Academic Preparation and College Success: Analyses of Indiana's 2000 High School Class

IPAS Research Report #04-03

ipas **Indiana Project on Academic Success**
Research-based inquiry for enhancing academic success

postsecondary *PATHWAYS* project with Lumina Foundation for Education & Indiana Commission for Higher Education

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ACADEMIC PREPARATION AND COLLEGE SUCCESS

Analyses of Indiana's 2000 High School Class

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Prepared for

Indiana Commission for Higher Education

Lumina Foundation for Education

IPAS Research Report #04-03

October 2004

The College Board, Indiana Commission for Higher Education, Independent Colleges of Indiana, Inc., and the State Student Assistance Commission of Indiana provided data for this project. The funding was provided by Lumina Foundation for Education through a joint project with the Indiana Commission for Higher Education. The authors gratefully acknowledge this data access and financial support. The authors would also like to thank David Mundel for his critical reading of an earlier version of this report. The opinions in this manuscript are the authors' and do not reflect policies of the funding agencies or collaborating organizations.

EXECUTIVE SUMMARY

The State of Indiana took steps to put college preparatory curricula in all high schools during the 1990s. At a time when this state and others are considering options for increasing graduation requirements for the standard diploma, an assessment of the effects of academic preparation in high schools on college success by students in Indiana can inform policy development in this and other states. This report analyzes a database that follows a cohort of students from high school through the first two years in college, focusing explicitly on the impact of high school curricula on college success.

First, the College Board student descriptive questionnaires for two samples of high school seniors taking the SAT were examined to assess the impact of high school curricula on SAT scores in Indiana and the U.S. Indiana has a higher percentage of high school students who take the SAT exam than most other states, with a rate of 60% compared to a national rate of 44%. The regression models measured the influence of student background, high school grades, and curricula on SAT scores. Key findings include

- In both Indiana and the U.S., advanced courses in math, science, history, English, literature, and foreign/classical languages were positively associated with SAT scores, when controlling for background and achievement.
- In both Indiana and the U.S., advanced math courses explained more variance in SAT scores than did other types of courses.
- In both Indiana and the U.S., the combinations of advanced courses included in Indiana's Core 40 (college preparatory) and honors (advanced) diplomas were also positively associated with SAT scores.
- A higher percentage of SAT takers in Indiana completed the advanced courses associated with the honors diploma, while a higher percentage of students in the U.S. took courses associated with Core 40 requirements.
- The state of Indiana ranks 43rd on state average SAT score and ranks 33rd for public high school students, adjusted for student demographic characteristics and state SAT participation rate.

Second, the analyses of college destinations used the College Board questionnaires and student college enrollment information from Indiana's public and independent[1] colleges. Multinomial logistic models were used to examine the relationships of student background, high school preparation (curriculum and grades), SAT scores, and student financial aid with enrollment in different types of four-year colleges (state universities, urban university, regional campuses, research universities, and private colleges), compared to enrollment in two-year colleges. In addition, a logistic regression analysis provided information on the association between curriculum and enrollment in two-year colleges. Key findings related to preparation included

- Both Core 40 and honors diplomas were positively associated with enrollment in all types of four-year colleges, although honors diplomas had a more substantial direct association with these college choices.
- Having high grades in high school was associated with enrollment in four-year colleges of all types.
- Academic preparation—the combination of diploma type and high school grades—explained more variations in enrollment in four-year colleges than did SAT scores.
- Controlling for academic preparation, SAT scores, and financial aid, low-income students had higher odds than middle-income students of enrolling in two-year colleges compared to four-year colleges.

The analyses of college destinations also examined the influence of student aid packages on where students enrolled. Key findings included

- All types of financial aid packages were positively associated with enrollment in the urban university and state universities compared to two-year colleges.
- Packages with loans were positively associated with enrollment in regional universities compared to two-year colleges, but other forms of aid did not substantially change the odds of this outcome.
- Packages with loans but not grants, both grants and loans, and with work-study were positively associated with enrollment in research universities compared to community colleges.
- Loans without grants were negatively associated with enrollment in private colleges. All other forms of aid were positively associated with private enrollment when compared to community colleges.

Third, the database on the 2000 Indiana cohort was also used to examine the influence of background, preparation, SAT score, college choice, major program, college achievement, and student aid package on persistence, considering three outcomes: persistence from fall to spring of the first year of college, persistence from spring of the first year to fall of the second, and continuous enrollment during the first two years at college. These analyses considered the impact of the type of package received, compared to not receiving student aid, rather than the amount of aid. Key findings included

- Both honors and Core 40 diplomas were positively associated with persistence within the first year, persistence from the first year to the second year of college, and continuous enrollment.
- Having high grades in high school was positively associated with between-year persistence, and low grades were negatively associated with persistence beyond the first year.
- All types of financial aid packages were positively associated with persistence within the first year of college.
- However, most financial aid was negatively associated with persistence between the first and second years.

- There was no significant positive or negative relationship between the financial aid packages received and continuous enrollment. There was not a significant difference in continuous enrollment between students who received financial aid and those who did not.

These findings provide strong, compelling evidence that a college preparatory curriculum improves academic success in college, controlling for background and finances. However, there is still reason to be concerned about affordability in Indiana, given the relationship between income and enrollment in two-year colleges, coupled with the negative associations between student aid and year-to-year persistence.

TABLE OF CONTENTS

Introduction 1

Indiana's Approach to Improving Academic Success 3

Indiana's Balanced Access Model 3

Is There a Link Between State Policy and Preparation? 7

Study Approach 9

A Comparison of Indiana and the U.S. 9

The 2000 High School Graduate Cohort 11

Limitations 12

Preparation and Test Scores: A Comparison of Indiana to the Nation 14

SAT Participation and College Enrollment 14

Adjusting State Scores for Participation 16

Curricula and SAT Scores 19

Academic Success: The Indiana Case 29

The College Transition 29

What Variables Were Associated with College Destinations? 33

Policy Variables and College Persistence 38

The Role of Policy in Access 41

Implications 46

Figure

The Indiana Model: A Balanced Approach to College Access and Success 6

Tables

1. Trends in Indiana K–12 Education Success 8
2. Indicators of Test Taking and College Enrollment for the Class of 2000 15

3. Relative Positions of States for the 2000 Graduating Class for Average Combined SAT Score 18

4. Descriptive Statistics for Variables in the OLS Regression Models of Combined SAT Score for the National and Indiana Analyses 21

5. Variables Significantly Associated with SAT Scores in Indiana and the U.S. 24

6. Average Predicted Point Differentials on SATs Associated with Taking Advanced High School Courses in Indiana and the U.S. 25

7. Diploma Types and Minimum Requirements 27

8. Predicted SAT Point Differential Associated with Different Curricula 28

9. Breakdown of Enrollment Rates for Variables in Analyses of College Destinations 30

10. Summary of Multinomial Logistic Regression Analyses for Students in the Indiana 2000 Cohort 34

11. Statistical Association with Three Measures of Persistence for Academic and Financial Policy Variables 39

Appendices

A. Indiana Education Access Policies 48

B. The College Board Data and Variable Coding 51

C. The Indiana 2000 Cohort: Database and Variable Coding 53

D. Adjustment of State Rankings on SAT 56

E. Regression Analyses of Curricula and SAT Scores 57

F. Multinomial Analyses of College Destinations Using Indiana 2000 Cohort Database 59

G. Logistic Regression Analyses of Enrollment in Two-year Colleges 64

H. Analyses of Persistence by Students in the Indiana 2000 Cohort 65

References 83

Endnotes 86

INTRODUCTION

Indiana has become a national success story with respect to improving college access. In 1986, the state ranked 40th in the percentage of high school graduates who enroll in college; but by 2000, the year the cohort examined in this report entered college, the state ranked 17th (Mortenson, 2002). Two aspects of this remarkable turnaround are well documented. Prior publications have considered the roles of postsecondary encouragement (Hossler & Schmit, 1995; Hossler, Schmit & Vesper, 1999) and Indiana's Twenty-first Century Scholars and other student aid programs in promoting access (St. John, Hu & Weber, 2001; St. John, Musoba & Simmons, 2001; St. John, Musoba, Simmons & Chung, 2002). However, the role of curriculum reform in Indiana has not been previously examined. In addition to improving college access, high school curriculum reforms can have a sustained impact on academic success in college. In fact, in addition to financing colleges and college students, encouraging and facilitating academic preparation is one of the few policy initiatives available to states that seek to improve academic success beyond high school for their citizens.

College access can be influenced by two types of policy initiatives in states: efforts to improve curriculum, a strategy that improves opportunity for all students; and efforts to ensure affordability for low-income students who could not afford to attend without student aid. While efforts to improve academic preparation influence the success for most students, efforts to ensure affordability are also necessary to equalize opportunities among students who qualify for enrollment. While both of these state roles in promoting college access have a long history, few policy studies consider both state roles. While the focus of this report is on the state role in promoting academic

preparation, it also considers the role of financial aid because it simply is not valid to consider the role of curriculum in promoting college equal access without also considering the role of finances.

This report examines the roles of academic preparation and financial aid in the academic success of Indiana students in the high school class of 2000 using data provided by the College Board, along with other data on Hoosiers in the class of 2000 collected by Indiana agencies. It uses a distinctive approach to the study of academic success within states, as well as compares Indiana students to students in other states in the U.S. using a College Board national sample. The research approach used in this study can be replicated by other states that seek to assess the effect of their education and public finance policies on the academic success of their citizens.

INDIANA'S APPROACH TO IMPROVING ACADEMIC SUCCESS

Indiana's approach to improving college access merits national attention because it combines a comprehensive set of policies on graduation requirements and achievement standards; financial incentives to schools, colleges, and students; and encouragement for students in middle schools and high schools to prepare academically and to apply for financial aid and college admission. A summary of those policies is presented in Appendix A. An overview of Indiana's balanced access model and a review of trends related to the direct impact of education policies on academic preparation follow.

Indiana's Balanced Access Model

To understand the significance of the strategies used to improve college access and academic success of Hoosiers who go on to college, it is important to consider Indiana's strategies from a balanced perspective that considers

- Academic preparation in high school, including state requirements that all high school students have access to a college preparatory curriculum (Core 40) and an advanced (honor's) curriculum;
- Postsecondary encouragement through the Indiana Career and Postsecondary Advancement Center (ICPAC);
- Need-based state grant programs that provide financial incentives for all students to complete a preparatory or advanced curriculum; and
- A comprehensive program that guarantees adequate grants (i.e., state grants equaling public tuition) for 8th graders from low-income families

who take a pledge to prepare and stay drug free (the Twenty-first Century Scholars Program).

Indiana's balanced approach[2] to promoting academic success (see Figure, page 6) recognizes that there is a core pipeline to college, as advocated by the National Center for Education Statistics (NCES) in several publications (NCES, 1997a, 1997b, 2001a, 2001b), that includes

- Aspirations to enroll in college
- Academic preparation for college
- Taking college entrance exams
- Applying for college admission and student aid

In the 1990s Indiana had a well-developed set of policies that were designed to influence student progress through these steps toward college enrollment. Indiana's program had four direct linkages to this preparation process:

- The Twenty-first Century Scholars Program guarantees adequate grant aid to 8th graders in the federal free and reduced lunch program who take a pledge to prepare for college (Linkage 1).[3]
- In addition to Indiana's requirement that high schools provide access to the Core 40 and honors diplomas, the state funds incentives to high schools to graduate students with these diplomas (Linkage 2).
- ICPAC provides encouragement for students to plan for postsecondary education, to take preparatory curricula, to take college entrance exams, and to apply for student aid and college admission (Linkage 3).

- The state need-based grant programs provide financial incentives for students to complete a Core 40 or honors diploma (Linkage 4).[4]

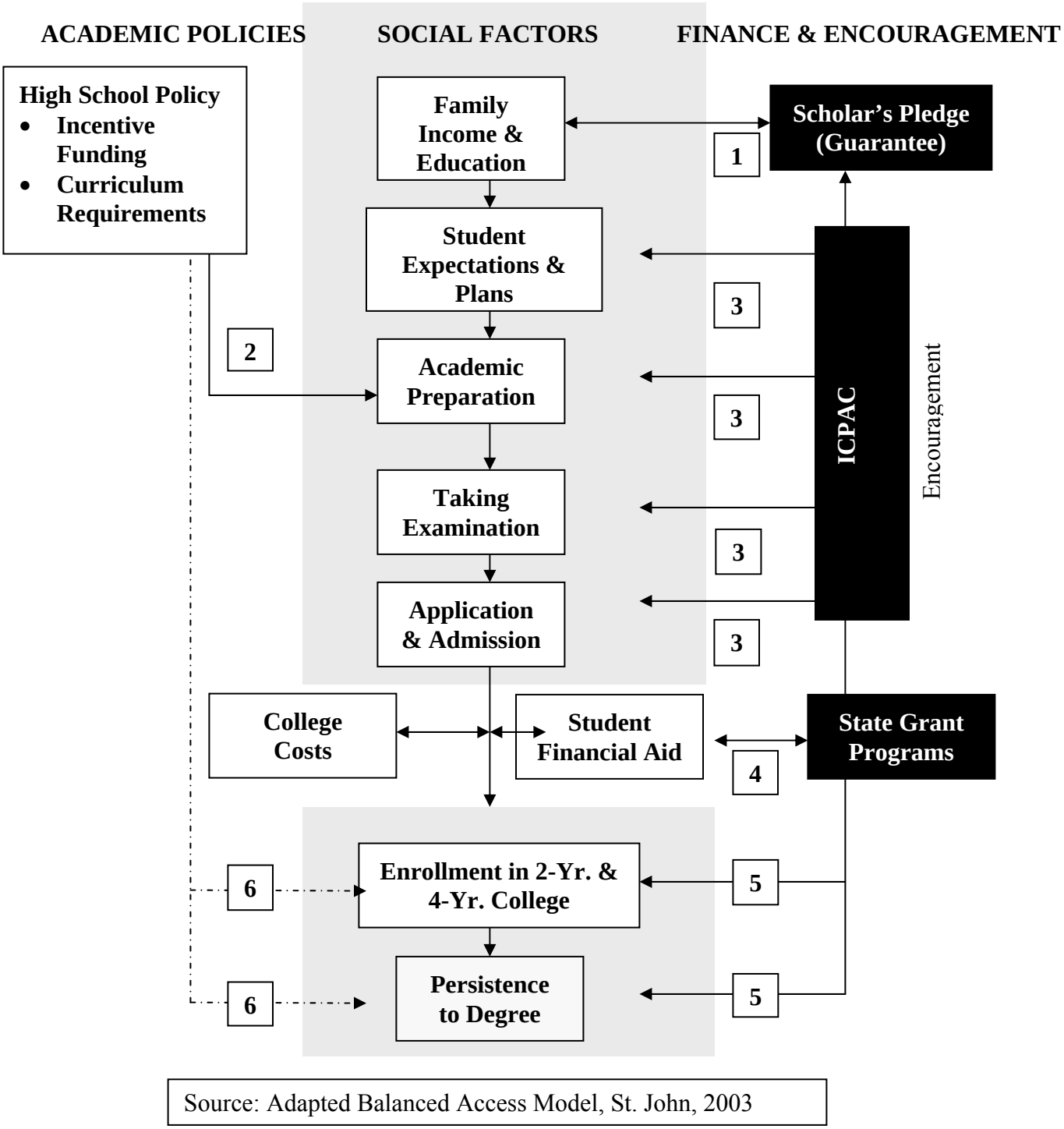
In addition to supporting preparation, Indiana's balanced approach to access encourages college enrollment and persistence through two linkages, one direct and the other indirect:

- State grant programs provide support for enrollment and persistence to students with financial need, a direct association (Linkage 5).
- State policy can affect the curricula students actually complete, which in turn can influence their college success, which means that state education policies have a potential sustained, but indirect, effect on college enrollment and persistence (Linkage 6).

The impact of high school curricula on college success is indirect because it is mitigated through college admissions decisions and academic experiences in college. Nevertheless, high school preparation can have an influence on success in college. Indeed, Linkage 6 is the focal point of the current study, since the impact of the other interventions has been extensively studied in Indiana.[5] More specifically, it is possible to build a database to track the effects of course taking, as an indirect indicator of the effect of state policy on high school curricula. However, we also examine the direct effects of state student aid policies, as a secondary focus.[6] It was necessary to control for the effects of student aid, including state grants, or our models would have been specified incorrectly and provided potentially biased estimates of the effects of preparation (Becker, 2004; Heller, 2004).

THE INDIANA MODEL

A Balanced Approach to College Access and Success



Is There a Link Between State Policy and Preparation?

This report provides analyses that examine the relationships between high school courses and achievement on college entrance examinations in Indiana and examines the impact of curricula on college choice and persistence. However, it is important to first consider the question: Does policy on high school curricula influence course taking, as posited in the hypothesized Indiana access model (Linkage 2 in the Figure)? A review of trends during the decade of the 1990s provides insight into this linkage, but it does not provide a basis for claiming a significant statistical association.[7] Indiana has a statewide postsecondary encouragement program and education policies (required graduation curriculum options, financial inducements for schools and students) that could influence students to complete a college preparatory or honors diploma and to take the SAT. These cohort analyses confirmed what was already known about relationships between high school courses and achievement on college entrance examinations.

Trends in diploma types (Table 1) reveal that the percentage of students completing a college preparatory curriculum has improved, as has participation on the SAT and, in the late 1990s, SAT scores. Improvement in the percentage of students completing a preparatory or honors curriculum could have had an influence on SAT scores, a hypothesis that can be tested with College Board data.

From these trends it is not possible to confirm linkages between specific education and finance policies in Indiana and the improvement in preparation-related outcomes. Although there is substantial reason to reach this conclusion, it is not possible to discern the causes for the increase from these trends—whether the education requirements, school funding, and encouragement had an effect. It cannot be entirely

coincidental, because schools must offer preparatory curricula for students to complete these courses. While the extent to which specific policies influenced these shifts remains uncertain, it is possible to examine the effects of the curricula on SAT scores of high school students and college success for those who enroll in the state higher education system.

Table 1. Trends in Indiana K-12 Education Success[8]

Graduation Year	Percentage Core 40 Diplomas*	Percentage Honors Diplomas	Percentage Participation in SAT	Average SAT Score
1990				972
1991		8	57	970
1992		9		973
1993		10	61	974
1994		12	60	981
1995		13	58	986
1996		14	57	988
1997		15	57	991
1998	43	19	59	997
1999	49	21	60	994
2000	55	24	60	999
2001	58	26	60	1000

*Core 40 was legislated in 1994, so the first graduating class was 1997-98.
SAT participation rates were unavailable for 1990 and 1992.

The analyses that follow explore the specific linkages between high school curricula and student outcomes. In addition to examining state rankings on SAT scores, we examine how curricula relate to SAT scores, college destinations, and persistence, controlling for background and other factors known to influence these outcomes.

