); results of tests for equality of slopes and intercepts are therefore ambiguous;
- For minority students, consistent with the pattern of zero-order coefficients, the admissions battery yields a higher multiple correlation (R = .693) with the CUM UGPA than with Year-1 GPA (R = .600) and in both instances the admissions battery yielded a somewhat higher multiple for minority than for nonminority students.

Generally speaking, these results indicate that the grades earned by minority students during the first year, and cumulatively over the total

Table M.6

Results of Multiple Correlational Analysis for Minority and Nonminority Students, with Tests for Comparability of Regression

Analysis	Minority				Nonminority			
	N	Mean	S.D.	Beta	N	Mean	S.D.	Beta
Year 1 GPA*	248	2.54	0.71		846	2.79	0.65	
SAT-V		41.5	11.2	.14		49.3	10.0	.14
SAT-M		44.3	10.8	.16		52.3	10.0	.13
Rank		54.7	9.2	.42		58.6	7.5	.41
Multiple Correlation				(.600)				(.573)
Cum UGPA**	267	2.47	0.72		932	2.78	0.74	
SAT-V		41.3	11.1	.22		49.1	10.0	.17
SAT-M		44.0	10.7	.22		52.1	10.0	.11
Rank		54.3	9.2	.39		58.4	7.5	.40
Multiple Correlation				(.693)				(.568)

*Analysis of covariance results indicated acceptance of the hypothesis of equality of estimate, slopes, and intercepts.

**Cum GPA analysis indicated unequal errors of estimate ($.05 > P > .02$); results of tests for equality of slopes and intercepts are thus made ambiguous.

period of attendance, are equal to those of nonminority students with comparable scores on the admissions battery. Moreover, the pattern of beta (standard partial regression) weights for the respective admissions variables is similar for both groups and both criteria. The Converted Rank receives greatest weight in every case. In the circumstances, it would be expected that predictive composites based on minority regression equations should be quite highly correlated with composites based on nonminority regression equations. Four composites of SAT-V, SAT-M, and Rank were computed based on regressions equations as follows:

1) Minority, Predicted Sem 1 GPA (PrS-1Min)
2) Minority, Predicted CUM UGPA (PrCumMin)
3) Nonminority, Predicted Sem 1 GPA (PrS-1Non)
4) Nonminority, Predicted CUM UGPA (PrCumNon)

The high intercorrelation of these four composites is shown below:

	PrS-1Min	PrCumNin	PrS-1Non	PrCumNon
PrS-1Min	1.000	.981	.994	.990
PrCumMin		1.000	.994	.999
PrS-1Non			1.000	.999
PrCumNon				1.000

Validity Patterns for Minority and Nonminority Composites

Table M.7 summarizes trends in the validity of two of the four composites,

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Insert Table M.7 about here

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namely, the Predicted Cum based on the minority equation, PrCumMin, and PrCumNon, based on the nonminority equation, using four criteria in various subgroups of minority and nonminority students.

TABLE M.7

Comparability of Trends in Validity for Two Weighted Combinations of SAT-V, SAT-M, and Rank: Predicted Cum UGPA Using a Minority Group Regression Equation and a Nonminority Group Equation

Group	Regression equation	Minority Students N	Sem 1 GPA r	Yr 1 GPA r	Cum UGPA r	Progress r	Nonminority Students N	Sem 1 GPA r	Yr 1 GPA r	Cum UGPA r	Progress r
TOTAL	Min *	(270)	538	598	693	524	(936)	540	567	561	271
	Non *		542	603	685	525		547	575	569	282
SEX											
Male	Min	(123)	449	482	625	504	(464)	534	559	545	293
	Non		456	492	628	509		546	572	556	308
Female	Min	(147)	623	705	730	539	(510)	541	568	573	251
	Non		628	706	720	539		534	566	566	260
SCHOOLS											
Arts & Sci	Min	(89)	513	592	657	387	(346)	567	544	620	300
	Non		525	596	641	380		566	544	616	309
Busi-ness	Min	(31)	146	223	621	341	(125)	495	568	577	368
	Non		216	278	597	311		511	597	593	390
Educ & HPER	Min	(43)	642	715	670	239	(179)	377	453	492	028
	Non		648	708	658	238		376	471	491	030
Univ Div	Min	(59)	177	197	342	200	(160)	426	515	463	-024
	Non		161	212	343	203		432	508	467	-041
PROGRESS**											
Prog 7	Min	(41)	554	621	669		(153)	537	599	626	
Prog 6	Min	(54)	509	632	738		(253)	601	610	628	
Prog 5	Min	(26)	385	459	686		(96)	360	339	468	
Prog 4	Min	(32)	385	415	580		(104)	432	371	445	
Prog 3	Min	(31)	110	299	382		(68)	482	498	487	
Prog 2	Min	(49)	398	422	467		(140)	526	524	528	
Prog 1	Min	(37)	047	212	284		(120)	449	598	509	

Note: Entries are correlation coefficients with leading decimals omitted. Ns are essentially constant. N for Yr 1 GPA slightly lower than N for Sem 1 GPA due to attrition following the first semester.

*Min = Predicted Cum UGPA based on a regression equation developed in the total minority student sample

*Non = Predicted Cum UGPA based on a regression equation developed in the total nonminority sample.