STUDY APPROACH

To assess the impact of high school curricula, it is important to build an understanding of how the state compares to other states in the U.S. This report summarizes two sets of descriptive statistics and regression analyses. The first set examines statistical associations between high school courses and SAT scores and also considers related analyses of state rakings on SAT scores. The second set of analyses focuses on the relationships between high school curricula and college enrollment and persistence. Detailed tables on these analyses are appended for interested readers.[9] The methods used for the comparisons and analyses of the association between academic preparation and academic success are summarized below.

A Comparison of Indiana and the U.S.

The first set of analyses in this study examines the association between the preparatory courses students took in high school and their SAT scores,[10] an outcome that could be compared between Indiana and a national sample. We examine similarities and differences between course-taking patterns among SAT-takers in Indiana and the U.S. population, as well as consider how SAT scores in Indiana compare to other states, making adjustments for participation rates. This comparison establishes the comparability between the Indiana case study and the U.S. as a whole. The first set of analyses used College Board questionnaires for all Indiana public high school students in the class of 2000 and a national sample of public high school students who completed the detailed questionnaires on the SAT in the same year. (See Appendix B for a discussion of the College Board databases and coding of this data.)

Two sets of comparisons are made between Indiana and the U.S. with respect to SAT scores. First, we present summative analyses of the association between high school courses and SAT scores. These analyses examine the association between different types of advanced courses and SAT scores. The detailed tables are attached to this report, while the text presents representative descriptive statistics and summarizes measures of association. This approach provides educators and policymakers with reliable information on appropriate measures of association. Ordinary least squares (OLS) regression was used to examine test scores, using model specifications described in Appendix B. OLS regression is an appropriate method of analysis for continuous outcome measures like SAT scores.

Second, we used several methods of adjusting average state SAT scores for variability in participation rates. Research documents that high SAT participation rates in states are associated with lower state average test scores (Powell & Steelman, 1996). However, making statistical adjustments for participation rates only modestly changes the ranking of most states. We used the national sample of students and our regression analyses of these students as a basis for one set of adjustments. We also used analyses of state-level data files to illustrate an alternative method of adjustment.

In addition to providing information for other states, these comparisons provide a basis for understanding the implications of the analyses of the Indiana cohort for the national sample. There is no comparable national database for tracking students, but other states can replicate or extend the methodology we used in this study.

The 2000 High School Graduate Cohort

The second set of analyses in this report examines the associations between high school curricula—preparatory (Core 40) and honors—and academic success in college, focusing on the statistical relationship between the type of diplomas completed and the types of colleges attended and persistence in college during the first two years of college. These analyses involved developing a database that tracked students from their senior year into Indiana public and private colleges. All public colleges and most private colleges[11] participated in the data collections. These analyses add to the general understanding of the statistical association between family background, curriculum, achievement in high school, and SAT scores with where students enrolled within Indiana's higher education system. Since it was not possible to examine enrollment of students who attend out-of-state institutions and students who did not enroll, these analyses do not represent a study of whether or not students enroll in college. Rather, they examine the transitions between high school and college within a state system. Second, we also examined persistence by students in the 2000 cohort during the first two years after high school, using multiple measures of persistence.

The 2000 cohort of Indiana students was developed expressly for this study from data provided on public high school students by the College Board and information on college enrollments provided by collaborating organizations in Indiana (Appendix C). These analyses represent the first state-level analysis of the transition between high school and college for a cohort of students. The analyses of persistence along with patterns of enrollment provide a reasonably comprehensive statewide picture of educational progress from high school through college.

Analyses of college enrollment compared students who enrolled in different types of four-year colleges to students who enrolled in two-year colleges. These analyses used a multinomial logistic model because multiple comparisons were made. Logistic regression analyses were used to examine student persistence in college, an appropriate approach when dichotomous outcomes are compared. The logistic regression analyses of persistence considered three outcomes equivalent to three definitions of persistence: 1) persistence from the first term to the second term of the freshman year (within-year persistence), 2) enrollment in both the spring term of the first year and the fall term of the second year (between-year persistence), and 3) enrollment for each term during the first two years after high school (continuous persistence). These analyses used logistic models with single comparisons of dichotomous variables, comparing students who persisted to those who did not. Students who continued their enrollment within the state system, i.e., transfers within Indiana were counted as persisting.

Limitations

Using appropriate statistical methods and logical models, we were careful to control for family finances and financial aid, variables that did not receive adequate consideration in recent national studies (Becker, 2004; Heller, 2004). However, there are still potential sampling errors associated with the analysis of panel surveys (Becker, 2004), since the variables being analyzed are not random treatments. Students make choices about their high school courses; courses are not randomly assigned to them. Also, there is variability in the availability of honors courses in different locales (St. John et al., 2002), and students were not randomly assigned to high schools.

The current arguments about statistical methods, including random assignment and experimental design, substantially confound attempts to use generally accepted statistical methods with panel surveys—either state or national databases. It is important that these debates continue and that further analyses be conducted. However, in the interim, policy analysts should use proven methods and sound logic, informed by generally accepted theory and extant research. Our statistical models, discussed in the appendices, were developed based on extensive reviews (St. John, 2003; St. John, Asker & Hu, 2001; St. John, Cabrera, Nora & Asker, 2000; St. John, Kline & Asker, 2001).

Given these considerations, especially the need to refine the methodologies used in statistical research on education, we are cautious to describe these analyses as statistical measures of association. They establish relationships between curricula students completed in high school and a sequence of outcomes (SAT scores and college destinations and persistence in the state system). These analyses provide a reasonable assessment of the academic pathways model that has developed in Indiana. However, we stop short of making causal inferences from these analyses for the reasons noted above.

Further, the analyses were limited to public high school students. The database from the College Board for Indiana included only students in public schools, an artifact of the data agreement for the project,[12] whereas the national random sample included students who attended different types of schools. Therefore, we selected only public high school students from the national database, so we would have a better comparison group.[13] However, because of this limitation, our analyses do not consider all high school students in Indiana or the U.S.

PREPARATION AND TEST SCORES
A Comparison of Indiana to the Nation

There is substantial evidence that taking college entrance examinations (i.e., ACT and/or SAT) and having a moderate to high score on these exams is associated with enrollment in four-year colleges (NCES, 1997a; St. John, 1991). One possible way for colleges to expand college enrollment is to encourage more students to take these tests. In Indiana, the Indiana Career and Postsecondary Advancement Center along with high school counselors encourage students to take the PSAT and the SAT. However, while we might expect that increasing participation in the SAT (or the ACT) would improve college enrollment rates, it is also possible that increases in SAT taking could reduce rankings on SAT scores, an indicator occasionally used to make judgments about the quality of state education systems.

SAT Participation and College Enrollment

For the high school class of 2000, there was a strong set of relationships between taking the SAT and PSAT and college enrollment rates (see Table 2). The percentage of high school students in a state that take the SAT is negatively associated to the state average score. Indiana has a higher than average participation rate on the SAT, while it ranks lower on the state average score. Indiana encourages more students to take the SAT, therefore potentially lowering its average score (Powell & Steelman, 1996). The SAT, or other college admissions test, is one step in the process of college admissions for traditional-age students. While there are concerns about the overemphasis on test scores in admissions, college admissions offices use the SAT as a national benchmark to

compare students from different schools, and this is expected to continue until a better assessment is available (Gose, Selingo & Brownstein, 2001). While class rank and high school grades also predict college success, Bridgeman, McCamley-Jenkins, and Ervin (2000) reported an adjusted correlation of .52 between SAT scores and college first-year grades.

Table 2. Indicators of Test Taking and College Enrollment for the Class of 2000

	HS Graduation Rate	College Enrollment Rate for HS Grads	Percentage HS Seniors Who Took the SAT
Indiana Percentage	68 %	60	60%
Indiana Rank	36	17	15
U.S. Percentage	67%	57	44%

*Percentage is of juniors (an additional 27% of sophomores take the PSAT).
Source for HS grad and college enrollment data: Mortenson Postsecondary Opportunity Newsletter at http://www.postsecondary.org/archives/Reports/Spreadsheets/Public%20High%20School%20Graduation%20Rates%20by%20State.htm
Source for SAT and PSAT data: http://www.collegeboard.com

There is a difference between participation and achievement. The fact that SAT exams and most other tests are norm referenced means that higher participation rates on the tests are often associated with lower test scores. Yet, as noted above, higher participation rates on the SAT are positively correlated with college enrollment rates. This leaves a challenge for states: As they make efforts to expand participation rates in tests and college, they can expect to have lower state average scores as an artifact of more students taking these exams.

In Indiana, the average SAT score increased in the 1990s, while the exam participation rate remained relatively stable. Therefore, it is possible that changes in the percentage of students completing preparatory curricula (Core 40 and honors) improved SAT scores.

Adjusting State SAT Scores for Participation

The correlation between participation rates on the SAT and average SAT scores, coupled with multivariate studies that indicate statistical association (Powell & Steelman, 1996), also raises questions about how the rankings of states on SAT scores should be undertaken. Since there is not an agreed-upon adjustment method, we compared two methods of adjusting participation rates; one used national indicators in a state-level database, and the other used the national College Board individual student record database. With each data set, we made adjustments based on demographic characteristics of the populations; then we also added participation rates. The rankings using the adjustment methods are compared in Table 3, with Indiana indicated in **bold**. (See Appendix D for a discussion of adjustment methods). The relative positions for Indiana are

- 43 for the unadjusted state average reported by the College Board
- 35 with adjustments using demographic indicators and participation rates from a state-level data set
- 36 with adjustments for student background, using analyses of student files for public high school students
- 33 with adjustments for background and state participation rate, using student files for public high school students.

Indiana's relative position among states on the average SAT score improves using any of these adjustments. Considering the emphasis these rankings get in comparing state education systems, despite the College Board's warnings, it is important to consider the meaning of those rankings in light of the adjustments. From the perspective of

educators in Indiana, it is noteworthy that the state score ranked 33rd for public high school students for the class of 2000. However, other states may choose to emphasize other ranking schemes.

Table 3. Comparison of Relative Positions of States for the 2000 Graduating Class for Average Combined SAT Score Based on Predicted Values from Regression Models with Two National Data Sets

	National state average data set		National individual level random sample data			
Position	**Actual position published by College Board for 2000**	**Predicted position based on state demographics and participation rate**	**Actual position based on public high school students in the random sample**	**Predicted position based on student demographic info regression**	**Predicted position based on student demographic info & SAT participation rate regression**	**Position**
1	North Dakota	Minnesota	Wisconsin	Minnesota	Minnesota	1
2	Iowa	Iowa	North Dakota	Kansas	Kansas	2
3	Wisconsin	South Dakota	Iowa	Wisconsin	Wisconsin	3
4	Minnesota	North Dakota	Minnesota	Wyoming	Iowa	4
5	South Dakota	Wisconsin	Illinois	Iowa	Utah	5
6	Kansas	Kansas	South Dakota	Utah	North Dakota	6
7	Illinois	Missouri	Kansas	Illinois	Wyoming	7
8	Missouri	Utah	Missouri	North Dakota	South Dakota	8
9	Utah	Nebraska	Mississippi	Nebraska	Nebraska	9
10	Nebraska	Illinois	Utah	South Dakota	Illinois	10
11	Michigan	Michigan	Nebraska	Kentucky	Arkansas	11
12	Oklahoma	Wyoming	Louisiana	Idaho	Missouri	12
13	Louisiana	Kentucky	Arkansas	Missouri	Kentucky	13
14	Arkansas	Oklahoma	Kentucky	Arkansas	Oklahoma	14
15	Tennessee	Colorado	Michigan	Oklahoma	Idaho	15
16	Alabama	Tennessee	Wyoming	Michigan	Michigan	16
17	Mississippi	Arkansas	Montana	Colorado	Louisiana	17
18	Kentucky	Alabama	Alabama	Montana	Tennessee	18
19	New Mexico	Idaho	Oklahoma	Ohio	New Mexico	19
20	Wyoming	Ohio	Tennessee	West Virginia	Montana	20
21	Montana	Louisiana	Idaho	Vermont	West Virginia	21
22	Idaho	Montana	Ohio	Tennessee	Ohio	22
23	Ohio	Mississippi	Colorado	New Mexico	Alabama	23
24	Colorado	West Virginia	Washington	New Hampshire	Mississippi	24
25	Washington	New Mexico	Oregon	Washington	Colorado	25
26	Oregon	Washington	Arizona	Oregon	Arizona	26
27	Arizona	Nevada	New Mexico	Alaska	Nevada	27
28	New Hampshire	Arizona	New Hampshire	Louisiana	Alaska	28
29	West Virginia	Alaska	Alaska	Arizona	Washington	29
30	Alaska	Oregon	West Virginia	Connecticut	Oregon	30
31	Nevada	New Hampshire	Vermont	Massachusetts	Vermont	31
32	Massachusetts	California	Massachusetts	Maine	New Hampshire	32
33	Vermont	Massachusetts	Maine	Rhode Island	**Indiana**	33
34	Connecticut	Maryland	Connecticut	Nevada	Hawaii	34
35	Maryland	**Indiana**	Nevada	Alabama	Maine	35
36	California	Virginia	California	**Indiana**	Rhode Island	36
37	New Jersey	Vermont	Rhode Island	Mississippi	Massachusetts	37
38	Virginia	Connecticut	New Jersey	Pennsylvania	California	38
39	Hawaii	Maine	Maryland	Hawaii	Pennsylvania	39
40	Rhode Island	Rhode Island	New York	New Jersey	Connecticut	40
41	Maine	Hawaii	Virginia	Virginia	Texas	41
42	New York	Florida	**Indiana**	New York	Virginia	42
43	**Indiana**	Texas	Pennsylvania	North Carolina	Florida	43
44	Florida	Pennsylvania	Florida	Maryland	North Carolina	44
45	Delaware	Delaware	Texas	California	Maryland	45
46	Pennsylvania	North Carolina	North Carolina	Delaware	Delaware	46
47	Texas	New Jersey	Georgia	Florida	New Jersey	47
48	North Carolina	Georgia	South Carolina	Texas	Georgia	48
49	Georgia	New York	Hawaii	Georgia	South Carolina	49
50	South Carolina	South Carolina	Delaware	South Carolina	New York	50

Curricula and SAT Scores

The balanced access model—developed based on reviews of the literatures on access and persistence in sociology, economics, and K-16 education (St. John, 2002, 2003)—provides a basis for discerning the variables that are associated with SAT scores.[14] First, we compare the composition of test takers in Indiana to the national sample, using appropriate associated variables, followed by a summary of the regression analyses.

SAT Takers in Indiana Compared to the U.S.

While a higher percentage of SAT takers in Indiana and the U.S. are female, in both data sets around 54%, there are modest differences in the demographics in Indiana compared to the U.S. (Table 4):

- Indiana had lower percentages of African Americans and Hispanics than the U.S., both in the percentage of SAT takers (Table 4) and in the population.
- A higher percentage of Indiana SAT takers were from homes in which English was the first language (98% in Indiana compared to 93% in the U.S.).
- A higher percentage of Indiana SAT takers had parents who had two-year degrees (31% compared to 27%), reflecting efforts to expand participation in the SAT more than the presence of a population with two-year degrees.
- Indiana SAT takers were also more likely to be from rural locales and less likely to be from cities or suburbs, reflecting success of ICPAC's outreach

as well as the state's population distribution (Hossler, Schmit & Vesper, 1997).

- Indiana SAT takers were more likely to aspire to a bachelor's degree (31% compared to 23%) and less likely to aspire to an advanced degree, reflecting both the fact that Indiana is an SAT state (a factor that depresses the average score) and that efforts have been made to increase postsecondary awareness (a force that increases SAT taking and college participation rates).

Table 4. Descriptive Statistics for Variables in the OLS Regression Models of Combined SAT Score for the National and Indiana Analyses

Variable	Category	National Percentage	Indiana Percentage
Gender	Female ©	55.2	54.6
	Male	44.8	45.4
Race/ethnicity	All other races/students ©	81.0	92
	African American	10.7	5.8
	Hispanic American	8.3	2.2
Home Language	English as only or first language ©	92.6	98.4
	English is not student's first language	7.4	1.6
Parent Education	Parents are high school graduates or no response ©	23.3	26.8
	Parents did not finish high school	3.8	1.7
	Parents' highest ed is 2 year degree	26.8	31.2
	Parents' highest ed is BA degree	20.2	19.1
	Parents' highest ed is graduate ed	25.8	21.2
Family Income	Middle income ($30-70,000) ©	34.8	43.5
	Family income is less than $30,000	19.3	15.1
	Family income is above $70,000	25.8	25.8
	No family income reported	20.1	15.7
Locale	Suburbs/town/no response ©	55.7	51.6
	Large/medium-sized city	32.5	26.9
	Rural area	11.8	21.5
Postsecondary Aspirations	Student aspires to a bachelor's degree ©	23.3	30.5
	Student did not respond regarding aspirations	10.4	8.4
	Student was undecided regarding aspirations	16.4	16.9
	Aspires to an AA/certificate/other	3.2	4.6
	Aspires to a master's degree	27.7	24.8
	Aspires to a doctoral degree	19.0	14.7
GPA	B grade point average ©	43.8	47.4
	C or lower GPA	11.6	18.8
	A GPA	36.7	28.1
	No reported GPA	7.9	5.7
Class Rank	The lower 90% ©	82.3	83.2
	Student has top 10% class rank	17.7	16.8
Prior Testing	Student had not taken the PSAT ©	27.9	26.9
	Took the PSAT exam prior to the SAT	72.1	73.1
Math	Student's highest math course was Algebra II or lower ©	38.6	44
	Precalculus or trigonometry	40.0	37
	Calculus	21.4	19
Science	Student did not take physics ©	55.3	59.2
	Student took high school physics	44.7	40.8
History	Student took no honors courses in history ©	72.7	87.6
	One history honors course	11.6	8.1
	Two or more history honors courses	15.7	4.3

Table 4 continues on the next page.

Table 4. (cont.) Descriptive Statistics for Variables in the Regression Models for the National and Indiana Analyses			
Variable	**Category**	**National Percentage**	**Indiana Percentage**
English	Student did not take honors ©	65.0	73.6
	Student took honors English	35.0	26.4
Literature	Student did not take historical literature ©	55.1	58.7
	Student took literature from different historical periods	44.9	41.3
Foreign Language	Student took three or less years ©	64.8	66.5
	Student took four or more years of foreign/classical language	23.4	21.3
	Student did not take any foreign/classic language	2.8	5.4
	Student did not respond regarding f/c language	9.0	6.8
Classical Language	Student did not take Latin ©	49.5	59.3
	Student took Latin in high school	6.8	5.8
	Student did not respond regarding Latin courses	43.7	34.9
Academic Index	20 or more years of study in six academic subject areas ©	37.4	37.9
	19-19.5 years of study	10.4	10.3
	18-18.5 years of study	9.2	8.8
	17-17.5 years of study	7.4	6.9
	16-16.5 years of study	5.5	6.1
	15-15.5 years of study	4.2	4.6
	15 years of study	6.1	8.7
	No response on number of years of study	19.8	16.7
Degree Type	Regular diploma ©	36.5	39.8
	Core 40 but not honors diploma	30.7	29.4
	Honors diploma	13.0	14.1
	Missing diploma type coursework data	19.8	16.7
		Mean	**Mean**
	Combined SAT verbal and math score	1014.1	997.6
	State SAT participation rate	58.1	
	Number of cases	74311	35137

There were also modest differences in preparation. A lower percentage of the SAT takers in Indiana had A-grades (28% compared to 37%) and, conversely, a higher percentage had C-grades or lower (19% compared to 12%), a reflection of the efforts to expand participation in the SAT. In addition, the percentages of students taking more advanced math and science coursework were higher in the national sample than the Indiana sample. Similarly, students in the national sample were more likely to have taken honors coursework in history and English and more likely to have taken an advanced literature course.

Associations Between Curricula and SAT Scores

The regression analyses of the association between curricula and SAT scores (Appendix E) provide information about the association between background and SAT scores, as well as between curricula and SAT scores. The analyses considered the influence of high school curricula in two ways—as individual courses and as types of curricula (college preparatory and honors compared to regular)—controlling for background. Below, we review the associations between background and SAT scores before examining the three types of curricula.

Student background. The statistical relationships between background variables and SAT scores were similar in Indiana and the U.S. In general the same variables had positive and negative associations for both groups in all of the regression analyses with the exception of the geographic locale variable. There was not a significant difference between cities and suburbs or towns in the Indiana model, but they were significantly different in the national sample. Table 5 presents the variables that were positively and negatively associated (Alpha .01) with SAT scores in Indiana and the U.S. Further, these patterns are consistent with decades of research on the SAT:

- Students from underrepresented minority groups have lower SAT scores than Whites and Asians.[15]
- Students from high-income families and families with high levels of parent degree attainment also had higher scores.
- Higher academic aspirations were also associated with higher scores, along with unreported or undecided aspiration.

- High school grades, high class rank, and having taken the PSAT were associated with higher scores.
- Students from urban and rural locales were less likely to score well on the SAT.

Table 5. Variables Significantly Associated with SAT Scores in Indiana and the U.S.

Positively Associated with SAT Scores	Negatively Associated with SAT Scores
Male (vs. female)	
	African American (vs. White and other)
	Hispanic (vs. White and other)
	English not primary language in the home (vs. English primary language in the home)
Parents w/ two-year degree (vs. parents w/ high school)	Parents did not finish high school (vs. parents w/ high school)
Parents w/ BA (vs. parents w/ high school)	
Parents w/ graduate degree (vs. parents w/ high school)	
Family income over $70K (vs. income of $30-70K)	Income less than $30K (vs. income of $30-70K)
No income reported (vs. income of $30-70K)	
	Urban locale (vs. town/suburban locale)
	Rural locale (vs. town/suburban locale)
No response on aspirations (vs. aspire to BA/BS)	Aspire to AA degree (vs. aspire to BA/BS)
Undecided aspiration (vs. aspire to BA/BS)	
Master's aspiration (vs. aspire to BA/BS)	
Doctoral aspiration (vs. aspire to BA/BS)	
A-grades (vs. B-grades)	C-grades (vs. B-grades)
No GPA reported (vs. B-grades)	
Top 10% class rank (vs. lower rank)	
Took PSAT (vs. did not take PSAT)	

These patterns of relationships are already well established in the research literature (Burton & Ramist, 2001; Camara & Schmidt, 1999; College Entrance Examination Board, 1998; Jencks & Phillips, 1998; Pallas & Alexander, 1983; Rothstein, 2002; Stricker, Rock, Pollack & Wenglinsky, 2002; Young, 2001), so there were not surprises in Indiana or the U.S. for the 2000 high school cohort. Nevertheless, we needed

to control for these statistical associations when we examined how curriculum variables were associated with SAT scores.

Associations Between High School Courses and SAT Scores

Most analyses of high school preparation focus on advanced math courses. These current analyses examined the influence of more types of advanced courses[16] in a single equation, controlling for background as noted above (see Table 6, below, based on Appendix E).

Table 6. Average Predicted Point Differentials on SATs Associated with Taking Advanced High School Courses in Indiana and the U.S., Controlling for Background and Achievement Variables

		SAT Differential Controlling for Background	
Courses	**Comparison Group**	**U.S.**	**IN**
Pre-calculus/Trigonometry	Algebra II or less	55	54
Calculus	Algebra II or less	109	96
Physics	No physics	25	26
1 Honors history	No honors history	32	30
2+ Honors history	No honors history	42	36
Honors English	No honors English	38	40
Literature/Historical period	No historical literature	32	29
4+ yrs of foreign/Classical language	1-3 yrs. study	38	20
No foreign/Classical language	1-3 yrs. study	-61	-59
No response on language	1-3 yrs. study	31	12
Latin	No Latin	31	8
No response on Latin	No Latin	4	NS
R^2 for full model		0.54	0.54

These analyses reveal that advanced math courses, especially calculus compared to taking algebra II or less, was associated with a substantial SAT point differential. Students who took calculus scored, on average, 109 points higher than students who did not take math coursework beyond algebra II. However, most other types of advanced courses were also associated with improved SAT scores. For example, in the U.S. sample, taking four

or more years of foreign/classical languages was associated with a plus 38 SAT point differential, compared to one to three years, while no foreign/classical languages had a negative point differential of 61 points. The total spread in SAT points associated with the range between no foreign/classical language and four or more years was about 100 points.

These analyses lead to a related hypothesis: packaging courses into different diploma types—the combinations of courses related to college preparatory and honors diplomas—could also be associated with improvements in SAT scores. This question is examined below in the second analysis.

Association Between Diploma Types and SAT Scores

The diploma options in Indiana differentiate the regular diploma from the Core 40 (college preparatory) and honors diplomas based on the number and types of advanced courses students take (see Table 7). The Core 40 requires more advanced courses in math, science, English, and social studies than the regular diploma. The honors diploma requires an additional seven advanced academic courses with further criteria for which courses. We used these course structures to classify the students' self-reported high school courses that appeared in the Student Descriptive Questionnaire.[17] Students were classified into the three diploma categories, or program types: regular, college preparatory, and honors, and one additional category for missing information. The regression analyses (Appendix E, Table E.2) compared honors and college preparatory diploma curricula to the regular.

Table 7. Diploma Types and Minimum Requirements

Subject Area	General Diploma	College Preparatory Diploma (Core 40)	Honors Diploma
English/ Language Arts	8	8: Literature, Composition, and Speech	8: Literature, Composition, and Speech
Mathematics	4: Algebra I or Integrated Math I	6-8: Algebra I and II and Geometry	8: Algebra I and II, Geometry, and more advanced math, such as Calculus, Trigonometry, or AP Statistics
Social Studies	4: U.S. History, U.S. Government, and other	6: US History, US Government, World History or Geography, Economics, and other	6: U.S. History, U.S. Government, and credits in World History, Geography, or Economics
Science	4: More than one area of science represented	6: Laboratory in Biology I, Chemistry I, Physics I, or more advanced	6: Laboratory in Biology I, Chemistry I, Physics I, or more advanced
Foreign Language		Can be part of the 8 "other areas"	6 -8: must include 6 credits in one language or 4 each in two languages
Fine Arts		Can be part of the 8 "other areas"	2: Visual or Performing Arts
Other Areas	2: Above subjects or technology competency	8: Either more advanced in above subjects, or in computers, or a career/technical area	
Physical Education and Health & Safety	1: In each	1: In each	1: In each
Electives	16	2-4	9
Total Credit Hours	**40**	**40**	**47**
College Access	Eligible for regular admission at 2-year campuses and some four year	Eligible for regular admission at a 4-year public campus, recommended by 2-year campuses	Eligible for regular admission at a 4-year public campus, recommended by 2-year campuses

The analysis confirms that, controlling for background and achievement, students who complete the Core 40 have higher predicted SAT scores than students with regular diplomas (by 37 points in the U.S. and by 31 points in Indiana). Further, the differentials were even greater for students taking honors diploma coursework (see Table 8). However, it should also be noted that the final model R^2 for curriculum types was lower than for specific courses. In other words, controlling for different courses predicted the overall SAT score slightly better than the model using curriculum packages. However, both models explained a substantial portion of the variance in scores.

Table 8. The Predicted SAT Point Differential Associated with Different Curricula, Controlling for Background and Achievement, for Students in the Class of 2000 in Indiana and the U.S.

Diploma Curriculum Type (compared to regular)	Point Differential U.S.	Point Differential IN
Core 40/ Not honors	37	31
Honors	96	75
Not reported	10	10
R^2 full model	0.47	0.47

ACADEMIC SUCCESS

The Indiana Case

How did academic preparation influence college success for students who graduated from Indiana high schools in the class of 2000[18] and enrolled in public and private colleges in the state? This question could be addressed with the database constructed from the College Board data and Indiana college student records (Appendix C). After reviewing descriptive data on college transition patterns for students in this high school class, the relationships between academic preparation, receipt of aid, and student success indicators are examined below.

The College Transition

The enrollment breakdown for Hoosiers in the class of 2000 going on to Indiana colleges and universities[19] is presented in Table 9. As noted (on the bottom line of the table), the enrollment was distributed across different types of institutions:

- 20% enrolled in public two-year colleges
- 16% enrolled in private colleges
- 25% enrolled in the two research university campuses (main campuses of IU and Purdue)
- 8% enrolled in the major public urban university campus (IUPUI)
- 17% enrolled in regional campuses of the two state systems (other IU and Purdue campuses)
- 14% enrolled in the three state universities (Ball State, Indiana State, and University of Southern Indiana).

Table 9. Breakdown of Enrollment Rates for Variables in Analyses of College Destinations

Variable	Category	College Destination											
		State Universities		Regional Campuses		Urban University		Research Universities		Private		2-Year ©	
		N	Row %	N	Row %	N	Row %	N	Row %	N	Row %	N	Row %
Composite Gender	Male	2,221	13.3	2,607	15.6	1,206	7.2	4,382	26.2	2,551	15.2	3,777	22.6
	Female ©	2,943	15.2	3,423	17.7	1,560	8.1	4,711	24.3	3,298	17.0	3,437	17.7
	Missing ©	2	8.3							14	58.3	8	33.3
Composite Ethnicity	Native American	22	15.4	35	24.5	14	9.8	24	16.8	18	12.6	30	21.0
	Asian Amer. Pac. Is.	31	6.0	58	11.1	74	14.2	252	48.4	71	13.6	35	6.7
	African American	366	16.7	324	14.7	275	12.5	379	17.3	262	11.9	591	26.9
	Hispanic American	67	8.4	298	37.4	45	5.6	182	22.8	95	11.9	110	13.8
	White ©	4,607	15.1	5,228	17.2	2,304	7.6	8,128	26.7	5,264	17.3	4,909	16.1
	Other	46	14.2	66	20.4	31	9.6	109	33.7	25	7.7	46	14.2
	Missing	27	1.6	21	1.2	23	1.3	19	1.1	128	7.4	1,501	87.3
Composite Parent Income Level	Low (below $30,000)	938	14.1	1,118	16.8	534	8.0	1,138	17.1	1,071	16.1	1,855	27.9
	Mid ($30-70,000) ©	1,997	15.7	2,362	18.5	987	7.8	2,844	22.3	2,112	16.6	2,433	19.1
	High (over $70,000)	1,805	16.0	1,498	13.3	803	7.1	3,992	35.5	2,077	18.5	1,077	9.6
	Missing	426	7.7	1,052	19.1	442	8.0	1,119	20.3	603	11.0	1,857	33.8
Composite Parent Education Level	Middle/Jr. HS or less	46	13.6	80	23.6	35	10.3	42	12.4	29	8.6	107	31.6
	High school	1,845	16.6	2,265	20.4	985	8.9	2,176	19.6	1,427	12.8	2,430	21.8
	College or beyond ©	2,775	16.4	2,510	14.8	1,228	7.3	5,611	33.2	2,544	15.0	2,247	13.3
	Missing	500	6.4	1,175	15.1	518	6.7	1,264	16.3	1,863	24.0	2,438	31.4
Composite Locale	City	1,278	16.8	831	10.9	958	12.6	2,137	28.1	949	12.5	1,447	19.0
	Suburban and town ©	2,157	14.3	3,138	20.8	997	6.6	4,199	27.8	2,168	14.4	2,427	16.1
	Rural	1,520	16.5	1,478	16.1	556	6.0	2,336	25.4	1,431	15.6	1,878	20.4
	Missing	211	5.0	583	13.7	255	6.0	421	9.9	1,315	30.9	1,470	34.5
Composite High School Diploma	Honors	1,763	17.7	940	9.4	396	4.0	4,426	44.3	2,102	21.1	354	3.5
	Core 40	2,733	23.0	2,335	19.6	1,217	10.2	2,936	24.7	1,256	10.6	1,421	11.9
	Regular or missing ©	670	4.7	2,755	19.3	1,153	8.1	1,731	12.1	2,505	17.6	5,447	38.2
Composite High School GPA	A	1,210	15.8	697	9.1	349	4.5	3,655	47.6	1,542	20.1	224	2.9
	B ©	2,666	19.8	2,516	18.7	1,177	8.8	3,722	27.7	1,722	12.8	1,636	12.2
	C or lower	978	15.7	1,409	22.6	621	10.0	733	11.8	733	11.8	1,755	28.2
	Missing	312	3.5	1,408	16.0	619	7.0	983	11.2	1,866	21.2	3,607	41.0
Composite SAT Scores	High	1,184	13.3	763	8.5	425	4.8	4,154	46.5	2,169	24.3	231	2.6
	Mid ©	2,020	19.1	1,700	16.1	896	8.5	3,470	32.9	1,636	15.5	832	7.9
	Low	1,514	18.1	2,013	24.0	892	10.6	1,101	13.1	989	11.8	1,870	22.3
	Missing	448	5.4	1,554	18.8	553	6.7	368	4.4	1,069	12.9	4,289	51.8
Dependency Status	Indeterminate status ©	997	8.2	2,781	22.7	872	7.1	3,036	24.8	1,667	13.6	2,880	23.5
	Self-supporting	102	12.2	147	17.6	102	12.2	62	7.4	57	6.8	367	43.8
	Dependent ©	4,067	17.6	3,102	13.4	1,792	7.8	5,995	26.0	4,139	17.9	3,975	17.2
Aid Packages	Grants only	1,265	12.3	1,708	16.6	829	8.0	2,151	20.9	2,111	20.5	2,245	21.8
	Loans only	871	21.0	800	19.3	373	9.0	1,393	33.6	59	1.4	656	15.8
	Grants and loans	1,176	16.9	678	9.7	389	5.6	2,142	30.7	1,813	26.0	777	11.1
	Other packages	492	21.2	121	5.2	64	2.8	487	21.0	1,039	44.7	121	5.2
	None ©	1,362	11.0	2,723	22.0	1,111	9.0	2,920	23.6	841	6.8	3,423	27.6
Total		5,166	14.3	6,030	16.7	2,766	7.7	9,093	25.2	5,863	16.2	7,222	20.0

© is the reference category in regression.

Compared to other states, a high percentage of high school graduates enrolled in four-year colleges. However, the community college system in Indiana is still under development, which means that the percentage going to two-year campuses will likely increase for future cohorts. In fact, the community college system expands the network of options for students who experience academic difficulty at four-year campuses.[20] It is also important to consider the background characteristics, preparation, and aid packages for students who enroll at different types of campuses.

It is important to note that students from low-income families and from families that had parents who had not graduated from high school enrolled in two-year colleges at higher rates. This is consistent with national descriptive analyses reported by NCES (1997a, 2001a, 2001b; Choy, 2002). However, as noted below, these correlations are not significant in the ways implied in the NCES analyses, which have been used to argue that parents' education is one the major determinants of enrollment in four-year colleges (Choy, 2002). The relationship between parent education and college access is more complex than indicated in these earlier studies. Future research should distinguish between types of four-year institutions as this study did. While students whose parents did not attend college were less likely to attend private, research, or state universities than two-year institutions, there was not a significant difference based on parent education between regional four-year institutions and two-year colleges in Indiana. Access to those campuses that typically require on-campus residential living may be different than access to less traditional four-year institutions. This suggests that Indiana's postsecondary encouragement program is working for students whose parents did not attend college, that the regional four-year campuses in Indiana have been more accessible, or that the

adequacy of aid has removed the barriers for first-generation students. Indeed, it is important to understand the roles of preparation and financial aid in both the transition to college and persistence in college.

With respect to the role of academic preparation, Table 9 reveals a strong association between curricula and enrollment in four-year colleges. More than a third of the students who had regular diplomas (versus one of the college preparatory diplomas) enrolled in community college, indicating students who are underprepared are also more likely to enroll in two-year colleges (since only 20% of the population enrolled in two-year colleges). The percentages of students with regular diplomas who enrolled in private colleges, the urban university, and the regional universities were nearly equal to the percentage of the population who enrolled in these institutions. And the percentages of students with advanced diplomas at these campuses were high, compared to their enrollment rates (the bottom line of the table). Put simply, students who completed advanced curricula enrolled in four-year colleges at higher rates than they did in two-year colleges. However, there were also differences in the distribution of students with respect to grades and SAT scores. Students with high scores had higher rates of enrollment in research universities and state universities. So it is important to untangle how different aspects of academic preparation—curricula, grades, and test scores—relate to the types of opportunities students have after high school.

In addition, there is a statistical relationship between student aid packages and college enrollment. Of the full- and part-time students who did not receive an aid package, 28% enrolled in two-year colleges. Since 33% of the population that did not have income reported (and therefore we know they did not apply for student aid[21])

attended two-year colleges, it appears community colleges in Indiana could do more to encourage traditional-age students to apply for aid. In addition, it is interesting to note that a low percentage of the students enrolled in two-year colleges had work-study, indicating limited access to campus-based programs through Title IV of the Higher Education Act.

What Variables Were Associated with College Destinations?

Much has been made of the role of high school preparation and family background in the recent literature on college access (e.g., Choy, 2002), but the role of financial aid has been largely overlooked by these scholars. There is a clear need for better balance in assessment methods, especially with the difficult decisions states face with respect to crafting policies that promote college access (St. John, 2003). The analysis of enrollment destinations in Indiana provides evidence about the role of family background, academic preparation, and financial aid in providing opportunities to enroll in four-year colleges, as compared to enrollment in two-year colleges.