**Progress: 7 = postgraduate enrollment, 6 - graduated on schedule, 5 = graduated behind schedule, 4= senior status, 3 = junior, 2 = sophomore, and 1 = freshman (highest level attained)

- Trends in patterns of validity of the two composites and the actual values of the validity coefficients are very similar in subgroups defined in terms of sex, school, and level of progress.
- It is noteworthy that validities are higher for minority than for nonminority students in most instances, especially when longer-term criteria are involved.

Prediction of Independently Computed Semester GPA

Having examined the validity of the admissions battery with respect to 1st year and cumulative GPA, it is of interest to assess validity with respect to independently computed semester GPA. A summary of the intercorrelations of the preadmissions variables (SAT-V, SAT-M, and Rank) and the independently computed Semester GPA variables for semesters 1 through 8 is included as Table AM.2 in the Appendix. Table M.8 shows the correlation with each of the eight semester GPA of two predictive composites of the

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Insert Table M.8 about here

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three admissions variables, namely, Predicted Cumulative GPA based on the regression equation for minority students and Predicted Cumulative GPA based on the regression equation for nonminority students. Correlations are computed for all minority students and for minority students who earned a Main Campus GPA during eight consecutive semesters, for comparable groups of nonminority students, and for the pooled minority-nonminority sample.

Table M.8

Prediction of Independently Computed

Semester GPA

Group/ Predictive composite	Validity of composite with respect to Sem 1 GPA	Sem 2 GPA	Sem 3 GPA	Sem 4 GPA	Sem 5 GPA	Sem 6 GPA	Sem 7 GPA	Sem 8 GPA
All minority PredCumGPA*	.54	.51	.55	.54	.55	.60	.61	.50
(N)	(267)	(248)	(193)	(175)	(138)	(134)	(108)	(96)
Minority with 8 consec sem N = 66	.53	.54	.57	.54	.64	.58	.59	.54
All nonminority PredCumGPA**	.55	.47	.50	.50	.51	.40	.35	.37
(N)	(932)	(864)	(716)	(674)	(551)	(550)	(465)	(417)
Nonminority with 8 consec sem N = 332	.56	.42	.53	.50	.49	.37	.40	.39
All students PredCumGPA**	.55	.50	.53	.53	.54	.48	.44	.43
(N)	(1200)	(1114)	(911)	(851)	(691)	(686)	(575)	(514)
All students with 8 consec sem N = 398	.55	.49	.54	.51	.56	.46	.47	.45

*Regression equation for predi .ing CumUGPA for minority students

**Regression equation for predicting CumUGPA for nonminority students

- For minority students the predictive composite was about equally valid for every Semester GPA in both groups studied. Validities tended to be higher than those for nonminority students after the first semester.
- For the nonminority and pooled samples, validities were relatively stable over the first five semesters. Over semesters 6, 7, and 8, validities were somewhat lower, but again comparatively stable.

As at College, trends in the validity of predictive composites versus independently computed semester GPA do not clearly parallel those reported by Humphreys (1968) who studied validities for individual predictors rather than composites of admissions variables. (See Table AM.2 in the Appendix for detail on zero-order validities.)

Combined with results of previous correlational analyses, these results indicate that the validity coefficients for the admissions variables individually and when combined into predictive composites tend to be somewhat higher for minority than for nonminority students at Main, regardless of the criterion studied: nonGPA criteria such as Progress, Hours Attempted, Hours Passed; long-term or short-term GPA criteria; and independently computed semester GPA, especially GPA during the later semesters.

RECAPITULATION

This has been a longitudinal, comparative analysis of the records of performance over four or more years following matriculation, of cohorts of minority and nonminority students in two quite different undergraduate settings. Several aspects of the record were analyzed:

1) Overall attainment (graduation rate, highest educational level attained, and other non-GPA long-term criteria);
2) Trends in mean GPA from the first through the last period of enrollment, semester by semester and cumulatively;
3) Validity of admissions variables for predicting long-term GPA and non-GPA criteria as well as short-term (first semester or first year) GPA.

Overall Attainment

At College, overall attainment was measured by graduation versus non-graduation. Graduation rates were very high and almost identical for both minority and nonminority students (approaching 90 percent) in this highly selective setting.

At Main Campus, in sharp contrast, graduation rates were considerably lower and there was great variability in level of progress attained during the study period, ranging from less than one full semester of work completed through completion of a bachelor's degree program followed by enrollment in a postgraduate program. The range of attainment was similar for both minority and nonminority students. However, minority students had a somewhat lower graduation rate, completed fewer hours of graded course work, and had a somewhat lower mean number of hours passed. The distribution of students to Schools (e.g., Arts and Sciences, Business, Education) was roughly similar for both minority and nonminority students.

Trends in Mean GPA

In both settings, special consideration was given to the late-bloomer hypothesis according to which the performance of minority students might

be expected to follow a different gradient from the first to the last term of enrollment than that of nonminority students--more specifically, that minority students might show relatively greater improvement in the level of grades earned as the college record accumulates. To explore this hypothesis, trends in mean GPA semester-by-semester and cumulatively were examined in both settings using the point-biserial correlation coefficient as an index of group separation on the continuous GPA variables.