The multinomial logistic analysis summarized in Table 10 (see also Appendix F) provides substantial insight into the factors that influence enrollment in four-year colleges and especially the role of variables that can be influenced by state policy (e.g., high school diplomas and student aid). The associations of variables related to background, preparation, and finances are summarized. In addition, an analysis of enrollment in two-year colleges, compared to enrollment in four-year colleges, is appended (Appendix G).

Table 10. Summary of Multinomial Logistic Regression Analyses for Students in the Indiana 2000 Cohort: Comparing Students Enrolled in Different Types of Four-Year Colleges to Students Enrolled in Two-Year Colleges

Variables and Coding		Statistical Association				
Variable	Comparison Group	State U	Region U	Urban U	Research U	Private U
Male	Female	Neg.	Neg.	Neg.	Neg.	Neg.
Native American/Other	White	NS	NS	NS	NS	Neg.
Asian American	White	NS	Pos.	Pos.	Pos.	Pos.
African American	White	NS	NS	NS	Pos.	Neg.
Hispanic American	White	NS	Pos.	NS	Pos.	NS
No race reported	White	Pos.	Neg.	Neg.	Neg.	Neg.
Low income	Middle income	NS	NS	NS	NS	Neg.
High income	Middle income	Pos.	Pos.	Pos.	Pos.	Pos.
No income reported	Middle income	Pos.	Pos.	Pos.	Pos.	Neg.
Parents ed. H S or less	Some college or more	Neg.	NS	NS	Neg.	Neg.
Parents ed. missing	Some college or more	Pos.	NS	NS	Pos.	Pos.
City locale	Suburb/town	Pos.	Neg.	Pos.	Pos.	NS
Rural locale	Suburb/town	Neg.	Neg.	Neg.	Neg.	Neg.
Missing locale	Suburb/town	Pos.	Neg.	Pos.	Pos.	Pos.
Honors diploma	Regular or missing	Pos.	Pos.	Pos.	Pos.	Pos.
Core 40 diploma	Regular or missing	Pos.	Pos.	Pos.	Pos.	Pos.
A average	B average	Pos.	Pos.	Pos.	Pos.	Pos.
C average or lower	B average	Neg.	Neg.	Neg.	Neg.	Neg.
Missing GPA	B average	Neg.	NS	NS	Neg.	NS
High SAT	Mid SAT	Pos.	Pos.	Pos.	Pos.	Pos.
Low SAT	Mid SAT	Neg.	Neg.	Neg.	Neg.	Neg.
Missing SAT	Mid SAT	Neg.	Neg.	Neg.	Neg.	Neg.
Self supporting	Family support	NS	Neg.	NS	Neg.	Neg.
Grants only	No Aid	Pos.	NS	Pos.	NS	Pos.
Loans only	No Aid	Pos.	Pos.	Pos	Pos.	Neg.
Grants & loans	No Aid	Pos.	NS	Pos.	Pos.	Pos.
Other pages (CWS)	No Aid	Pos.	NS	Pos.	Pos.	Pos.

Model indicators: R^2 (.556), Model X^2 (27,958), % Correctly predicted (46%)

NS = Not significant at .05, Pos. = Positive (.05 or .01), Neg. = Negative (.05 or .01)

Family Background

Other than for gender, there was not a consistent pattern of relationships between family background and enrollment in four-year colleges compared to two-year colleges. Males were consistently less likely than females to enroll in four-year institutions, controlling for other variables included in the model. Asian American students were generally more likely to enroll in four-year institutions than White students, with the exception of state universities. Underrepresented minorities had not significantly different or higher chances of enrolling in public four-year colleges than in two-year colleges. However, Native Americans and African Americans had lower odds of enrolling in private college than in public two-year colleges, controlling for other variables. Similarly, low-income aid applicants' chances of enrolling in public four-year colleges were not significantly different from middle-income students who applied for aid, but they had lower odds of enrolling in private colleges. Students who applied for aid from high-income families were more likely to enroll in four-year colleges than middle-income aid applicants. Having parents who were high school graduates or less reduced the chances of enrolling in state universities, research universities, and private colleges. However, parents' education was not a significant factor for enrollment at regional campuses or the urban university compared to two-year institutions.

Thus, social-class-related variables were not strong sorting criteria in Indiana, possibly because of the confluence of strategies that aim to promote college access. Only parents' education was significant in educational sorting, controlling for other variables, but only for colleges that typically required on-campus residential living in the first year of college (i.e., state universities, research universities, and private colleges). It is

possible that families with lower levels of prior education placed less value on going away to college; but these families had similar access to regional campuses and community colleges. While there were significant differences between high- and middle-income students, there were generally not significant differences between middle- and low-income students, with the exception of access to private college, suggesting that differences are in choices at the high end of the socioeconomic scale rather than access for low-income students.

Academic Preparation

Preparation variables were significantly associated with enrollment in all types of four-year colleges.

- Completing honors or Core 40 diplomas improved the odds of enrolling in four-year colleges compared to regular high school diplomas.
- Having A-grades in high school improved the odds of enrolling in four-year colleges over having B-grades.
- Having C or lower grades in high school reduced the odds of enrolling in four-year colleges compared to having B-grades.
- Having high SAT scores improved the odds of enrolling in four-year colleges compared to having mid-range SAT scores, while receiving low SAT scores or not taking the SAT[22] actually reduced the odds of going to a four-year colleges.

These findings show that, at least in Indiana, the process is more complex than portrayed in some texts which suggest that taking the entrance exam is a necessary step for attending a four-year college.[23] High scores on the SAT and high grades were associated with attending four-year colleges. The odds ratio for not taking the SAT was of larger magnitude than the odds ratio for GPA-A or honors diploma in deciding that test taking did make a difference. Yet taking the SAT and receiving a low score was associated with lower odds of enrolling in four-year colleges. Achievement on the test had a positive association with enrollment in four-year colleges, but taking the test per se did not. In contrast, controlling for these achievement variables, completing one of the preparatory curricula made a difference, since both diploma variables were positively associated with enrollment in all types of four-year colleges. Thus, it is important to consider curriculum as a preparatory milestone, but using this as a criterion is misguided, as others have argued (Becker, 2004; Heller, 2004).

Student Financial Aid

All types of student financial aid packages were either positively associated with enrollment in public four-year colleges compared to two-year colleges, or did not have a significant association with these outcomes. Put another way, student aid in Indiana improved the odds of enrolling in public four-year colleges.[24] However, loans as the only form of aid the student receives was negatively associated with enrollment in private colleges, while all other types of packages had a positive association. This suggests that grant aid was especially important in ensuring access to private colleges for students who made applications for student financial aid.

These analyses indicated that student financial aid was sufficient to ensure access to four-year colleges in Indiana. The Twenty-first Century Scholars program, the state grant program, and other government and institutional aid, in combination, improve opportunity for low-income students to enroll in four-year colleges. However, as is evident from analyses of enrollment in two-year colleges, low-income students who enroll were more likely to enroll in two-year colleges than four-year colleges. Thus there was evidence of unequal financial access to four-year colleges in Indiana.

Policy Variables and College Persistence

The analyses of persistence consider the association of variables related to student background, preparation, type of college attended, college major, college achievement, and financial aid package (see Appendix H), focusing on persistence within the state system.[25] The analyses considered three persistence outcomes:

- *Within-year*: Persistence from the first term to the second term of the first year.
- *Between-year*: Persistence from the spring term of the first year to the fall term of the sophomore year.
- *Continuous*: Persistence through each term of the first two years of colleges after enrollment.

Since this report is concerned primarily with the role of academic preparation and the direct effects of student financial aid, the summary (see Table 11) includes only variables related to these policy initiatives.[26] Readers interested in all of the variables in the model can refer to the full set of analyses (Appendix H).

Academic Preparation

Both types of preparatory curricula—the honors diploma and Core 40 diploma—were positively associated with persistence, using all three persistence measures. This provides substantial evidence that high school curricula have sustained effects on success in college.

Table 11. Statistical Association with Three Measures of Persistence for Academic and Financial Policy Variables

		Statistical Associations with Persistence		
Variables	**Comparison Group**	**Within-Year**	**Between-Year**	**Continuous**
Preparation Variables				
Honors diploma	Regular diploma	Positive	Positive	Positive
Core 40 diploma	Regular diploma	Positive	Positive	Positive
High school A-grades	B-grades	NS	Positive	Positive
High school C or lower	B-grades	NS	Negative	Negative
Missing GPA	B-grades	Negative	NS	Negative
High SAT	Mid SAT	NS	NS	NS
Low SAT	Mid SAT	NS	NS	NS
Missing SAT	No SAT	NS	Positive	Positive
Financial Aid Variables				
Grants only	No aid	Positive	Negative	NS
Loans only	No aid	Positive	Negative	NS
Grants & loans	No aid	Positive	Negative	NS
Other (with CWS)	No aid	Positive	Negative	NS

See Appendix H for the full models (full set of variables and model statistics).

However, SAT scores do not show a consistent pattern of relationship with persistence. In fact, compared to having an average SAT score, not taking the SAT was positively associated with first-to-second year persistence and continuous enrollment. Yet, while high school grades were not predictive of persistence within the first year, they were positively associated with on-going persistence. Students with A-grades in high school were more likely to persist to the second year and to be continuously enrolled than students with B-grades in high school; and having low grades in high school (C or lower),

compared to having B-grades, was negatively associated with persistence beyond the first year. Curricula were consistently associated with success in college while achievement variables (test scores) were not significant. The bottom line is this: Providing students with the opportunity to prepare for college by taking challenging courses in high schools is associated with academic success in college.

Student Financial Aid

In addition to having an influence on where students have the opportunity to enroll—and attending four-year colleges makes a difference in persistence (see Appendix H)—student financial aid had a direct association with persistence. All types of financial aid packages were positively associated with persistence through the freshman year, but most were negatively associated with returning the next year. Thus, packages that were adequate for students during the first year were not sufficient to motivate returning the next year. Financial aid packages that only included grants were positively associated with continuous enrollment—sustaining enrollment across two years—while grants combined with loans had a negative association.[27]

These relationships merit further exploration, especially with analyses of the role of prices. However, from our analyses it appears that some students who need loans as well as grants did not have sufficient financial resources to maintain continuous enrollment. If college tuition rises, it will be important to continue making a sufficient investment in grants for low- and middle-income students and, perhaps, to extend loan limits.

THE ROLE OF POLICY IN ACCESS

These analyses of academic preparation add substantially to the general understanding of the role of public policy in promoting college access and success. They also provide further evidence of the efficacy of the balanced approach to access that has evolved in Indiana. Not only did Indiana make substantial improvement in its rank among states in college enrollment rates in the 1990s, but there is strong evidence that public policies played a major role in this transformation. Evidence related to the six linkage structures identified in the balanced access model (Figure, page 6) is summarized below, with an explicit focus on understanding the role of academic preparation that emerged from this study.

Linkage 1: Scholars Grants Reduce Concerns About Finances for Low-Income Families

Previous studies have established that the Twenty-first Century Scholars program improves the chances of enrollment in both two-year and four-year colleges for low-income students (Musoba, 2004b; St. John, Musoba, Simmons & Chung, 2002). This study extends these findings, providing evidence that low-income students have opportunity to enroll in four-year colleges (Table 10, page 34) and to persist (Appendix H). Low family income compared to middle income was generally not significantly associated with enrollment or persistence. However, since low-income students were more likely to enroll in two-year colleges than middle-income students (Appendix H), it is not possible to conclude equal access has been achieved in Indiana.

However, there is evidence that the state's promise in the Scholars program is being maintained: low-income students who take the pledge to prepare receive supplemental student aid (St. John, Musoba, Simmons & Chung, 2002). However, there are still students in Indiana who do not take the steps to prepare (Musoba, 2004b), so it is important to further improve encouragement efforts in the state.

Linkage 2: Requiring High Schools to Offer Preparatory Curricula Improve Preparation

The reviewed trends (Table1, page 8) provided prima facie evidence related to this linkage. The percentages of students who complete both types of preparatory curricula has increased in Indiana. While information provided through ICPAC might have stimulated this increased demand for advanced courses, students would not be able to complete these curricular options if they were not available in their schools. Requiring high schools to offer these courses and providing additional financial support to schools to encourage these options appears to be working in Indiana. There is evidence that school funding is positively associated with SAT scores (Musoba, 2004a; Powell & Steelman, 1996) and high school graduation rates (St. John & Associates., in preparation). However, experimentation with funding incentives or types of analyses might be needed to provide mathematical proof of this linkage for school funding.

This study also examined the linkage between academic preparation and SAT scores. There was a clear, positive association between completing the honors and Core 40 courses—in Indiana and the U.S.—and SAT scores (Table 8, page 28). Further, the analyses of enrollment indicated high SAT scores were associated with enrollment in

colleges (Table 10, page 34) as well as with persistence in college (Table 11, page 39). Confirming the linkage between state policies and preparation is more difficult to establish, however.

Linkage 3: Encouraging Students to Prepare and Apply for Student Aid Improves Preparation

This report adds to the descriptive evidence that encouragement seems to work, a point made by others who have examined Indiana and the role of public information (Hossler & Schmit, 1995; Hossler, Schmit & Vesper, 1997). The trends reviewed in this report (Table 10, page 34) add to the descriptive evidence related to this linkage. Further study of this policy linkage may be helpful, but it is difficult to establish proof of this linkage mathematically without an *experiment* that withheld information from some students (control group).

Linkage 4: Financial Aid Improves Enrollment, Including in Four-Year Colleges

There is already substantial evidence that state grants play an important role in improving access in Indiana (Musoba, 2004b; St. John, Musoba, Simmons & Chung, 2002). This study adds further evidence for that by indicating aid packages in Indiana were positively associated with enrollment in all types of four-year colleges. Specifically, this study found that there were not significant differences for low- and middle-income students in the chances of enrolling in public four-year colleges compared to public two-year colleges. However, low-income students had significantly lower odds

than middle-income students of enrolling in private colleges and were more likely to enroll in two-year colleges than four-year colleges in the statewide analysis. So, substantial progress toward removing access barriers was evident in Indiana, but it is important to continue efforts to improve affordability at four-year colleges for low-income students.

Linkage 5: Financial Aid Improves Persistence

In addition to its direct association with enrollment in public four-year colleges (Table 10, page 34), financial aid in Indiana has an indirect effect on persistence because students enrolled in most types of public four-year colleges have substantially higher odds of persisting, compared to peers enrolled in two-year colleges (Appendix H). However, financial aid also had a significant direct association with persistence by students in the 2000 cohort, especially during the first year (Table 11, page 39). The results raise a question about whether the amount of grants and loans available is adequate over the long term for students who need both types of aid. Therefore, given rising tuition charges in Indiana, there is continued need for research on the impact of state grants and financial aid packages.

Linkage 6: Offering Preparatory Curricula to High School Students Improves the Odds of Success in College

This policy linkage is both direct and indirect: High school curricula directly influence preparation and preparation (represented by curriculum types) is associated

with persistence. This linkage is well established by this study, at least for the Indiana 2000 cohort. The analyses of college destinations established that the preparatory curricula were associated with enrollment in four-year colleges (Table 10), while the persistence analyses confirmed the association with success in college (Table 11).

IMPLICATIONS

The analyses of the role of academic preparation in Indiana confirmed that high school curricula have significant associations with achievement, as measured by test scores, as well as with college enrollment and persistence. In addition, student financial aid had a direct association with enrollment in four-year colleges and persistence by Indiana students in the high school class of 2000. Further, in Indiana—a state that uses available policy mechanisms to encourage preparation and that provides substantial student financial aid—low-income students did not differ significantly from middle-income student with respect to enrollment in four-year colleges. But there were significant differences, especially related to the opportunity to enroll in private colleges and over representation in community college, controlling for preparation. So progress toward equal opportunity was evident in Indiana even if all financial barriers had not been removed. In addition, low parents' education did inhibit enrollment in colleges and universities that emphasized residential experiences, but did not inhibit enrollment in regional four-year campuses, compared to enrollment in community colleges. This study also indicates that the combination of policies used in Indiana substantially improved academic preparation and college success.

The policies used in Indiana indicate that a comprehensive and cohesive approach to education and finance policies can improve academic preparation and academic success in college for state residents. The Indiana strategy includes financial incentives for high schools to offer preparatory curricula, as well as for students to complete these programs. ICPAC provides information to students, encouraging them to prepare and apply, both for admission and student aid. In addition, the state grant program has grown

to keep pace with rising tuition charges (National Association of State Student Grant and Aid Programs, 2004).

There is reason to expect that the Indiana's balanced approach to college access and success would work well in other states. First, as noted in the analyses of preparation in this study, the relationship between academic preparation and SAT scores evident in Indiana were also evident for the national sample of high school students. Encouraging students to complete preparatory curricula and providing financial incentives to schools and students appears to help. In addition, there is evidence from recent analyses of financial access that need-based grant aid can improve high school graduation and college enrollment rates (St. John, Chung, Musoba, Simmons, Wooden & Mendez, 2004). Not only is there evidence of success with efforts to improve college access in Indiana, but there is a research base for hypothesizing that a similar comprehensive, cohesive approach would improve access in other states.

APPENDIX A

Indiana Education Access Policies

K-12 Academic Policies

Honors Diploma. The Indiana Academic Honors Diploma was enacted in 1987 to recognize students who had taken 47 credits in rigorous academic subject areas, including language arts, social studies, mathematics, science, foreign language, fine arts, health and safety, and physical education. All Indiana high schools are required to offer the honors diploma. As of 1997, students who graduate with an Academic Honors Diploma and with a cumulative grade point average of at least 3.0 may qualify for a state grant premium of 100 per cent of demonstrated need for approved tuition and mandatory fees. This is slightly higher than the 90% of need met for students with Core 40 (preparatory curriculum) and 80% for student with regular diplomas. (Indiana Administrative Code 511 IAC 6-7-6.5).

Incentive Funding for Honors Diplomas. In order to increase participation in the honors program and support school costs to offer the honors diploma, the state provides a bonus ($800 in the 1997 budget) in the school funding formula for each student who earns an honors diploma.

Dual Enrollment. In 1987, the Indiana General Assembly adopted a postsecondary enrollment program, under which 11th and 12th graders could enroll in courses at institutions of higher education. (IC 20-10.1-15).

Raising Curriculum Requirements. After 1988, a minimum of 38 credits was necessary for high school graduation with 22 required in the academic core. Beginning with students who enter high school in the 2000-2001 school year, the minimum was 40 credits with 24 in the academic core. (Indiana Administrative Code 511 IAC 6-7-6.5).