College provided data for four successive Classes, 1974 through 1977. Findings based on data for the two earlier Classes (1974 and 1975, combined) indicated that minority and nonminority students were more sharply separated by longer-term Cumulative GPA than by GPA at the end of the first year of study, and that the average degree of separation was greater for later- than for earlier-semester GPA, a pattern inconsistent with late-blooming. Findings based on data for the two later Classes (1976 and 1977, combined) indicated that minority and nonminority students were somewhat less sharply differentiated by Semester GPA during later semesters than they were by earlier-semester GPA, a pattern consistent with late blooming.

This pattern of findings suggested the need to consider the possibility of, and to develp an explanatory rationale for, what may be termed "emergent late-blooming tendencies"--i.e., the findings suggested that late-blooming tendencies might be present in more recent (and perhaps in future) cohorts of minority students at College, but were not present in earlier cohorts. Interpretation was complicated by (a) inability to introduce controls over variables that might affect GPA levels (e.g., course-selection patterns, pass/fail vs. credit options, and the like), and especially by

(b) the presence of large unexplained across-Class increases in average grades, much larger for minority than for nonminority students at every GPA level, that could not be accounted for by increases in ability levels across-Classes--average scores on admissions variables did not increase across-Classes for either group.

In the circumstances, a strong case can be made that the observed trends, perhaps in large measure, reflect differential rates of grade "inflation," greater for minority than for nonminority students, due to gradual, unplanned faculty adjustments in grading standards and performance-expectations. However, possible arguments were recognized for an emergent late-blooming rationale for the findings, especially the greater across-Class GPA gains for minority students. More specifically, it was speculated that in a variety of ways not reflected in their test-score averages, minority students in the later cohorts could have been "better equipped" emotionally and intellectually than their predecessors in earlier cohorts to deal with problems of personal and academic adjustment at College--(e.g. have higher levels of academic sophistication, motivation, and self-confidence). Moreover, College's support systems (counseling, tutoring, guidance, etc.) for minority students may have improved over the study period.

Factors such as the foregoing, if present, could help to explain some of the across-Class GPA gains of minority students. Thus, at College it was possible to adduce both inflationary and emergent late-blooming rationales to help "explain" observed findings, but rigorous evaluation was not possible within the framework of available data. Regardless of interpretation, continuation into subsequent Classes of GPA trends such

as those observed over the Classes of 1974 through 1977 would result in a continued gradual reduction of differences in GPA-level between minority and nonminority students despite continued sharp disparities in test-score averages. Attention was directed to the need for faculty consideration of factors involved in grading and procedures for setting and monitoring "grading standards." The importance of monitoring trends in minority student performance across- as well as within-Cohorts in order to assess possible developmental (across-cohort, generational) late-blooming tendencies was noted.

At Main Campus, based on data for only one cohort (entering in September 1971), minority and nonminority students were found to be more sharply differentiated by longer-term Cumulative GPA than by GPA at the end of the first semester or the first year of study; moreoever, trends toward increasing separation of minority and nonminority students on GPA variables from the first through the eighth semester were found consistently in analyses that introduced some control over variables that might affect GPA levels (e.g., sex, school of enrollment, highest level of progress attained, etc.). The trends observed at Main Campus clearly did not conform to those expected under the late-bloomer hypothesis.

Validity of Admissions Variables

Non-GPA Criteria. At College, scores on the admissions variables did not differentiate graduating from nongraduating students within either the minority or the nonminority sample. As indicated earlier, almost 90 percent of the respective samples graduated resulting in severe restriction

of range on this long-term criterion, the only non-GPA criterion available for analysis at College.

At Main Campus, characterized by much greater variability among students with respect to overall attainment, three non-GPA long-term criteria were analyzed, namely, Progress (one a seven-point scale, reflecting highest level of attainment during the study period), hours completed in graded courses, and total hours passed. The admissions variables (SAT-V, SAT-M, Converted Rank) yielded higher validities for minority than for nonminority students with respect to all three non-GPA criteria, especially Progress.

GPA Criteria. At College the validity of admissions variables (SAT-V, SAT-M, Converted Rank, and the CEEB Achievement Average or Ach Av) tended to be higher for longer-term (e.g., 3-yr and 4-yr CUMGPA) than for shorter-term GPA (e.g., Yr 1 GPA) among nonminority students and in the pooled minority-nonminority sample. For minority students the validity of admissions variables for longer-term Cumulative GPA was approximately the same as validity for shorter-term GPA.

Regardless of the GPA criterion employed (Cumulative or independently computed semester GPA) the validity of admissions variables was higher in the pooled minority-nonminority sample than in either the minority or the nonminority sample. This result was due to the fact that minority means were very substantially lower than nonminority means on both sets of variables--i.e., the admissions variables and the GPA criteria.

At College, tests for comparability of regression were conducted using Year-1 GPA and 3-yr CUM GPA, respectively, versus the admissions battery in

the all-Classes combined sample. Results of the Year-1 GPA analysis indicated equality of errors of estimate and slopes, but inequality of intercepts (minority performance overestimated somewhat by scores on admissions variables); results involving 3-yr CUM GPA were ambiguous (errors of estimate were unequal, thus clouding interpretation of remaining tests). For minority students both Year-1 and 3-yr CUM GPA means were lower than estimated from their test-scores. Using pooled-sample regression equations based on all Classes combined, Predictive composites based on minority-group regression equations for Year-1 and 3-yr Cumulative GPA were highly correlated with each other and with comparable composites based on nonminority regression equations.

Minority-based predictive composites yielded similar patterns of validities versus GPA in both minority and nonminority samples, and the same was true of nonminority-based predictive composites.

At Main Campus, validity coefficients of the admissions variables with respect to GPA (as well as non-GPA) criteria were consistently higher for minority than for nonminority students, and among minority students coefficients were consistently higher for long-term Cumulative GPA than for either Semester 1 or Year 1 GPA. For nonminority students validities were comparable or slightly higher for longer-term Cumulative GPA.

Results of tests for comparability of regression systems using Year 1 GPA versus the admissions battery at Main indicated minority performance consistent with scores on the admissions variables; results of regression tests using the Undergraduate Cumulative GPA were ambiguous (inequality of errors of estimate clouded interpretation of tests for slopes and intercepts).

Predictive composites based on minority-group regression equations for Year 1 and Undergraduate CUM GPA, respectively, were highly correlated with each other and with comparable composites based on nonminority regression equations. Minority-based composites yielded similar patterns of validities in both minority and nonminority samples and the same was true for nonminority-based composites.

DISCUSSION, EVALUATION, IMPLICATIONS

As suggested at the outset, research using short-term GPA criteria indicates that low scores on standard admissions tests relative to the average for all students in a given context, presage relatively low performance whether those scores are presented by a minority or a nonminority student; that minority students should not be expected to perform at a level higher than that estimated on the basis of their scores on traditional admissions tests; and that the correlational validity of traditional admissions variables tends to be similar for minority and nonminority students. Findings of the present, essentially exploratory study indicate that these conclusions hold generally for long-term GPA, as well as for short-term GPA criteria in at least two quite different settings.*

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*Evidence from other recently reported studies concerned with the longer-term performance of minority students tend to extend and confirm this conclusion. Farver, Sedlacek, and Brooks (1975) using longitudinal data for two recent cohorts of minority (Black) and nonminority students in a university setting, concluded that the admissions measures involved (SAT-V, SAT-M and High School GPA) had "...considerable usefulness (for both groups) in predicting grades beyond the freshman year" (p. 246). Warren (1976), in a CEEB-sponsored study, examined the correlational validity of standard admissions variables with respect to one-, two-, three-, and four-year cumulative GPA in samples of concurrently enrolled freshman-, sophomore-, junior-, and senior-level Mexican-American and nonMexican-American students in several California colleges. The admissions variables were found to have comparable correlational validity for the two groups involved at every GPA level, with but minor exceptions.

With regard to the more novel question of "late-blooming," the hypothesized tendency for minority students to show relatively greater improvement in performance following the freshman year, GPA trends semester-by-semester and cumulatively in one setting (Main Campus) clearly did not follow a late-blooming pattern--minority and nonminority students were somewhat more sharply differentiated by later-semester and cumulative GPA variables than by GPA during earlier semesters.

In the second setting (College), which provided data for four successive classes, the pattern of findings was quite complex. Substantial across-class (across-cohort) increases in average grades relative to average ability levels, present for both minority and nonminority students, were greater for minority students; as a consequence (a) in later cohorts minority and nonminority students were less sharply differentiated by their average grades (even though somewhat more sharply differentiated by their average scores on admissions tests) than were their counterparts in earlier cohorts, and (b) in the later but not in the earlier cohorts, GPA trends semester-by-semester suggested the possibility of late-blooming.

A tentative explanatory rationale for these ambiguous findings, especially for the "extra" across-cohort gains in average grades relative to average ability-levels for minority students, must include consideration of several interpretive possibilities including the following:

a) differential rates of grade inflation, greater for minority than for nonminority students marked by gradual, unplanned, compensatory adjustments in faculty grading standards and performance expectations.

for minority students--i.e., changes over time in the comparability of grading standards for minority and nonminority students;

b) disproportionate, systematic across-cohort shifts among minority students toward "less difficult" courses, nongraded courses and/or departments characterized by "more lenient" grading practices;

c) improvement over time in the efficacy of institutional support systems for minority students (e.g., programs of counseling, tutoring, and other services designed to facilitate the personal, social, and academic adjustment of minority students);

d) across-cohort increases, plausibly greater for minority than for nonminority students, in average entry-levels of academic, social, and intellectual sophistication, self-confidence, general coping skills, and other attributes--reflecting developmental changes that might be expected to emerge over time among minority students, which would not necessarily be reflected in higher average scores on ability measures but which could contribute to increased levels of academic productivity;

A parsimonious evaluation of the findings at College suggests (a) that the larger across-cohort minority GPA gains relative to ability levels probably reflect substantial inflationary effects, but (b) that the possibility of some increase in average levels of "academic productivity" relative to average ability levels across the four cohorts of minority students cannot be ruled out (due to possibilities such as those suggested in c) and d), above). Rigorous assessment of these alternative but not mutually exclusive rationales clearly is not feasible within the framework of data available.

Both the findings and the interpretive rationales adduced to "explain" them have implications for future studies of the performance of minority and nonminority students.