Incentive Funding for Advanced Placement. In 1990, the Indiana Department of Education began covering the cost of Advanced Placement (AP) exams for students who have taken the required College Board AP coursework (in biology, chemistry, physics, calculus, environmental science, statistics, and English language and composition) and the cost of teacher training to teach these courses. This program was implemented to encourage students to pursue a more rigorous and demanding course of study in high school. Since 1994, Indiana has required all schools to provide AP math and science courses. (IC 20-10.1-22)

Core 40 Diploma. In February 1994, the State Board of Education and the Commission for Higher Education jointly adopted the Core 40 initiative to better prepare high school students for college. The Core 40 identifies the minimum coursework in academic subjects for admission to college. Two-year institutions recommend Core 40 for admission and most four-year institutions require it for regular admission. As of 1998, students who graduate having met prescribed Core 40 requirements and with a cumulative grade point average of at least 2.0 may qualify for a state grant premium of

90% of demonstrated need for approved tuition and mandatory fees. Students who do not meet these criteria (i.e., receive a regular diploma) receive 80% of demonstrated need for tuition and mandatory fees.

High School Graduation Qualifying Exam (GQE). The GQE was given for the first time to the Class of 2000 in their sophomore year (1997) as a requirement to receive a high school diploma. It was determined that all graduates should demonstrate ninth-grade competency in English and mathematics. In 1999, HB1050 tightened the graduation examination requirements and required all students to take the exam in tenth grade. (IC 20-10.1-16-13)

Standards and Accountability. Schools with low percentage passing rates on the high school graduation exam are awarded additional funding in the school funding formula.

Higher Education Academic Policies

Regional Campuses. Prior to the 1990s, Indiana's higher education access plan was based on the development and availability of regional campuses with a four-year campus within driving distance of any community.

Transfer and Articulation. Public Law 19 from the Acts of 1992 mandated transfer of 30 semester hours of general education courses among public institutions in Indiana. The 1994 progress report confirmed that the ten, three-hour courses (totaling 30 semester hours) identified by the institutions in fulfillment of the P.L. 19-1992 mandate did, in fact, transfer among all Indiana public institutions, with the exception of Ivy Tech colleges, the two-year technical colleges at the time.

The committee on statewide transfer and articulation was established by the commission under the transfer and articulation initiative of March 1, 2000, to facilitate the movement of students with college credits between higher education institutions. The committee was to develop statewide transfer agreements and statewide agreements for articulation for associate of arts and science programs to bachelor's degree programs. (Subsequent assignment from House Enrolled Act 1209 signed in 2003.)

Community College System. Indiana established a community college system as a partnership of Vincennes University and Ivy Tech State College to offer associate's degrees and college transfer coursework at all the two-year campuses. Courses were first offered in 2000. *As added by P.L.273-1999, SEC.203.* (IC 20-12-75-4).

Higher Education Finance and Postsecondary Encouragement Policies

Frank O'Bannon Grants (HEA and FOC Grants). The Frank O'Bannon Grant (formerly the Indiana Higher Education Grant) Program is a need-based grant program with grants targeted to tuition and regularly assessed fees. HEA grants fund students at

public Indiana institutions while the Freedom of Choice (FOC) Grant facilitates enrollment at private institutions. The State Student Assistance Commission was founded in 1965 to administer state grants.

ICPAC. The Indiana Career and Post-secondary Advancement Center (ICPAC) was created in 1986 by the Indiana General Assembly to encourage, educate, and support the education and career development of all Hoosiers. Currently, ICPAC is transforming into Indiana's P-16 education portal with information for parents, students, counselors, and others.

Twenty-first Century Scholars Aid Guarantee and Encouragement. The Scholars program began in 1990 as a scholarship and encouragement program for low-income Hoosiers. Scholars enroll in the program in eighth grade and promise to graduate from high school; refrain from alcohol, illegal drugs, or criminal activity; earn a 2.0 grade point average; and enroll full time in college. In exchange, students are guaranteed the cost of four years of college tuition at any participating public college or an amount comparable to that at a private institution in Indiana. The Scholars program was designed to raise educational aspirations and provide opportunity for low-income students. In 1995, the first group of Scholars started college. The addition of the Gear Up Summer Scholarship provided summer grants for underprepared students. (IC 20-12-70).

Part-Time Grant. As of 1991, degree-seeking part-time students are eligible for the part-time grant program to encourage degree completion. Grants are awarded each enrollment term to students earning less than 12 credit hours. The part-time grant is a need-based award and was needed because the HEA and FOC were not available to part-time students. (P.L.166-1991, SEC.5; IC 20-12-22.1-8).

College Choice Plan (formerly the Family College Savings Plan). Developed in 2001, the College Choice 529 Investment Plan, was renamed in 2002 and adjusted to conform to federal statutes. (P.L.15-2001, SEC.1. HB1273–changes).

APPENDIX B

The College Board Data and Variable Coding

Data

National individual level SAT taking sample. Educational Testing Services, by way of the Indiana Commission for Higher Education, provided a random sample of 100,000 US test takers from the 2000 cohort. Of the 100,000 cases, 5,497 elected not to complete the student descriptive questionnaire and were removed. In addition, 2,943 cases did not have an identified state of residence and were removed. In telephone conversation with staff at ETS and their staff member's casual look at the data, it was learned that many of these were international test takers or students living outside the U.S. An additional 465 students were from US territories or had military addresses (AA AE AP AS GU MP PR VI) and were removed, leaving 91,095 public and private high school test takers. Of those, 74,311 were identified as attending public high schools.

Indiana individual level SAT taking cohort. Educational Testing Services by way of the Indiana Commission for Higher Education provided a dataset of the Indiana public high school graduates from the graduating class of 2000 who took the SAT. There were 33,448 useable cases of the initial 35,137 students in this database.

Variable coding

In these analyses the following independent variables from the SAT data were analyzed (not all variables were in all models):

- Males were compared to females.

- A design set of dummy variables for African Americans, Hispanics, Asian Americans, Native Americans, students who identified themselves as other race, and students who did not respond to the race question were compared to Whites.

- Students whose primary home language is a language other than English were compared to students whose only or primary language is English.

- A design set of variables regarding levels of parents' education was created using a combined variable of the highest level of mother's or father's education. Students with parents who did not finish high school, parents who had a two-year degree, parents with a bachelor's degree, or parents with a graduate education were compared to students whose parents had high school diplomas and students who did not respond to the question.

- Students from low income families (less than $30,000) students from high income families (above $70,000) and students who did not report their family income were compared to students from middle income families (between $30,000 and $70,000).

- Students from large or medium sized cities and students from rural areas were compared to students from towns, suburban communities, and students who did not respond to the question.

- A design set of dummy variables was created to compare students' educational aspirations after high school. Students who aspired to a master's, doctoral, or associate of arts degree as well as students who responded undecided or did not respond were compared to students who aspired to a bachelor's degree.

- High school coursework in mathematics was categorized into a design set of variables representing three levels of mathematics education. Students who had taken precalculus and/or trigonometry and students who had taken calculus in high school were compared to students whose highest math course was algebra II or lower.

- Students who had taken high school physics were compared to students who had not, as a measure of science preparation. Coursework in biology and chemistry was prevalent among students in the sample; therefore, physics was selected as the best distinguishing measure of someone who had additional science study.

- A design set of variables based on students' high school grade point average compared students with A and C or lower grades, as well as students who did not report their grade point average, against students with B-grades.

- Students who ranked in the top 10% of their high school class were compared against all other students in the sample.

- As a rough measure of practice effect, preparation, or sophistication in the college preparation process, students who had taken the PSAT prior to taking the SAT were compared to students who had not taken the exam. The College Board did not provide data on whether a student had taken the SAT prior to this administration.

- The percentage of students in a state taking the SAT was matched to the individual cases from that state. This variable was left as a continuous variable in the regression models.

- Students who had the coursework to meet the Indiana criteria for an honors or Core 40 diploma were compared to students who only had the coursework for a regular diploma.

APPENDIX C

The Indiana 2000 Cohort: Database and Variable Coding

College enrollment data. The Indiana Commission for Higher Education (ICHE) Student Information System (SIS) provided the college enrollment data for all students enrolled in Indiana public colleges and universities in the 2000-01 and 2001-02 school years. The Independent Colleges of Indiana consortium provided parallel data for most of the students attending private colleges in Indiana in the same years.

Additional data. The State Student Aid Commission of Indiana provided application and award information for Indiana students which was combined with college reports of aid provided through the ICHE. School locale information was collected from the Indiana Department of Education Web site.

Variable coding. In these analyses the following independent variables were analyzed when analyzing college destinations, major choice and persistence.

- Students enrolling in state universities, regional campuses, the urban university, research universities, and private colleges were compared to students enrolling in two-year colleges.

- The wide array of college majors were collapsed into 11 categories, and the students who had declared a major were compared to undecided students.

- Students above and below the mean SAT score by one-half a standard deviation and students who did not take the SAT were compared against students in the mid-range of scores.

- Students with college grades of A and C or lower as well as students with missing grades were compared to students with B-grades.

- Remedial coursework in college was classified as in mathematics only, in language arts only, or coursework in both. These categories were compared to students with no remedial coursework.

- Students enrolled full time in their first semester were compared to part-time students.

- Students who lived in on-campus university housing were compared to students who lived off campus, either with parents or in another living situation.

- Students who were classified as self supporting for financial aid purposes (a small group in this traditional-age population) were compared to students who were dependent or for whom their status was missing.

- Student financial aid was classified into four categories: those students who received grants but not loans, those who received loans but not grants, those who received both grants and loans, and those students who received neither but did receive some other form of financial aid (usually work-study). These categories of students were compared against students who received no financial aid.

Data sampling.

- Only students who graduated from Indiana high schools in 2000 were selected (no out-of-state college students in all analyses).

- Students enrolled only in summer sessions were excluded.

- Several private colleges were deleted from the between-year and continuous enrollment persistence analyses because data from those campuses was incomplete for the second (2001) year. These campuses were included in the within-year persistence analyses because the first-year data (2000) was complete.

- Students who did not earn credits in their first semester of the persistence time frame were not considered in the three persistence analyses (fall for the within-year persistence analyses, spring for the between-year persistence analyses, and fall or spring [whichever was the first for the student] for the continuous enrollment analyses). Therefore the difference in the sizes of the samples is related to the enrollment in the first semester of consideration

Regression Analyses. Data from these multiple sources was matched on individual identifiers, primarily social security number. When data was available from multiple sources, the source judged most reliable or with the most complete data was used as the primary source and supplemented with the secondary sources (see Table C.1). Identifiers were removed before analysis.

Table C.1. Data Sources for the Cohort of Students Graduating from High School in 2000 and Starting College the Following Year
(The data file marked in bold was the primary source for this variable.)

	SIS*	SSACI**	SDQ***
College campus first year	**X**		
Major in freshman year	**X**		
Persistence in college	**X**		
Gender	**X**	X	X
Ethnicity	X		**X**
Parent income	X	**X**	X
Parent education		**X**	X
Locale (HS)	X		**X**
HS diploma type	**X**	X	X
HS GPA	X	X	**X**
SAT score	X		**X**
College first year GPA	**X**		
Remedial coursework in first year	**X**		
Delayed enrollment to spring	**X**		
Dependency status/self supporting	**X**		
Financial aid packages	**X**	X	

*Two years of SIS data (2000-1, 2001-2) provided by the Indiana Commission for Higher Education.
** Two years of financial aid and award data (2000-1, 2001-2) provided by the State Student Assistance Commission of Indiana.
*** Student Descriptive Questionnaire and SAT scores (for students graduating from high school in 2000) provided by the College Board.

Analyses included ordinary least squares regression models for the combined SAT score outcome, multiple regression models for the college destinations outcome, and logistic regression analyses for the persistence outcomes.

APPENDIX D

Adjustment of State Rankings on SAT

The two sets of actual SAT state averages in Table 3 are the first and third column of rankings. The first are the actual rankings based on all students in each state and were taken from the College Board website. The second set of actual SAT state averages was based on the random national sample of 74,311 public high school test takers. There are subtle differences in the two actual rankings columns because of the smaller sample and the inclusion of private high school students in the College Board rankings.

The adjustments to the state rankings using the individual level national data file were the average of the predicted values for each participant based on their values for the independent variables placed in the regression equation. In other words, using the coefficients from the regression, a predicted SAT score was calculated for each student in the data and the average of the students became the state average.

The first set of predicted values (fourth column of rankings) based on the student sample data adjusted the rankings using the regression equation with only the demographic characteristics of the students in each state. The second set of rankings (fifth column) based on the student sample adjusts for both the demographic characteristics and the percentage of students in each state that takes the SAT (the SAT participation rate).

The adjustments to the state rankings (column two) using a different data set that had state-level averages rather than individual-level data follows the same procedure of substituting the values on the independent variable for each case (in this instance the state) into the regression equation to get a predicted state average SAT score. Then the states were reordered based on their predicted values when taking into account the state demographics and participation rate.

APPENDIX E: Regression Analyses of Curricula and SAT Scores

Table E.1. Advanced Coursework Analyses: National and Indiana Individual Regression of Combined SAT Score for All Students with the Full Set of Background and High School Course Variables

	National			Indiana		
Variables	Unstand. Beta	Stand Beta	Sig	Unstand. Beta	Stand Beta	Sig
Male	49.00	1.06	***	56.63	0.16	***
African American	-101.09	1.77	***	-107.98	-0.14	***
Hispanic American	-58.34	2.01	***	-22.81	-0.02	***
English is not student's first language	-30.55	2.12	***	-64.39	-0.04	***
Parents did not finish high school	-31.63	3.02	***	-13.03	-0.01	*
Parents' highest ed is 2 year degree	15.00	1.58	***	13.72	0.04	***
Parents' highest ed is BA degree	35.95	1.73	***	33.18	0.07	***
Parents' highest ed is graduate ed	58.73	1.71	***	46.58	0.11	***
Family income is less than $30,000	-23.52	1.54	***	-5.87	-0.01	**
Family income is above $70,000	16.69	1.39	***	6.25	0.02	***
No family income reported	27.05	1.63	***	21.10	0.04	***
Large/medium-sized city	-20.74	1.17	***	-6.50	-0.02	***
Rural area	-28.31	1.65	***	-17.30	-0.04	***
Student did not respond regarding aspirations	32.07	2.36	***	25.55	0.04	***
Student was undecided regarding aspirations	27.01	1.64	***	17.69	0.04	***
Aspires to an AA/certificate/other	-26.37	3.05	***	-26.34	-0.03	***
Aspires to a master's degree	19.08	1.45	***	18.29	0.04	***
Aspires to a doctoral degree	35.54	1.66	***	32.70	0.07	***
State SAT participation rate	-0.35	0.03	***			
C or lower GPA	-44.60	1.74	***	-55.22	-0.12	***
A GPA	51.99	1.39	***	60.39	0.15	***
No reported GPA	68.33	2.56	***	34.71	0.04	***
Student has top 10% class rank	62.97	1.64	***	62.54	0.13	***
Took the PSAT exam prior to the SAT	29.90	1.31	***	20.85	0.05	***
Precalculus or trigonometry	54.79	1.29	***	53.80	0.15	***
Calculus	109.38	1.78	***	95.99	0.21	***
Student took HS physics	24.69	1.18	***	26.20	0.07	***
One history honors course	32.41	1.79	***	30.21	0.05	***
Two or more history honors courses	42.48	1.78	***	35.71	0.04	***
Student took honors English	38.45	1.44	***	39.59	0.10	***
Student took literature from different historical periods	32.31	1.09	***	28.74	0.08	***
Student took 4 or more years of foreign/classical language	37.78	1.30	***	19.94	0.05	***
Student did not take any foreign/classic language	-61.10	3.16	***	-59.02	-0.07	***
Student did not respond regarding f/c language	31.41	2.23	***	12.41	0.02	***
Student took Latin in HS	30.54	2.11	***	8.27	0.01	**
Student did not respond regarding Latin courses	3.63	1.12	**	0.31	0.00	
Number of cases	74311			33448		
Adjusted R2	0.542			0.541		

Table E.2. Diploma Type Analyses.* OLS Regression of Diploma Type with Combined SAT Scores as the Outcome Comparing Honors Diploma and Core 40 Diploma with Regular Diploma as the Reference Group with Background Variables

	National			Indiana		
Variables	Unstand. Beta	Stand. Beta	Sig	Unstand. Beta	Stand. Beta	Sig
Male	54.11	1.12	***	63.50	0.18	***
African American	-110.37	1.91	***	-113.76	-0.14	***
Hispanic American	-61.17	2.16	***	-24.81	-0.02	***
English is not student's first language	-23.57	2.28	***	-52.74	-0.03	***
Parents did not finish high school	-30.62	3.26	***	-14.75	-0.01	*
Parents' highest ed is 2 year degree	18.90	1.71	***	18.68	0.05	***
Parents' highest ed is BA degree	47.06	1.86	***	41.95	0.09	***
Parents' highest ed is graduate ed	73.63	1.84	***	57.69	0.13	***
Family income is less than $30,000	-26.78	1.66	***	-8.85	-0.02	***
Family income is above $70,000	20.50	1.50	***	9.81	0.02	***
No family income reported	27.59	1.76	***	18.98	0.04	***
Large/medium-sized city	-15.18	1.26	***	3.30	0.01	N/S
Rural area	-39.41	1.78	***	-20.96	-0.05	***
Student did not respond regarding aspirations	32.40	2.51	***	22.28	0.03	***
Student was undecided regarding aspirations	34.09	1.77	***	19.67	0.04	***
Aspire to an AA/certificate/other	-36.84	3.29	***	-41.28	-0.05	***
Aspire to a master's degree	32.45	1.56	***	29.00	0.07	***
Aspire to a doctoral degree	60.92	1.77	***	50.89	0.10	***
State SAT participation rate	-0.36	0.03	***			
C or lower GPA	-69.88	1.85	***	-84.11	-0.18	***
A GPA	84.80	1.46	***	92.11	0.23	***
No reported GPA	62.58	2.67	***	22.44	0.03	***
Student has top 10% class rank	97.31	1.73	***	87.71	0.19	***
Took the PSAT exam prior to the SAT	51.83	1.39	***	34.73	0.08	***
Core 40 but not honors diploma	37.32	1.37	***	31.01	0.08	***
Honors diploma	96.11	1.87	***	74.98	0.15	***
Missing diploma type coursework data	9.70	1.63	***	10.14	0.02	***
Number of cases	74311			33448		
Adjusted R^2	0.465			0.472		

*Results are for best approximation of diploma type with available data. Career track and computer coursework data are limited or unavailable.