Implication for Minority Studies

First of all, the possibility of "emergent late-blooming"--i.e., significant, gradual, across-cohort (generational) improvement in the academic productivity of minority students relative to ability--should be recognized and considered in future comparative investigations of the performance of minority and nonminority students. The concept of emergent late-blooming focuses attention on the possibility that there may be increases across successive cohorts of minority students in average levels of academic, intellectual, and social sophistication, self-confidence, general coping skills, achievement motivation, and other noncognitive performance-related characteristics. Such average increases, which may not be reflected in test-score averages, might reasonably be expected to occur over time as the more obvious societal barriers to full equality of opportunity for minorities are removed.

The effects on performance of developmental, generational changes such as those outlined above may be reinforced by possible improvements in the efficacy of institutional support systems designed to facilitate the personal, social, and academic adjustment of minority students.

It is important that investigations concerned with the educational development of minority students be undertaken. It is critical that these be planned and designed in such a way as to make it possible to monitor trends in performance, and in the relationship of cognitive, noncognitive,

and situational variables to performance, across- as well as within-cohorts of students in a number of different academic settings. Such investigations should include studies of "comparative growth" during the college years in the abilities measured by traditional admissions tests--i.e., for example, verbal and quantitative reasoning--and other relevant abilities.

The unexplained increases in average grades across-cohorts and especially the interpretive problems introduced by the differential rates of increase for minority and nonminority students at College,* point up recognized limitations of the grade-point average as an index of "academic performance"

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*Such trends are not unique to College, as indicated by results of a recently completed comprehensive longitudinal internal study conducted by a selective coeducational liberal arts college (unpublished institutional internal report, 1976; findings cited with permission). Conducted in a setting much like College in terms of selectivity (e.g., SAT means of 650 plus for nonminority students and roughly 500 for Black students, the principal minority group represented), this study analyzed the performance records of students in six recent Classes (1972 through 1977). With respect to student attainment, it was reported that "...Black students score lower (with respect to Cumulative GPA) on the average than other students at the college...Black students grades on a semester-by-semester basis tend to parallel and converge slightly with those of other students over time. This effect is present over all Classes."

The report noted a steady rise in average grades across Classes, even though the more recent Classes included proportionately more students with "low" SAT-scores (below 400) and "low" rank in class (below the 90th percentile). This is symptomatic of grade inflation, as at College, and in the words of the report contributes to "troubling concern ... over the proper interpretation of the meaning of the 'pass'" (p. 14). Examination of data on GPA levels for minority and nonminority students by Class indicated that the across-Class increase in mean GPA was considerably greater for Black than for nonminority students.

in comparative validity studies generally, that must be given special consideration in future research concerned with across-cohort developmental trends in the comparative performance of minority and nonminority students. Two of the principal limitations are as follows:

- Generally speaking, observed increase (decreases, invariances) in the average level of grades awarded across-cohorts do not necessarily reflect increases (decreases, invariances) in the average quality and/or quantity of "academic output" or "productivity" and;
- Grades may be "biased" to some extent--i.e., faculty "grading standards" and performance expectations may not be strictly comparable for minority and non-minority students within a given cohort, and there may be "unplanned" but nonetheless real changes in relative standards from cohort to cohort in response to local or other conditions.

Problems involved in setting and maintaining "grading standards" (which merit special consideration because of the serious implications of college grades both for students and for institutions) must be dealt with in future comparative across-cohort studies. For example, it would be useful in future study-settings (as well as in college-settings, generally) for college faculties to consider procedures for linking the level of grades awarded to defined samples of academic output (e.g., writing samples of critical examination papers, basic laboratory exercises, major papers) for students at known levels of measured ability. By comparing samples of

current output with such "standard samples" a faculty might to some extent objectify and give operational meaning to grades. Use of standard subject-matter tests of achievement as supplemental measures of academic performance would be helpful.

Implications for Validation Research Generally

Apart from the special implications of the findings of this study for questions regarding minority-nonminority performance, the findings are of interest with regard to their implications for validation research generally.

Findings at College and Main Campus indicating that the correlation of admissions variables with long-term cumulative GPA criteria tended to be equal to or higher than their correlation with short-term GPA criteria, are consistent with findings reported by a number of investigators over the last 20 years (e.g., French, 1958; Hills, Bush & Klock, 1964; Schrader, 1971; Mauger & Kolmodin, 1975; Wilson, 1976).

It is possible that studies involving only short-term GPA criteria, such as the Year-1 GPA, typically employed in validity studies, may be underestimating somewhat the correlational validity of admissions variables. A long-term cumulative GPA based on all work completed by a student is a more representative and reliable measure of performance than is a GPA based on only the first (or the last) semester or year of study, and as such should tend to be a more predictable as well as a more relevant criterion for the validation of admissions variables.

It is useful to consider as a working proposition that the longest term cumulative GPA available for all or essentially all members of an entering cohort may be the most predictable and the most appropriate GPA

criterion for the general validation of admissions tests. In highly selective settings, such as College, in which most entering students complete their degree program and admissions tests tend to be unrelated to "survival," the four-year cumulative GPA may be the most relevant long-term GPA criterion. In settings such as Main Campus in which a substantial percentage of an entering cohort does not graduate, the most relevant GPA criterion may be the "longest-stay" cumulative GPA--a variable-period cumulative GPA based on all work completed by a student regardless of length of tenure. Such a cumulative GPA criterion would be applicable to all members of an entering cohort.

Further development of these ideas is beyond the scope of the present study. Humphreys (1976) has called attention to certain of the conditions that would tend to lead to an increase in the validity of admissions variables as the GPA record accumulates. These include a homogeneous (stable) pattern of intercorrelations of semester grade-point averages (rather than a declining gradient from earlier to later semesters) and a homogeneous pattern of correlations of semester averages with freshman predictors (rather than a decline in validity from earlier to later semesters, as reported by Humphreys (1968) and others (e.g., Juola, 1966).

In certain of the analyses reported herein, validities for composites of predictors have shown a greater degree of stability across semesters than validities for the predictors separately; and validities of the admissions variables separately and in best-weighted combination have been somewhat greater for longer-term cumulative than for first-semester or

first-year GPA. Additional studies employing both cumulative and independently computed GPA (by semester and/or by year) are needed.

Studies involving longer-term cumulative GPA criteria and/or remote GPA criteria (such as, for example senior-year GPA) have been reported far less frequently than studies using first-year GPA criteria. One reason for this is that longitudinal studies calling for cohort analysis in the development of longer-term criteria pose more complex problems of design, analysis, and interpretation than traditional first-year studies. A second reason is logistical--i.e., institutional records systems do not appear to be oriented to problems calling for collating admissions data (on the entry characteristics of students) with data on student progress (such as grades earned semester-by-semester and cumulatively, highest level of progress attained, and choice of major field) in cohort files. Admissions records (with precollege information) and records on student progress (registration, records, and related systems) frequently are maintained separately without routines for merging into "cohort files." This may reflect lack of institutional orientation to routine, systematic analysis of the "experience" of subgroups of students in successive cohorts--subgroups defined in terms of level of ability, sex, race, and/or other important personal and background characteristics.

Better systems of student flow analysis are needed to enable colleges and universities to obtain not only information that is useful for planning, evaluation, and policy review, generally, but also invaluable up-to-date empirical evidence regarding the relationship of student characteristics considered in the admissions process to important educational outcomes.

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APPENDIX

Table AC.1

Means, Standard Deviations, and Intercorrelations of Variables

For All Students, Minority Students, and Nonminority Students:

All Classes, Graduates plus Nongraduates

Variable	SAT-V	SAT-M	Rank	Ach Av.	Cum GPA at end of year 1	2	3	4	Independent semester GPA 1,2	3	4	5	6	7	8	Mean	S.D.	N
All students																		
SAT-V	---	531	244	680	398	446	461	500	398	398	333	379	341	349	324	63.3	8.1	1219
SAT-M	---	---	288	701	368	392	394	402	368	356	290	206	270	268	193	67.0	8.3	1219
Rank			---	303	336	353	354	339	336	294	268	281	241	192	218	64.2	7.2	1134
Ach Av.				---	500	527	531	539	500	455	389	400	370	384	336	64.7	7.6	1185
Cum 1					---	921	877	841	---	686	619	603	566	561	457	9.97	1.39	1248
Cum 2						---	963	941		---	---	692	650	640	541	10.14	1.27	1158
Cum 3							---	977				---	---	693	593	10.30	1.23	1013
Cum 4								---						---	---	10.44	1.14	810
Sem 1,2 *					---	921	877	841		686	619	603	563	561	457	9.97	1.39	1248
Sem 3						866	856	838		---	646	637	595	610	508	10.10	1.69	1185
Sem 4						819	813	798			---	620	576	543	490	10.46	1.48	1154
Sem 5						---	825	814				---	672	621	499	10.52	1.58	1025
Sem 6							791	796					---	626	543	10.75	1.51	1008
Sem 7								786						---	611	10.91	1.46	1055
Sem 8								709							---	10.88	1.40	808
Minority																		
SAT-V	---	514	-048	592	236	246	179	235	236	243	182	132	206	106	086	52.9	8.7	116
SAT-M	---	---	-030	587	191	142	127	181	191	119	052	105	186	033	014	55.4	9.5	116
Rank			---	-014	236	190	260	153	236	201	166	212	203	073	155	60.3	7.7	103
Ach Av.				---	357	322	318	321	357	237	232	285	243	235	131	55.0	7.1	113
Cum 1					---	882	832	763	---	505	608	576	446	332	186	8.77	1.47	120
Cum 2						---	945	911		---	---	643	551	709	299	8.87	1.39	110
Cum 3							---	975				---	---	731	398	9.02	1.35	97
Cum 4								---						---	---	9.14	1.27	72
Sem 1,2 *					---	882	832	763	---	505	608	576	449	612	186	8.77	1.47	120
Sem 3						777	710	695		---	534	505	412	593	259	8.48	2.18	112
Sem 4						820	803	785			---	567	545	552	375	9.25	1.80	110
Sem 5							785	756				---	575	579	246	9.12	1.96	105
Sem 6							747	734					---	559	416	9.59	1.95	97
Sem 7								803						---	358	9.80	1.87	102
Sem 8								506							---	9.86	1.71	72
Nonminority																		
SAT-V	---	408	223	617	339	385	408	452	339	326	274	329	289	317	290	64.4	7.2	1103
SAT-M	---	---	278	640	301	324	322	326	301	283	233	227	193	220	178	68.2	7.1	1103
Rank			---	288	315	341	333	325	315	273	251	251	215	177	196	64.6	7.0	1032
Ach Av.				---	449	480	478	489	449	406	336	330	318	344	295	65.8	6.8	1072
Cum 1					---	918	869	835	---	682	584	562	547	515	454	10.10	1.32	1128
Cum 2						---	960	938		---	---	665	636	598	541	10.28	1.19	1048
Cum 3							---	973				---	---	666	586	10.44	1.14	916
Cum 4								---							---	10.56	1.04	738
Sem 1,2 *					---	918	869	835	---	682	584	562	547	516	454	10.10	1.32	1128
Sem 3						864	857	841		---	630	621	592	578	512	10.26	1.54	1073
Sem 4						802	797	777			---	590	547	506	472	10.59	1.39	1044
Sem 5							809	796				---	659	592	498	10.68	1.45	920
Sem 6							782	781					---	609	528	10.87	1.41	911
Sem 7								760						---	627	11.03	1.35	953
Sem 8								718							---	10.98	1.32	724