APPENDIX F

Multinomial Analyses of College Destinations Using Indiana 2000 Cohort Database

Table F.1. Multinomial Logistic Regression Analyses of the Influence of Background, Preparation, SAT Scores, and Student Aid Packages on College Destinations

Part A: State Universities

	Model 1		Model 2		Model 3		Model 4	
	Odds R	Sig.	Odds R	Sig.	Odds R	Sig.	Odds R	Sig.
Male	0.680	***	0.825	***	0.723	***	0.722	***
Native American and other	0.863		0.887		0.782		0.780	
Asian American	1.053		0.996		0.982		1.018	
African American	0.685	***	0.980		1.209	**	1.010	
Hispanic American	0.730	**	0.934		1.075		1.018	
Race missing	0.034	***	0.083	***	0.090	***	0.101	***
Family income low	0.744	***	0.905	*	0.996		0.913	
Family income high	1.805	***	1.757	***	1.641	***	2.054	***
Family income missing	0.939		1.135		1.269	**	2.201	***
Parent education high school or less	0.719	***	0.733	***	0.856	***	0.774	***
Parent education missing	0.370	***	1.214	**	1.438	***	1.356	***
Locale city	1.228	***	1.252	***	1.430	***	1.433	***
Locale rural	0.875	***	0.823	***	0.806	***	0.810	***
Locale missing	0.382	***	1.026		1.428	***	1.417	***
High school diploma honors			13.648	***	11.854	***	10.871	***
High school diploma Core 40			9.764	***	8.849	***	8.010	***
High school GPA A			2.232	***	1.404	***	1.364	***
High school GPA C or lower			0.464	***	0.638	***	0.628	***
High school GPA missing			0.417	***	0.758	***	0.678	***
SAT score high					1.690	***	1.702	***
SAT score low					0.462	***	0.455	***
SAT score missing					0.112	***	0.111	***
Self-supporting							0.983	
Grants only							1.399	***
Loans only							2.654	***
Grants and loans							3.453	***
Other packages							10.279	***
Number of cases	36,140		36,140		36,140		36,140	
Model χ^2	10,500		18,618		23,037		27,958	
Nagelkerke Pseudo R^2	0.260		0.415		0.486		0.556	
% correctly predicted	35.122		41.146		44.17		46.063	

Note: *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Table F.1: Multinomial Logistic Regression Analyses of the Influence of Background, Preparation, SAT Scores, and Student Aid Packages on College Destinations

Part B: Regional Campuses

	Model 1		Model 2		Model 3		Model 4	
	Odds R	Sig.	Odds R	Sig.	Odds R	Sig.	Odds R	Sig.
Male	0.678	***	0.728	***	0.675	***	0.665	***
Native American and other	1.291	*	1.281		1.182		1.195	
Asian American	1.759	***	1.725	**	1.765	**	1.798	***
African American	0.698	***	0.785	***	0.880		0.908	
Hispanic American	2.712	***	2.950	***	3.223	***	3.249	***
Race missing	0.017	***	0.022	***	0.024	***	0.024	***
Family income low	0.738	***	0.804	***	0.861	***	0.898	*
Family income high	1.331	***	1.310	***	1.245	***	1.230	***
Family income missing	1.386	***	1.451	***	1.560	***	1.657	***
Parent education high school or less	0.908	**	0.915	**	1.012		1.003	
Parent education missing	0.571	***	0.878		0.948		0.954	
Locale city	0.531	***	0.538	***	0.584	***	0.578	***
Locale rural	0.601	***	0.581	***	0.575	***	0.579	***
Locale missing	0.533	***	0.727	***	0.855	**	0.864	**
High school diploma honors			2.280	***	2.090	***	2.136	***
High school diploma Core 40			2.182	***	2.069	***	2.044	***
High school GPA A			1.673	***	1.208	**	1.204	**
High school GPA C or lower			0.627	***	0.767	***	0.760	***
High school GPA missing			0.608	***	0.896		0.893	
SAT score high					1.538	***	1.511	***
SAT score low					0.589	***	0.587	***
SAT score missing					0.291	***	0.289	***
Self-supporting							0.761	**
Grants only							1.020	
Loans only							1.278	***
Grants and loans							0.978	
Other packages							1.105	
Number of cases	36,140		36,140		36,140		36,140	
Model χ^2	10,500		18,618		23,037		27,958	
Nagelkerke Pseudo R^2	0.260		0.415		0.486		0.556	
% correctly predicted	35.1		41.1		44.2		46.1	

Note: *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Table F.1. Multinomial Logistic Regression Analyses of the Influence of Background, Preparation, SAT Scores, and Student Aid Packages on College Destinations

Part C: Urban University

	Model 1		Model 2		Model 3		Model 4	
	Odds R	Sig.	Odds R	Sig.	Odds R	Sig.	Odds R	Sig.
Male	0.694	***	0.753	***	0.670	***	0.668	***
Native American and other	1.124		1.116		0.998		0.994	
Asian American	4.318	***	4.294	***	4.311	***	4.423	***
African American	0.773	***	0.899		1.078		1.040	
Hispanic American	0.853		0.950		1.064		1.061	
Race missing	0.039	***	0.052	***	0.057	***	0.058	***
Family income low	0.752	***	0.836	***	0.914		0.904	
Family income high	1.723	***	1.698	***	1.596	***	1.658	***
Family income missing	1.294	**	1.363	***	1.500	***	1.689	***
Parent education high school or less	0.890	**	0.895	**	1.026		1.001	
Parent education missing	0.585	***	0.946		1.065		1.044	
Locale city	1.909	***	1.931	***	2.158	***	2.140	***
Locale rural	0.706	***	0.679	***	0.668	***	0.671	***
Locale missing	0.755	***	1.047		1.340	***	1.306	***
High school diploma honors			2.273	***	1.982	***	1.985	***
High school diploma Core 40			2.892	***	2.658	***	2.605	***
High school GPA A			1.944	***	1.284	**	1.241	**
High school GPA C or lower			0.540	***	0.712	***	0.714	***
High school GPA missing			0.650	***	1.095		1.102	
SAT score high					1.595	***	1.576	***
SAT score low					0.469	***	0.466	***
SAT score missing					0.165	***	0.161	***
Self-supporting							1.180	
Grants only							1.193	***
Loans only							1.454	***
Grants and loans							1.401	***
Other packages							1.422	**
Number of cases	36,140		36,140		36,140		36,140	
Model χ^2	10,500		18,618		23,037		27,958	
Nagelkerke Pseudo R^2	0.260		0.415		0.486		0.556	
% correctly predicted	35.1		41.1		44.2		46.1	

Note: *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Table F.1. Multinomial Logistic Regression Analyses of the Influence of Background, Preparation, SAT Scores, and Student Aid Packages on College Destinations

Part D: Research Universities

	Model 1		Model 2		Model 3		Model 4	
	Odds R	Sig.	Odds R	Sig.	Odds R	Sig.	Odds R	Sig.
Male	0.797	***	1.075	*	0.814	***	0.797	***
Native American and other	1.031		1.017		0.902		0.915	
Asian American	4.802	***	4.109	***	4.278	***	4.477	***
African American	0.461	***	0.784	***	1.334	***	1.201	**
Hispanic American	1.246	*	1.696	***	2.252	***	2.230	***
Race missing	0.013	***	0.026	***	0.031	***	0.033	***
Family income low	0.672	***	0.839	***	0.959		0.912	
Family income high	2.554	***	2.416	***	2.220	***	2.758	***
Family income missing	1.307	***	1.488	***	1.728	***	3.138	***
Parent education high school or less	0.468	***	0.492	***	0.624	***	0.557	***
Parent education missing	0.425	***	1.587	***	1.898	***	1.792	***
Locale city	1.117	**	1.177	***	1.341	***	1.342	***
Locale rural	0.714	***	0.652	***	0.640	***	0.649	***
Locale missing	0.340	***	0.749	***	1.145		1.200	**
High school diploma honors			11.860	***	7.862	***	7.029	***
High school diploma Core 40			5.336	***	4.430	***	3.945	***
High school GPA A			4.153	***	2.024	***	2.050	***
High school GPA C or lower			0.260	***	0.384	***	0.369	***
High school GPA missing			0.511	***	0.893		0.783	***
SAT score high					2.730	***	2.798	***
SAT score low					0.223	***	0.220	***
SAT score missing					0.042	***	0.043	***
Self-supporting							0.346	***
Grants only							1.050	
Loans only							2.531	***
Grants and loans							3.638	***
Other packages							7.484	***
Number of cases	36,140		36,140		36,140		36,140	
Model χ^2	10,500		18,618		23,037		27,958	
Nagelkerke Pseudo R^2	0.260		0.415		0.486		0.556	
% correctly predicted	35.1		41.1		44.2		46.1	

Note: *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Table F.1. Multinomial Logistic Regression Analyses of the Influence of Background, Preparation, SAT Scores, and Student Aid Packages on College Destinations

Part E: Private Colleges

	Model 1		Model 2		Model 3		Model 4	
	Odds R	Sig.	Odds R	Sig.	Odds R	Sig.	Odds R	Sig.
Male	0.670	***	0.844	***	0.680	***	0.702	***
Native American and other	0.606	**	0.609	**	0.544	***	0.536	***
Asian American	1.729	***	1.544	**	1.602	**	1.652	**
African American	0.451	***	0.634	***	0.883		0.681	***
Hispanic American	0.816		1.018		1.274		1.139	
Race missing	0.076	***	0.102	***	0.126	***	0.160	***
Family income low	0.669	***	0.794	***	0.896	*	0.634	***
Family income high	1.911	***	1.806	***	1.679	***	3.091	***
Family income missing	0.170	***	0.181	***	0.211	***	0.717	***
Parent education high school or less	0.615	***	0.637	***	0.787	***	0.701	***
Parent education missing	2.386	***	5.111	***	5.848	***	4.910	***
Locale city	0.924		0.978		1.102		1.104	
Locale rural	0.822	***	0.770	***	0.756	***	0.721	***
Locale missing	1.516	***	2.458	***	3.413	***	3.395	***
High school diploma honors			7.942	***	5.825	***	4.643	***
High school diploma Core 40			2.558	***	2.230	***	1.924	***
High school GPA A			3.709	***	1.963	***	1.613	***
High school GPA C or lower			0.553	***	0.757	***	0.729	***
High school GPA missing			0.774	***	1.217	**	1.034	
SAT score high					2.929	***	2.646	***
SAT score low					0.405	***	0.397	***
SAT score missing					0.122	***	0.131	***
Self-supporting							0.123	***
Grants only							4.755	***
Loans only							0.352	***
Grants and loans							12.907	***
Other packages							55.331	***
Number of cases	36,140		36,140		36,140		36,140	
Model χ^2	10,500		18,618		23,037		27,958	
Nagelkerke Pseudo R^2	0.260		0.415		0.486		0.556	
% correctly predicted	35.1		41.1		44.2		46.1	

Note: *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Appendix G:

Logistic Regression Analyses of Enrollment in Two-Year Colleges

Table G.1. Logistic Regression Analyses of the Influence of Background, Preparation, SAT Scores, and Student Aid Packages on Enrollment in 2-Year Colleges Compared to Enrollment in 4-Year Colleges

Destination: 2-Year vs. All Others

	Model 1		Model 2		Model 3		Model 4	
	Odds R	Sig.	Odds R	Sig.	Odds R	Sig.	Odds R	Sig.
Male	1.415	***	1.204	***	1.434	***	1.444	***
Native American and other	1.014		0.986		1.093		1.065	
Asian American	0.366	***	0.413	***	0.426	***	0.400	***
African American	1.725	***	1.271	***	0.994		1.111	
Hispanic American	0.748	***	0.577	***	0.476	***	0.470	***
Race missing	26.566	***	17.031	***	15.041	***	13.933	***
Family income low	1.403	***	1.200	***	1.091	*	1.214	***
Family income high	0.519	***	0.572	***	0.629	***	0.539	***
Family income missing	1.544	***	1.456	***	1.284	***	0.799	***
Parent education high school or less	1.522	***	1.387	***	1.147	***	1.206	***
Parent education missing	1.207	***	0.506	***	0.475	***	0.543	***
Locale city	0.993		1.002		0.931		0.945	
Locale rural	1.372	***	1.492	***	1.526	***	1.548	***
Locale missing	1.478	***	0.850	***	0.667	***	0.692	***
High school diploma honors			0.162	***	0.221	***	0.248	***
High school diploma Core 40			0.280	***	0.319	***	0.347	***
High school GPA A			0.348	***	0.610	***	0.649	***
High school GPA C or lower			2.085	***	1.502	***	1.517	***
High school GPA missing			1.740	***	1.033		1.110	*
SAT score high					0.423	***	0.438	***
SAT score low					2.410	***	2.395	***
SAT score missing					7.135	***	6.828	***
Self-supporting							1.884	***
Grants only							0.687	***
Loans only							0.622	***
Grants and loans							0.386	***
Other packages							0.144	***
Number of cases	36,140		36,140		36,140		36,140	
Model χ^2	5,423		9,227		11,852		12,488	
Nagelkerke Pseudo R^2	0.220		0.356		0.442		0.462	
% correctly predicted	83.6		83.9		85.2		85.5	

Note: *** $p<0.01$, ** $p<0.05$, * $p<0.1$

APPENDIX H

Analyses of Persistence by Students in the Indiana 2000 Cohort

Table H.1. Descriptive Statistics for Variables in Analyses of Persistence of Fall 2000 to Spring 2001 Freshman

Variable	Category	N	%
College Destination	State universities	4,924	15.1
	Regional campuses	5,218	16.0
	Urban university	2,343	7.2
	Research universities	8,848	27.2
	Private	5,520	17.0
	2-Year ©	5,664	17.4
Major in Freshman Year	Humanities	997	3.1
	Arts	1,233	3.8
	Science and math	2,200	6.8
	Social science	1,801	5.5
	Health	2,364	7.3
	Business	4,369	13.4
	Education	3,452	10.6
	Computer	1,118	3.4
	Engineering	1,963	6.0
	Others	5,470	16.8
	Undecided ©	7,550	23.2
Persistence of Fall to Spring Freshman	Persisters	27,753	85.3
	Nonpersisters ©	4,764	14.7
Composite Gender	Male	15,043	46.3
	Female ©	17,454	53.7
	Missing ©	20	0.1
Composite Ethnicity	Native American	128	0.4
	Asian American Pacific Islander	480	1.5
	African American	1,904	5.9
	Hispanic American	703	2.2
	White ©	27,771	85.4
	Other	295	0.9
	Missing	1,236	3.8
Composite Parent Income Level	Low (below $30,000)	5,847	18.0
	Mid ($30,000-$70,000) ©	11,670	35.9
	High (over $70,000)	10,548	32.4
	Missing	4,452	13.7
Composite Parent Education Level	Middle/Jr high school or less	295	0.9
	High school	10,152	31.2
	College or beyond ©	15,741	48.4
	Missing	6,329	19.5
Composite Locale	City	6,878	21.2
	Suburban and town ©	13,773	42.4
	Rural	8,373	25.7
	Missing	3,493	10.7

Table H.1. (cont.) Descriptive Statistics for Variables in Analyses of Persistence of Fall 2000 to Spring 2001 Freshman

Variable	Category	N	%
Composite High School Diploma	Honors	9,594	29.5
	Core 40	11,022	33.9
	Regular or missing ©	11,901	36.6
Composite High School GPA	A	7,414	22.8
	B ©	12,514	38.5
	C or lower	5,559	17.1
	Missing	7,030	21.6
Composite SAT Scores	High	8,515	26.2
	Mid ©	9,795	30.1
	Low	7,624	23.4
	Missing	6,583	20.2
College Freshman GPA	A	6,985	21.5
	B ©	13,606	41.8
	C or lower	10,822	33.3
	Missing	1,104	3.4
Remedial Coursework in Freshman Year	Remedial math only	3,222	9.9
	Remedial language arts only	1,072	3.3
	Remedial math and language arts	2,132	6.6
	No remedial coursework ©	26,091	80.2
Enrollment Status in Freshman Fall	Full-time	29,284	90.1
	Part-time ©	3,233	9.9
Housing Status in Freshman Year	On-campus	13,364	41.1
	Others ©	19,153	58.9
Dependency Status	Indeterminate status ©	10,526	32.4
	Self-supporting	634	1.9
	Dependent ©	21,357	65.7
Aid Packages	Grants only	9,321	28.7
	Loans only	3,848	11.8
	Grants and loans	6,600	20.3
	Other packages	2,246	6.9
	None ©	10,502	32.3
Total		32,517	100.0

© is the reference category in regression.

Table H.2. Breakdown of Persistence Rates for Variables in Analyses of Persistence of Fall 2000 to Spring 2001 Freshman

Variable	Category	Persistence of Fall to Spring Freshman			
		Persisters		Nonpersisters ©	
		N	Row %	N	Row %
College Destination in Freshman Year	State universities	4,390	89.2	534	10.8
	Regional campuses	4,270	81.8	948	18.2
	Urban university	1,905	81.3	438	18.7
	Research universities	8,283	93.6	565	6.4
	Private	4,711	85.3	809	14.7
	2-Year ©	4,194	74.0	1,470	26.0
Major in Freshman Year	Humanities	902	90.5	95	9.5
	Arts	1,092	88.6	141	11.4
	Science and math	1,990	90.5	210	9.5
	Social science	1,585	88.0	216	12.0
	Health	2,063	87.3	301	12.7
	Business	3,807	87.1	562	12.9
	Education	3,089	89.5	363	10.5
	Computer	922	82.5	196	17.5
	Engineering	1,772	90.3	191	9.7
	Others	4,198	76.7	1,272	23.3
	Undecided ©	6,333	83.9	1,217	16.1
Composite Gender	Male	12,757	84.8	2,286	15.2
	Female ©	14,989	85.9	2,465	14.1
	Missing ©	7	35.0	13	65.0
Composite Ethnicity	Native American	109	85.2	19	14.8
	Asian American Pacific Islander	445	92.7	35	7.3
	African American	1,623	85.2	281	14.8
	Hispanic American	581	82.6	122	17.4
	White ©	24,132	86.9	3,639	13.1
	Other	252	85.4	43	14.6
	Missing	611	49.4	625	50.6
Composite Parent Income Level	Low (below $30,000)	4,829	82.6	1,018	17.4
	Mid ($30,000-$70,000) ©	10,059	86.2	1,611	13.8
	High (over $70,000)	9,496	90.0	1,052	10.0
	Missing	3,369	75.7	1,083	24.3
Composite Parent Education Level	Middle/Jr high school or less	228	77.3	67	22.7
	High school	8,621	84.9	1,531	15.1
	College or beyond ©	14,092	89.5	1,649	10.5
	Missing	4,812	76.0	1,517	24.0
Composite Locale	City	5,876	85.4	1,002	14.6
	Suburban and town ©	11,934	86.6	1,839	13.4
	Rural	7,216	86.2	1,157	13.8
	Missing	2,727	78.1	766	21.9
Composite High School Diploma	Honors	9,005	93.9	589	6.1
	Core 40	9,672	87.8	1,350	12.2
	Regular or missing ©	9,076	76.3	2,825	23.7

Table H.2. (cont.) Breakdown of Persistence Rates for Variables in Analyses of Persistence of Fall 2000 to Spring 2001 Freshman

Variable	Category	Persistence of Fall to Spring Freshman			
		Persisters		Nonpersisters ©	
		N	Row %	N	Row %
Composite High School GPA	A	6,958	93.8	456	6.2
	B ©	11,059	88.4	1,455	11.6
	C or lower	4,580	82.4	979	17.6
	Missing	5,156	73.3	1,874	26.7
Composite SAT Scores	High	7,849	92.2	666	7.8
	Mid ©	8,634	88.1	1,161	11.9
	Low	6,404	84.0	1,220	16.0
	Missing	4,866	73.9	1,717	26.1
College Freshman GPA	A	6,576	94.1	409	5.9
	B ©	12,722	93.5	884	6.5
	C or lower	8,212	75.9	2,610	24.1
	Missing	243	22.0	861	78.0
Remedial Coursework in Freshman Year	Remedial math only	2,573	79.9	649	20.1
	Remedial language arts only	778	72.6	294	27.4
	Remedial math and language arts	1,660	77.9	472	22.1
	No remedial coursework ©	22,742	87.2	3,349	12.8
Enrollment Status in Freshman Fall	Full-time	25,691	87.7	3,593	12.3
	Part-time ©	2,062	63.8	1,171	36.2
Housing Status in Freshman Year	On-campus	12,073	90.3	1,291	9.7
	Others ©	15,680	81.9	3,473	18.1
Dependency Status	Indeterminate status ©	8,650	82.2	1,876	17.8
	Self-supporting	457	72.1	177	27.9
	Dependent ©	18,646	87.3	2,711	12.7
Aid Packages	Grants only	8,050	86.4	1,271	13.6
	Loans only	3,415	88.7	433	11.3
	Grants and loans	5,902	89.4	698	10.6
	Other packages	1,992	88.7	254	11.3
	None ©	8,394	79.9	2,108	20.1
Total		27,753	85.3	4,764	14.7

© is the reference category in regression.