Note: Entries are correlation coefficients with decimal omitted.

*Independently computed semester GPA not available for Semester 1 and Semester 2. This is the first-year GPA (Yr. 1).

Table AC.2

Means, Standard Deviations and Intercorrelation of Variables for Designated Subgroups: All Classes, Graduates Only with All Work at College (Missing Data Procedures)

Variable	Cum GPA at end of year 1	2	3	4	Independent semester GPA 1,2	3	4	5	6	7	8	Mean	S.D.	N
All students														
SAT-V	422	443	468	495	422	397	337	387	353	349	329	63.2	8.1	966
SAT-M	375	391	401	400	375	356	289	324	282	276	195	67.0	8.4	966
Rank	358	361	358	336	358	291	275	266	248	193	200	64.2	7.1	907
Ach Av.	517	528	542	536	514	449	401	421	389	397	336	64.7	7.6	943
Cum 1	---	928	883	844	---	692	642	628	579	567	463	9.95	1.37	986
Cum 2		---	965	942		---	---	711	659	642	547	10.11	1.29	977
Cum 3			---	978				---	---	692	592	10.30	1.23	947
Cum 4				---						---	---	10.41	1.16	714
Sem 1,2 *	---	928	883	844	---	692	642	628	579	567	463	9.99	1.37	986
Sem 3		871	858	843		---	666	644	598	610	512	10.08	1.65	984
Sem 4		828	813	799			---	629	584	541	498	10.48	1.44	976
Sem 5			829	817				---	667	621	497	10.57	1.51	945
Sem 6			793	798					---	626	550	10.76	1.49	944
Sem 7				784						---	606	10.88	1.48	939
Sem 8				708							---	10.84	1.38	713
Minority														
SAT-V	186	213	186	215	186	173	149	090	215	091	068	52.8	8.8	93
SAT-M	176	147	125	190	176	114	067	125	194	054	022	55.4	9.7	93
Rank	188	200	248	186	188	102	176	176	206	131	084	61.0	7.3	86
Ach Av.	344	330	332	330	344	200	225	261	261	284	072	55.6	7.7	90
Cum 1	---	881	836	777	---	477	611	584	447	637	216	8.74	1.49	97
Cum 2		---	945	916	---	---	---	640	542	718	334	8.83	1.39	96
Cum 3			---	976	---	---	---	---	---	745	416	9.01	1.38	90
Cum 4										---	---	9.08	1.33	62
Sem 1,2 *	---	881	836	777		477	611	584	447	637	216	8.74	1.49	97
Sem 3		772	736	690		---	514	442	407	591	269	8.57	1.95	97
Sem 4		816	805	789			---	554	531	550	392	9.28	1.81	96
Sem 5			805	784				---	601	591	284	9.19	1.92	95
Sem 6			745	739					---	563	460	9.59	2.00	90
Sem 7				817						---	411	9.71	1.96	89
Sem 8				524							---	9.89	1.63	62
Nonminority														
SAT-V	376	384	416	446	376	340	280	346	302	318	303	64.4	7.2	(873)
SAT-M	311	320	332	322	311	291	226	249	206	226	136	58.3	7.2	(873)
Rank	352	353	340	328	352	286	259	245	223	175	192	64.6	6.9	(821)
Ach Av.	476	481	492	486	476	408	352	365	342	354	309	65.7	7.0	(853)
Cum 1	---	926	876	837	---	692	612	593	564	518	459	10.08	1.29	(889)
Cum 2		---	963	938	---	---	---	688	648	596	542	10.25	1.20	(881)
Cum 3			---	974				---	---	652	588	10.44	1 13	(857)
Cum 4										---	---	10.54	1.05	(652)
Sem 1,2 *	---	926	876	837		692	612	593	564	518	459	10.08	1.29	(889)
Sem 3	---	871	860	847		---	658	640	596	577	513	10.25	1.53	(887)
Sem 4		814	796	778			---	603	559	502	478	10.61	1.33	(880)
Sem 5			811	797				---	648	589	496	10.72	1.38	(850)
Sem 6			784	786					---	608	536	10.88	1.38	(854)
Sem 7				753						---	615	11.00	1.37	(850)
Sem 8				717							---	10.93	1.32	(651)

Note: Entries are correlation coefficient, leading decimals have been omitted. Semester 8 and 4-yr CUM GPA, respectively, are not available for the Class of 1977. This accounts for the smaller Ns for these variables.

* This is the freshman year GPA.