Table H.3. Logistic Regression Analyses of Persistence of Fall to Spring Semester in Freshman Year

	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6		Model 7	
	Odds R	Sig.	Odds R	Sig.	Odds R	Sig.	Odds R	Sig.	Odds R	Sig.	Odds R	Sig.	Odds R	Sig.
Male	0.941	*	1.036		1.000		0.993		0.993		1.088	**	1.097	**
Native American/other	0.849		0.848		0.840		0.852		0.855		0.913		0.920	
Asian American	1.987	***	1.801	***	1.768	***	1.665	***	1.657	***	1.674	***	1.700	***
African American	0.969		1.141	*	1.208	***	1.182	**	1.175	**	1.370	***	1.338	***
Hispanic American	0.786	**	0.875		0.908		0.902		0.903		0.903		0.892	
Race missing	0.199	***	0.270	***	0.297	***	0.298	***	0.297	***	0.443	***	0.439	***
Family income low	0.862	***	0.935		0.947		0.937		0.933		0.992		0.948	
Family income high	1.291	***	1.199	***	1.176	***	1.132	***	1.136	***	1.114	**	1.188	***
Family income missing	0.849	***	0.873	**	0.902		0.857	**	0.879	**	0.988		1.161	*
Parent ed. H S/less	0.725	***	0.779	***	0.805	***	0.833	***	0.825	***	0.855	***	0.832	***
Parent ed. missing	0.536	***	0.850	***	0.828	***	0.829	***	0.802	***	0.670	***	0.665	***
Locale city	0.975		0.976		0.978		0.958		0.972		1.042		1.034	
Locale rural	0.963		0.949		0.954		0.956		0.955		0.973		0.967	
Locale missing	1.000		1.319	***	1.353	***	1.372	***	1.361	***	1.311	***	1.318	***
High S. diploma honors			2.640	***	2.405	***	2.160	***	2.139	***	1.673	***	1.637	***
High S. diploma Core 40			1.664	***	1.609	***	1.502	***	1.493	***	1.335	***	1.313	***
High S. GPA A			1.482	***	1.329	***	1.261	***	1.262	***	0.984		0.972	
High S. GPA C/lower			0.802	***	0.839	***	0.879	***	0.887	**	0.933		0.925	
High S. GPA missing			0.767	***	0.802	***	0.804	***	0.805	***	0.756	***	0.733	***
SAT score high					1.307	***	1.232	***	1.200	***	1.081		1.078	
SAT score low					0.909	**	0.991		0.994		1.021		1.021	
SAT score missing					0.795	***	0.895	**	0.904	*	0.974		0.966	
State universities							1.191	***	1.185	**	1.267	***	1.290	***
Regional campuses							0.900	**	0.929		1.052		1.037	
Urban university							0.826	***	0.805	***	0.847	**	0.828	**
Research universities							1.896	***	1.819	***	1.793	***	1.790	***
Private							0.999		0.978		0.954		0.912	
Humanities									1.554	***	1.345	**	1.337	**
Arts									1.568	***	1.259	**	1.238	**
Science and math									1.225	**	1.151		1.138	
Social science									1.180	**	1.061		1.061	
Health									1.323	***	1.246	***	1.226	**
Business									1.435	***	1.293	***	1.294	***
Education									1.502	***	1.229	***	1.215	***
Computer									1.316	***	1.426	***	1.403	***
Engineering									1.629	***	1.638	***	1.602	***
Others									1.094		1.095		1.098	
College GPA A											1.133	*	1.125	*

College GPA C / lower						0.241	***	0.242	***
College GPA missing						0.023	***	0.024	***
Remedial math only						1.352	***	1.356	***
Remed. lang. arts only						1.234	**	1.229	**
Remed. math & lang. Arts						3.280	***	3.249	***
Full-time in freshman fall						1.796	***	1.710	***
On-campus housing						0.906	**	0.784	***
Self-supporting								0.767	**
Grants only								1.367	***
Loans only								1.475	***
Grants and loans								1.516	***
Other packages								1.582	***
Number of cases	32,517	32,517	32,517	32,517	32,517	32,517		32,517	
Model χ^2	1,425	2,202	2,278	2,486	2,585	5,810		5,875	
Nagelkerke R^2	0.076	0.116	0.120	0.130	0.135	0.289		0.292	
% correctly predicted	85.5	85.6	85.6	85.6	85.6	87.4		87.4	

Note: *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Table H.4. Descriptive Statistics for Variables in Analyses of Persistence of Spring Freshman to Fall Sophomore

Variable	Category	N	%
College Destination	State universities	4,632	15.5
	Regional campuses	5,079	17.0
	Urban university	2,327	7.8
	Research universities	8,527	28.6
	Private	3,514	11.8
	2-Year ©	5,752	19.3
Major in Freshman Year	Humanities	915	3.1
	Arts	1,134	3.8
	Science and math	2,012	6.7
	Social science	1,582	5.3
	Health	2,231	7.5
	Business	4,017	13.5
	Education	3,142	10.5
	Computer	1,019	3.4
	Engineering	1,817	6.1
	Others	5,383	18.0
	Undecided ©	6,579	22.1
Persistence of Spring Freshman to Fall Sophomore	Persisters	23,512	78.8
	Nonpersisters ©	6,319	21.2
Composite Gender	Male	13,793	46.2
	Female ©	16,027	53.7
	Missing ©	11	0.0
Composite Ethnicity	Native American	118	0.4
	Asian American Pacific Islander	461	1.5
	African American	1,836	6.2
	Hispanic American	645	2.2
	White ©	25,445	85.3
	Other	272	0.9
	Missing	1,054	3.5
Composite Parent Income Level	Low (below $30,000)	5,427	18.2
	Mid ($30,000-$70,000) ©	10,590	35.5
	High (over $70,000)	9,596	32.2
	Missing	4,218	14.1
Composite Parent Education Level	Middle/Jr high school or less	265	0.9
	High school	9,232	30.9
	College or beyond ©	14,586	48.9
	Missing	5,748	19.3
Composite Locale	City	6,398	21.4
	Suburban and town ©	12,720	42.6
	Rural	7,709	25.8
	Missing	3,004	10.1

Table H.4. (cont.) Descriptive Statistics for Variables in Analyses of Persistence of Spring Freshman to Fall Sophomore

Variable	Category	N	%
Composite High School Diploma	Honors	8,808	29.5
	Core 40	10,210	34.2
	Regular or missing ©	10,813	36.2
Composite High School GPA	A	6,764	22.7
	B ©	11,570	38.8
	C or lower	5,112	17.1
	Missing	6,385	21.4
Composite SAT Scores	High	7,622	25.6
	Mid ©	8,993	30.1
	Low	6,920	23.2
	Missing	6,296	21.1
College Freshman GPA	A	6,722	22.5
	B ©	13,125	44.0
	C or lower	9,318	31.2
	Missing	666	2.2
Remedial Coursework in Freshman Year	Remedial math only	3,117	10.4
	Remedial language arts only	895	3.0
	Remedial math and language arts	2,076	7.0
	No remedial coursework ©	23,743	79.6
Enrollment Status in Freshman Spring	Full-time	26,054	87.3
	Part-time ©	3,777	12.7
Delayed Enrollment in Spring as Freshman	Delayed	3,586	12.0
	Not delayed ©	26,245	88.0
Housing Status in Freshman Year	On-campus	11,442	38.4
	Others ©	18,389	61.6
Dependency Status	Indeterminate status ©	10,056	33.7
	Self-supporting	651	2.2
	Dependent ©	19,124	64.1
Aid Packages	Grants only	8,545	28.6
	Loans only	3,689	12.4
	Grants and loans	5,716	19.2
	Other packages	1,817	6.1
	None ©	10,064	33.7
Total		29,831	100.0

© is the reference category in regression.

Table H.5. Breakdown of Persistence Rates for Variables in Analysis of Persistence of Spring Freshman to Fall Sophomore

Variable	Category	Persistence of Spring Freshman to Fall Sophomore			
		Persisters		Nonpersisters ©	
		N	Row %	N	Row %
College Destination in Freshman Year	State universities	4,096	88.4	536	11.6
	Regional campuses	3,842	75.6	1,237	24.4
	Urban university	1,696	72.9	631	27.1
	Research universities	7,481	87.7	1,046	12.3
	Private	2,702	76.9	812	23.1
	2-Year ©	3,695	64.2	2,057	35.8
Major in Freshman Year	Humanities	759	83.0	156	17.0
	Arts	930	82.0	204	18.0
	Science and math	1,697	84.3	315	15.7
	Social science	1,334	84.3	248	15.7
	Health	1,744	78.2	487	21.8
	Business	3,183	79.2	834	20.8
	Education	2,649	84.3	493	15.7
	Computer	727	71.3	292	28.7
	Engineering	1,478	81.3	339	18.7
	Others	3,750	69.7	1,633	30.3
	Undecided ©	5,261	80.0	1,318	20.0
Composite Gender	Male	10,717	77.7	3,076	22.3
	Female ©	12,791	79.8	3,236	20.2
	Missing ©	4	36.4	7	63.6
Composite Ethnicity	Native American	95	80.5	23	19.5
	Asian American Pacific Islander	389	84.4	72	15.6
	African American	1,352	73.6	484	26.4
	Hispanic American	519	80.5	126	19.5
	White ©	20,793	81.7	4,652	18.3
	Other	215	79.0	57	21.0
	Missing	149	14.1	905	85.9
Composite Parent Income Level	Low (below $30,000)	4,101	75.6	1,326	24.4
	Mid ($30,000-$70,000) ©	8,472	80.0	2,118	20.0
	High (over $70,000)	8,162	85.1	1,434	14.9
	Missing	2,777	65.8	1,441	34.2
Composite Parent Education Level	Middle/Jr high school or less	195	73.6	70	26.4
	High school	7,440	80.6	1,792	19.4
	College or beyond ©	12,241	83.9	2,345	16.1
	Missing	3,636	63.3	2,112	36.7
Composite Locale	City	4,988	78.0	1,410	22.0
	Suburban and town ©	10,348	81.4	2,372	18.6
	Rural	6,194	80.3	1,515	19.7
	Missing	1,982	66.0	1,022	34.0
Composite High School Diploma	Honors	7,900	89.7	908	10.3
	Core 40	8,523	83.5	1,687	16.5
	Regular or missing ©	7,089	65.6	3,724	34.4

Table H.5. (cont.) Breakdown of Persistence Rates for Variables in Analysis of Persistence of Spring Freshman to Fall Sophomore

Variable	Category	Persistence Spring Freshman to Fall Sophomore			
		Persisters		Nonpersisters ©	
		N	Row %	N	Row %
Composite High School GPA	A	6,125	90.6	639	9.4
	B ©	9,639	83.3	1,931	16.7
	C or lower	3,841	75.1	1,271	24.9
	Missing	3,907	61.2	2,478	38.8
Composite SAT Scores	High	6,540	85.8	1,082	14.2
	Mid ©	7,466	83.0	1,527	17.0
	Low	5,387	77.8	1,533	22.2
	Missing	4,119	65.4	2,177	34.6
College Freshman GPA	A	5,904	87.8	818	12.2
	B ©	11,370	86.6	1,755	13.4
	C or lower	5,960	64.0	3,358	36.0
	Missing	278	41.7	388	58.3
Remedial Coursework in Freshman Year	Remedial math only	2,143	68.8	974	31.2
	Remedial language arts only	598	66.8	297	33.2
	Remedial math and language arts	1,382	66.6	694	33.4
	No remedial coursework ©	19,389	81.7	4,354	18.3
Enrollment Status in Freshman Spring	Full-time	21,291	81.7	4,763	18.3
	Part-time ©	2,221	58.8	1,556	41.2
Delayed Enrollment in Spring as Freshman	Delayed	1,963	54.7	1,623	45.3
	Not delayed ©	21,549	82.1	4,696	17.9
Housing Status in Freshman Year	On-campus	9,827	85.9	1,615	14.1
	Others ©	13,685	74.4	4,704	25.6
Dependency Status	Indeterminate status ©	7,614	75.7	2,442	24.3
	Self-supporting	406	62.4	245	37.6
	Dependent ©	15,492	81.0	3,632	19.0
Aid Packages	Grants only	6,756	79.1	1,789	20.9
	Loans only	2,994	81.2	695	18.8
	Grants and loans	4,671	81.7	1,045	18.3
	Other packages	1,473	81.1	344	18.9
	None ©	7,618	75.7	2,446	24.3
Total		23,512	78.8	6,319	21.2

© is the reference category in regression.

Table H.6. Logistic Regression Analyses of Persistence of Spring Freshman to Fall Sophomore

	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6		Model 7	
	Odds R	Sig.	Odds R	Sig.	Odds R	Sig.	Odds R	Sig.	Odds R	Sig.	Odds R	Sig.	Odds R	Sig.
Male	0.913	***	0.998		0.990		0.981		0.971		1.074	**	1.068	*
Native American and other	0.813		0.806	*	0.808		0.821		0.817		0.851		0.854	
Asian American	1.277	*	1.143		1.145		1.144		1.156		1.182		1.177	
African American	0.686	***	0.814	***	0.824	***	0.798	***	0.803	***	0.952		0.971	
Hispanic American	0.999		1.105		1.111		1.130		1.132		1.229	*	1.239	**
Race missing	0.051	***	0.067	***	0.067	***	0.066	***	0.066	***	0.076	***	0.076	***
Family income low	0.951		1.045		1.044		1.034		1.033		1.081	*	1.112	**
Family income high	1.285	***	1.196	***	1.193	***	1.154	***	1.155	***	1.142	***	1.099	**
Family income missing	1.150	**	1.188	***	1.191	***	1.131	*	1.140	**	1.297	***	1.213	***
Parent education high school or less	0.873	***	0.934	*	0.938	*	0.965		0.965		0.987		1.000	
Parent education missing	0.428	***	0.658	***	0.653	***	0.659	***	0.654	***	0.583	***	0.587	***
Locale city	0.924	*	0.916	**	0.914	**	0.889	***	0.890	***	0.920	*	0.924	*
Locale rural	0.924	**	0.917	**	0.918	**	0.909	**	0.910	**	0.918	**	0.921	**
Locale missing	0.918		1.219	***	1.213	***	1.210	***	1.214	***	1.179	***	1.184	***
High school diploma honors			2.362	***	2.310	***	2.005	***	2.020	***	1.743	***	1.754	***
High school diploma Core 40			1.871	***	1.858	***	1.663	***	1.665	***	1.589	***	1.597	***
High school GPA A			1.538	***	1.509	***	1.468	***	1.476	***	1.213	***	1.223	***
High school GPA C or lower			0.804	***	0.805	***	0.838	***	0.835	***	0.876	***	0.877	***
High school GPA missing			0.871	**	0.858	**	0.862	**	0.861	**	0.897	*	0.906	
SAT score high					1.033		1.000		0.995		0.893	**	0.894	**
SAT score low					0.950		1.016		1.017		1.087	*	1.088	*
SAT score missing					1.001		1.124	**	1.128	**	1.230	***	1.238	***
State universities							1.736	***	1.688	***	1.536	***	1.535	***
Regional campuses							0.889	**	0.885	**	0.906		0.914	
Urban university							0.786	***	0.773	***	0.831	***	0.842	**
Research universities							1.520	***	1.489	***	1.313	***	1.312	***
Private							0.970		0.944		0.889		0.910	

Table H.6. (cont.) Logistic Regression Analyses of Persistence of Spring Freshman to Fall Sophomore

	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6		Model 7	
	Odds R	Sig.	Odds R	Sig.	Odds R	Sig.	Odds R	Sig.	Odds R	Sig.	Odds R	Sig.	Odds R	Sig.
Humanities									1.078		1.007		1.015	
Arts									1.205	**	1.016		1.028	
Science and math									0.929		0.897		0.903	
Social science									1.110		1.089		1.089	
Health									0.876	**	0.838	***	0.847	**
Business									1.077		1.010		1.009	
Education									1.160	**	1.063		1.070	
Computer									0.996		1.012		1.019	
Engineering									1.128		1.024		1.037	
Others									1.002		0.988		0.988	
College GPA A											1.136	**	1.138	**
College GPA C or lower											0.315	***	0.314	***
College GPA missing											0.371	***	0.369	***
Remedial math only											1.045		1.043	
Remedial language arts only											1.105		1.108	
Remedial math and language arts											1.349	***	1.353	***
Full-time in freshman spring											1.417	***	1.450	***
Delayed enrollment											0.487	***	0.479	***
On-campus housing											0.948		1.020	
Self-supporting													1.043	
Grants only													0.874	***
Loans only													0.871	**
Grants and loans													0.803	***
Other packages													0.770	***
Number of cases	29,831		29,831		29,831		29,831		29,831		29,831		29,831	
Model χ^2	2,775		3,581		3,584		3,841		3,867		5,517		5,536	
Nagelkerke R^2	0.138		0.176		0.176		0.188		0.189		0.262		0.263	
% correctly predicted	81.4		81.4		81.4		81.4		81.4		81.6		81.7	

Note: *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Table H.7. Descriptive Statistics for Variables in Analyses of Continuous Enrollment of Fall or Spring Freshman thru Spring Sophomore

Variable	Category	N	%
College Destination	State Universities	5,166	15.2
	Regional Campuses	6,030	17.7
	Urban University	2,766	8.1
	Research Universities	9,093	26.7
	Private	3,818	11.2
	2-Year ©	7,222	21.2
Major in Freshman Year	Humanities	997	2.9
	Arts	1,259	3.7
	Science and Math	2,184	6.4
	Social Science	1,775	5.2
	Health	2,514	7.4
	Business	4,541	13.3
	Education	3,448	10.1
	Computer	1,189	3.5
	Engineering	2,002	5.9
	Others	6,606	19.4
	Undecided ©	7,580	22.2
Persistence of Fall or Spring Freshman thru Spring Sophomore	Persisters	21,067	61.8
	Nonpersisters ©	13,028	38.2
Composite Gender	Male	15,858	46.5
	Female ©	18,213	53.4
	Missing ©	24	0.1
Composite Ethnicity	Native American	134	0.4
	Asian American Pacific Islander	493	1.4
	African American	2,089	6.1
	Hispanic American	747	2.2
	White ©	28,650	84.0
	Other	313	0.9
	Missing	1,669	4.9
Composite Parent Income Level	Low (below $30,000)	6,349	18.6
	Mid ($30,000-$70,000) ©	12,011	35.2
	High (over $70,000)	10,499	30.8
	Missing	5,236	15.4
Composite Parent Education Level	Middle/Jr high school or less	326	1.0
	High school	10,595	31.1
	College or beyond ©	16,033	47.0
	Missing	7,141	20.9
Composite Locale	City	7,307	21.4
	Suburban and town ©	14,352	42.1
	Rural	8,729	25.6
	Missing	3,707	10.9
Composite High School Diploma	Honors	9,260	27.2
	Core 40	11,425	33.5
	Regular or missing ©	13,410	39.3

Table H.7. (cont.) Descriptive Statistics for Variables in Analyses of Continuous Enrollment of Fall or Spring Freshman thru Spring Sophomore

Variable	Category	N	%
Composite High School GPA	A	7,117	20.9
	B ©	12,874	37.8
	C or lower	6,016	17.6
	Missing	8,088	23.7
Composite SAT Scores	High	8,154	23.9
	Mid ©	9,991	29.3
	Low	8,014	23.5
	Missing	7,936	23.3
College Freshman GPA	A	7,076	20.8
	B ©	13,901	40.8
	C or lower	11,591	34.0
	Missing	1,527	4.5
Remedial Coursework in Freshman Year	Remedial math only	3,742	11.0
	Remedial language arts only	1,168	3.4
	Remedial math and language arts	2,548	7.5
	No remedial coursework ©	26,637	78.1
Enrollment Status in First Semester	Full-time	29,603	86.8
	Part-time ©	4,492	13.2
Delayed Enrollment in Spring as Freshman	Delayed	3,586	10.5
	Not delayed ©	30,509	89.5
Housing Status in Freshman Year	On-campus	12,401	36.4
	Others ©	21,694	63.6
Dependency Status	Indeterminate status ©	11,817	34.7
	Self-supporting	822	2.4
	Dependent ©	21,456	62.9
Aid Packages	Grants only	9,643	28.3
	Loans only	4,120	12.1
	Grants and loans	6,229	18.3
	Other packages	1,964	5.8
	None ©	12,139	35.6
Total		34,095	100.0

© is the reference category in regression.

Table H. 8. Breakdown of Persistence Rates for Variables in Analysis of Continuous Enrollment of Fall or Spring Freshman thru Spring Sophomore

Variable	Category	Persistence of Fall or Spring Freshman thru Spring Sophomore			
		Persisters		Nonpersisters ©	
		N	Row %	N	Row %
College Destination in Freshman Year	State universities	3,729	72.2	1,437	27.8
	Regional campuses	3,253	53.9	2,777	46.1
	Urban university	1,403	50.7	1,363	49.3
	Research universities	7,047	77.5	2,046	22.5
	Private	2,556	66.9	1,262	33.1
	2-Year ©	3,079	42.6	4,143	57.4
Major in Freshman Year	Humanities	700	70.2	297	29.8
	Arts	846	67.2	413	32.8
	Science and math	1,575	72.1	609	27.9
	Social science	1,224	69.0	551	31.0
	Health	1,555	61.9	959	38.1
	Business	2,877	63.4	1,664	36.6
	Education	2,439	70.7	1,009	29.3
	Computer	621	52.2	568	47.8
	Engineering	1,313	65.6	689	34.4
	Others	3,223	48.8	3,383	51.2
	Undecided ©	4,694	61.9	2,886	38.1
Composite Gender	Male	9,529	60.1	6,329	39.9
	Female ©	11,536	63.3	6,677	36.7
	Missing ©	2	8.3	22	91.7
Composite Ethnicity	Native American	83	61.9	51	38.1
	Asian American Pacific Islander	365	74.0	128	26.0
	African American	1,114	53.3	975	46.7
	Hispanic American	444	59.4	303	40.6
	White ©	18,746	65.4	9,904	34.6
	Other	184	58.8	129	41.2
	Missing	131	7.8	1,538	92.2
Composite Parent Income Level	Low (below $30,000)	3,545	55.8	2,804	44.2
	Mid ($30,000-$70,000) ©	7,569	63.0	4,442	37.0
	High (over $70,000)	7,538	71.8	2,961	28.2
	Missing	2,415	46.1	2,821	53.9
Composite Parent Education Level	Middle/Jr high school or Less	170	52.1	156	47.9
	High school	6,534	61.7	4,061	38.3
	College or beyond ©	11,178	69.7	4,855	30.3
	Missing	3,185	44.6	3,956	55.4
Composite Locale	City	4,443	60.8	2,864	39.2
	Suburban and town ©	9,292	64.7	5,060	35.3
	Rural	5,597	64.1	3,132	35.9
	Missing	1,735	46.8	1,972	53.2
Composite High School Diploma	Honors	7,523	81.2	1,737	18.8
	Core 40	7,541	66.0	3,884	34.0
	Regular or missing ©	6,003	44.8	7,407	55.2

Table H. 8. (cont.) Breakdown of Persistence Rates for Variables in Analysis of Continuous Enrollment of Fall or Spring Freshman thru Spring Sophomore

Variable	Category	Persistence of Fall or Spring Freshman thru Spring Sophomore			
		Persisters		Nonpersisters ©	
		N	Row %	N	Row %
Composite High School GPA	A	5,833	82.0	1,284	18.0
	B ©	8,659	67.3	4,215	32.7
	C or lower	3,273	54.4	2,743	45.6
	Missing	3,302	40.8	4,786	59.2
Composite SAT Scores	High	6,160	75.5	1,994	24.5
	Mid ©	6,819	68.3	3,172	31.7
	Low	4,620	57.6	3,394	42.4
	Missing	3,468	43.7	4,468	56.3
College Freshman GPA	A	5,673	80.2	1,403	19.8
	B ©	10,628	76.5	3,273	23.5
	C or lower	4,568	39.4	7,023	60.6
	Missing	198	13.0	1,329	87.0
Remedial Coursework in Freshman Year	Remedial math only	1,744	46.6	1,998	53.4
	Remedial language arts only	500	42.8	668	57.2
	Remedial math and language arts	1,091	42.8	1,457	57.2
	No remedial coursework ©	17,732	66.6	8,905	33.4
Enrollment Status in First Semester	Full-time	19,451	65.7	10,152	34.3
	Part-time ©	1,616	36.0	2,876	64.0
Delayed Enrollment in Spring as Freshman	Delayed	1,523	42.5	2,063	57.5
	Not delayed ©	19,544	64.1	10,965	35.9
Housing Status in Freshman Year	On-campus	9,153	73.8	3,248	26.2
	Others ©	11,914	54.9	9,780	45.1
Dependency Status	Indeterminate status ©	6,791	57.5	5,026	42.5
	Self-supporting	317	38.6	505	61.4
	Dependent ©	13,959	65.1	7,497	34.9
Aid Packages	Grants only	6,136	63.6	3,507	36.4
	Loans only	2,649	64.3	1,471	35.7
	Grants and loans	4,205	67.5	2,024	32.5
	Other packages	1,331	67.8	633	32.2
	None ©	6,746	55.6	5,393	44.4
Total		21,067	61.8	13,028	38.2

© is the reference category in regression.

Table H. 9. Logistic Regression Analyses of Persistence of Continuous Enrollment of Fall or Spring Freshman thru Spring Sophomore

	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6		Model 7	
	Odds R	Sig.	Odds R	Sig.	Odds R	Sig.	Odds R	Sig.	Odds R	Sig.	Odds R	Sig.	Odds R	Sig.
Male	0.879	***	0.981		0.953	*	0.946	**	0.955	*	1.087	***	1.085	***
Native American and other	0.749	***	0.748	***	0.747	***	0.768	**	0.767	**	0.778	**	0.777	**
Asian American	1.578	***	1.392	***	1.385	***	1.377	***	1.393	***	1.449	***	1.450	***
African American	0.674	***	0.825	***	0.864	***	0.849	***	0.855	***	1.027		1.036	
Hispanic American	0.850	**	0.961		0.984		1.018		1.021		1.076		1.078	
Race missing	0.063	***	0.086	***	0.090	***	0.090	***	0.090	***	0.114	***	0.113	***
Family income low	0.886	***	0.974		0.981		0.968		0.968		1.024		1.019	
Family income high	1.340	***	1.241	***	1.225	***	1.180	***	1.178	***	1.162	***	1.157	***
Family income missing	0.993		1.040		1.058		1.112	**	1.115	**	1.287	***	1.296	***
Parent education high school or less	0.776	***	0.835	***	0.855	***	0.886	***	0.884	***	0.921	***	0.921	***
Parent education missing	0.492	***	0.793	***	0.780	***	0.710	***	0.708	***	0.589	***	0.593	***
Locale city	0.960		0.951		0.949		0.927	**	0.928	**	0.982		0.980	
Locale rural	0.970		0.954		0.957		0.947	*	0.949	*	0.961		0.960	
Locale missing	0.909	**	1.274	***	1.288	***	1.243	***	1.240	***	1.173	***	1.182	***
High school diploma honors			2.815	***	2.618	***	2.266	***	2.271	***	1.809	***	1.802	***
High school diploma Core 40			1.778	***	1.727	***	1.594	***	1.594	***	1.467	***	1.466	***
High school GPA A			1.627	***	1.518	***	1.448	***	1.457	***	1.128	***	1.126	***
High school GPA C or lower			0.787	***	0.811	***	0.843	***	0.844	***	0.900	***	0.897	***
High school GPA missing			0.829	***	0.842	***	0.841	***	0.848	***	0.830	***	0.827	***
SAT score high					1.127	***	1.054		1.063		0.944		0.939	
SAT score low					0.864	***	0.940	*	0.940	*	1.040		1.042	
SAT score missing					0.856	***	0.988		0.991		1.106	**	1.112	**
State universities							1.413	***	1.376	***	1.333	***	1.338	***
Regional campuses							0.846	***	0.846	***	0.896	**	0.898	**
Urban university							0.729	***	0.718	***	0.784	***	0.787	***
Research universities							1.643	***	1.617	***	1.543	***	1.550	***
Private							1.361	***	1.329	***	1.370	***	1.368	***

Table H. 9. (cont.) Logistic Regression Analyses of Persistence of Continuous Enrollment of Fall or Spring Freshman thru Spring Sophomore

	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6		Model 7	
	Odds R	Sig.	Odds R	Sig.	Odds R	Sig.	Odds R	Sig.	Odds R	Sig.	Odds R	Sig.	Odds R	Sig.
Humanities									1.121		1.040		1.041	
Arts									1.262	***	1.034		1.033	
Science and math									0.997		0.966		0.963	
Social science									1.080		1.054		1.056	
Health									0.949		0.900	*	0.901	*
Business									1.158	***	1.073		1.070	
Education									1.272	***	1.129	**	1.129	**
Computer									1.006		1.079		1.079	
Engineering									1.011		0.963		0.962	
Others									1.026		1.008		1.007	
College GPA A											1.232	***	1.224	***
College GPA C or lower											0.226	***	0.226	***
College GPA missing											0.087	***	0.087	***
Remedial math only											1.008		1.007	
Remedial language arts only											1.079		1.081	
Remedial math and language arts											1.548	***	1.547	***
Full-time in first semester											1.524	***	1.517	***
Delayed enrollment											0.773	***	0.773	***
On-campus housing											0.987		1.007	
Self-supporting													0.832	**
Grants only													1.055	
Loans only													0.998	
Grants and loans													0.963	
Other packages													0.957	
Number of cases	34,095		34,095		34,095		34,095		34,095		34,095		34,095	
Model χ^2	3,372		5,196		5,253		5,706		5,758		9,762		9,772	
Nagelkerke R^2	0.128		0.192		0.194		0.210		0.211		0.338		0.339	
% correctly predicted	65.7		67.5		67.8		68.2		68.3		74.5		74.5	

Note: *** $p<0.01$, ** $p<0.05$, * $p<0.1$

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ENDNOTES

[1] Most of Indiana's independent colleges provided information to Independent Colleges of Indiana, Inc. (ICI), which made data available to the Pathways project team. In addition, the Indiana Commission for Higher Education provided access to the Student Information System (SIS) for this project.
[2] The Indiana example is presented using the logic of the balanced access model, developed from a review of extant literature on access and persistence (St. John, 2002, 2003).
[3] See *Meeting the Access Challenge: Indiana's Twenty-first Century Scholars Program* (Lumina Foundation for Education) for a full description of this program.
[4] The state grants set a maximum award based on tuition charges and financial need. The students completing the honors diploma receive 100% of the maximum; students with a Core 40 diploma receive 90%; and students with a regular diploma receive 80%. Information on these differences in award levels is routinely disseminated by Indiana Career and Postsecondary Advancement Center (ICPAC) to students in middle schools and high schools.
[5] The most widely distributed text on ICPAC, Indiana's postsecondary encouragement program, is Don Hossler et al.'s *Going to College* (1999). Also our report, *Meeting the Access Challenge: Indiana's Twenty-first Century Scholars Program*, was widely distributed by Lumina Foundation for Education.
[6] Since financial aid is not the primary concern of this report, we use endnotes to comment on our findings about student aid.
[7] It would be necessary to construct a different type of model to test this association. However, we can infer an association from the trends reviewed.
[8] Source: Percentage Core 40 and honors after 1997: http://mustang.doe.state.in.us/TRENDS/core40_sub.cfm?year=2003 Percentage honors prior to 1997: http://dew4.doe.state.in.us/htbin/sas1.sh. SAT participation rate and score: www.collegeboard.com.
[9] In addition, technical research reports on the pathways analyses are available on request from the authors, some of which can be accessed on the Web page of the Indiana Project on Academic Success: http://education.indiana.edu/~ipas1/home.html.
[10] For a number of reasons, it is important to not consider the statistical associations reported as causal relationships. Therefore, we are careful in this text to discuss statistical relationships as measures of association, rather than to use the term *influence,* which implies causality.
[11] Most notably, Notre Dame does not participate in the data collections by the Independent Colleges of Indiana, Inc. Of the 36 colleges in the state, 29 provided data to ICI.
[12] An agreement was developed with the College Board by the Indiana Department of Education and the Indiana Commission for Higher Education. They could reach agreement to release data for public schools, but not for all students including those attending nonpublic schools.
[13] A more appropriate comparison would have been to examine only SAT takers from public schools in the U.S.
[14] This logic (St. John, 2002, 2003) posits that student test scores are influenced by student background (including SES variables and locales) and academic preparation in high school. The variable selection is similar to that in other studies of SAT scores (Musoba, 2004a).
[15] These analyses included American Indians and other small ethnic groups in the comparison group.
[16] The College Board asked about courses students had taken or planned to take. There is no way to distinguish between the two. So, students may not have actually completed the courses reported, but since they were in the senior year, most were at least enrolled in the courses they intended to take.
[17] In the Student Descriptive Questionnaire (SDQ) on the SAT, students are asked about the courses they have taken or plan to take, so we cannot be sure that students actually completed these courses. However, since these were responses for seniors, we assumed they were reasonably accurate. Freeberg, Rock, and Pollack (1989) concluded the SDQ was sufficiently accurate for its intended use in admissions and placement.
[18] As noted in Appendix B, the 2000 cohort was constructed to include Indiana residents in the high school class of 2000 who went on to college. A portion of this file was derived from college records, pulling in institutionally reported data on resident students who enrolled in public and private colleges in the state. If institutions had data on SAT scores and high school preparation—data not included in the College Board

file for students from private high schools—it was reported by the ICHE and the ICI and used here to supplement College Board variables. In addition, institutions reported data on resident students who were freshman but did not take the SAT. Thus, the 2000 cohort file is reasonably complete with respect to Hoosiers going on to college in Indiana.

[19] This excludes students who enrolled at Notre Dame and a few other private colleges, as noted in Appendix C.

[20] Analyses of college transfer by the 1999 cohort in Indiana revealed that about one quarter of the students who transferred during their first two years transferred to a two-year campus (tables available on the Indiana Project on Academic Success Web site: http://education.indiana.edu/~ipas1/home.html). This indicates that the pathway to academic success may include transitions from four-year colleges to two-year colleges and, possibly, back to four-year degree programs once again.

[21] Institutions reported students' income if they had it through financial aid applications. In addition, income information was available from the SAT questionnaire and applications for student aid. Thus, students who did not have income reported did not apply for aid or take the SAT.

[22] Because SAT scores came directly from the College Board, and university reporting was used as a secondary source, with this group of students we are quite confident that *missing* means that they did not take the SAT, not simply that their score was not reported.

[23] NCES (1997a) included taking college entrance exams among the sorting criteria included in their preparation index, an approach appropriately criticized by reviewers (Becker, 2004; Heller, 2004).

[24]This interpretation—viewing positive associations as adequate and negative associations as inadequate—is well support in the research literature (St. John, 2003; St. John & Starkey, 1995).

[25] Students who transferred between and among the public and private colleges within the state in the analyses were coded as persisting.

[26] It was necessary to consider the influence of socioeconomic variables in the discussion of access and persistence because many analysts used these variables to explain away inequalities in access (Choy, 1992, NCES, 1997a), which were not as evident in Indiana. When financial aid is not adequate there are greater disparities in enrollment and persistence between income and ethnic groups (St. John, 1999, 2003).

[27] While financial aid variables were not significant in the analysis of continuous enrollment, the odds ratios were substantial enough to be interpreted with the sample size and methodology.