Table AM.1

Measures of Central Tendency and Variability for All Variables, for Minority and Nonminority Students: Graduates and Nongraduates

Group/ Variable	Nongraduates Mean	S.D.	N	Graduates Mean	S.D.	N
NONMINORITY						
SAT-V	47.4	10.0	448	50.7	9.9	520
SAT-M	49.8	9.6	448	53.9	9.9	520
Rank	55.7	7.0	452	60.5	7.3	509
Progress	2.32	1.5	473	6.12	0.70	529
Year 1 GPA	2.49	0.69	401	3.02	0.52	521
Sem 1 GPA	2.46	0.81	468	2.99	0.56	528
Sem 2 GPA	2.44	0.86	404	3.06	0.59	521
Sem 3 GPA	2.28	0.96	266	3.01	0.63	495
Sem 4 GPA	2.43	0.87	220	3.08	0.62	494
Sem 5 GPA	2.29	0.90	130	3.13	0.59	445
Sem 6 GPA	2.44	0.92	128	3.21	0.61	448
Sem 7 GPA	2.24	1.00	88	3.21	0.61	396
Sem 8 GPA	2.31	1.01	78	3.25	0.59	356
CUM GPA	2.37	0.79	473	3.13	0.45	529
MINORITY						
SAT-V	37.3	9.2	151	45.8	11.4	122
SAT-M	40.4	9.0	151	48.0	11.2	122
Rank	50.7	8.4	149	58.6	8.2	121
Progress	2.39	1.08	151	6.11	0.74	122
Year 1 GPA	2.22	0.68	132	2.90	0.55	119
Sem 1 GPA	2.18	0.81	148	2.92	0.62	122
Sem 2 GPA	2.16	0.87	132	2.87	0.65	119
Sem 3 GPA	2.01	0.92	88	2.81	0.67	108
Sem 4 GPA	2.07	0.93	72	2.86	0.65	106
Sem 5 GPA	1.73	0.90	46	2.79	0.81	95
Sem 6 GPA	1.95	0.99	40	2.91	0.73	95
Sem 7 GPA	1.99	0.81	32	2.95	0.76	77
Sem 8 GPA	2.12	0.89	29	2.97	0.74	68
CUM GPA	2.06	0.63	151	2.94	0.49	122

Table AM.2

Correlation of Preadmissions Variables with Independently Computed Semester GPA and Intercorrelation of the Semester GPA:

Main Campus

Group/ variable	Sem 1 GPA	Sem 2 GPA	Sem 3 GPA	Sem 4 GPA	Sem 5 GPA	Sem 6 GPA	Sem 7 GPA	Sem 8 GPA	N	Mean	S.D.
Min Verbal	371	388	462	486	506	565	574	471	(273)	41.1	11.0
Non Verbal	392	340	385	379	380	279	242	318	(968)	49.2	10.0
Tot Verbal	402	379	428	435	451	385	349	383	(1241)	47.4	10.8
Min Math	410	370	430	424	491	541	549	530	(273)	43.8	10.7
Non Math	388	329	381	378	394	292	220	222	(968)	52.0	10.1
Tot Math	409	368	429	420	460	388	326	330	(1241)	50.2	10.7
Min Rank	504	460	444	450	430	472	472	352	(270)	54.3	9.2
Non Rank	499	452	468	455	463	394	349	352	(961)	58.4	7.8
Tot Rank	510	468	473	467	466	428	396	375	(1231)	57.4	8.2
Sem 1 Minority		578	486	457	401	433	407	288	(270)	2.51	0.82
Sem 1 Nonminority		621	555	487	570	451	431	426	(990)	2.74	0.76
Sem 1 Total		617	545	483	524	443	425	402	(1266)	2.69	0.78
Sem 2 M			519	382	514	511	352	381	(251)	2.50	0.85
Sem 2 N			624	496	493	428	384	404	(925)	2.80	0.80
Sem 2 T			609	492	520	468	397	420	(1176)	2.73	0.82
Sem 3 M				592	641	670	591	447	(196)	2.45	0.88
Sem 3 N				650	607	527	501	502	(763)	2.77	0.84
Sem 3 T				645	628	572	533	505	(959)	2.69	0.86
Sem 4 M					633	638	626	518	(179)	2.54	0.85
Sem 4 N					622	538	483	462	(714)	2.89	0.77
Sem 4 T					645	575	526	492	(892)	2.81	0.80
Sem 5 M						733	665	633	(141)	2.45	0.96
Sem 5 N						692	624	550	(575)	2.94	0.77
Sem 5 T						717	650	591	(716)	2.84	0.83
Sem 6 M							704	512	(135)	2.63	0.92
Sem 6 N							613	518	(576)	3.05	0.77
Sem 6 T							648	534	(711)	2.96	0.81
Sem 7 M								681	(109)	2.67	0.89
Sem 7 N								587	(484)	3.04	0.79
Sem 7 T								623	(593)	2.97	0.82
Sem 8 M									(97)	2.72	0.87
Sem 8 N									(434)	3.09	0.77
Sem 8 T									(531)	3.01	0.80

Note: These are missing data correlations; each coefficient is based on all available cases having the observations required. Leading decimals have been omitted. Numbers in parentheses indicate number of students having scores on the variable designated. Thus, for example, 270 minority students had a Sem 1 GPA while only 97 minority students had a Sem 8 GPA based on study at Main Campus.