MONTGOMERY COUNTY PUBLIC SCHOOLS

College Readiness and Postsecondary Educational Outcomes for 2003 Graduates of Montgomery County Public Schools

Office of Shared Accountability

April 2011

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EXECUTIVE SUMMARY

This study about the Montgomery County Public Schools (MCPS) Class of 2003 validates the MCPS Seven Keys to College Readiness (Seven Keys) framework, a set of predictive analytics, which inculcates a college-going culture as early as preschool. One of the most significant findings from the study demonstrates that regardless of race or ethnicity, students who achieve the secondary college-readiness benchmarks are far more likely than their peers to enroll and succeed in college. Furthermore, regardless of race or ethnicity, the more prepared a student is for college, the shorter time it takes to get a bachelor's degree.

The Seven Keys is a framework, launched in 2008, that identifies important benchmarks to help students attain the knowledge and skills needed for college and career readiness beginning in kindergarten (Appendix A). MCPS developed the college-readiness trajectory "by looking backwards from the goal of college and career readiness and linking successful attainment of one key with the likelihood of successful attainment of a subsequent key" (Von Secker, 2009). The foundational research for the Seven Keys began with the final key—1650 on the SAT or 24 on the ACT—and back-mapped to what students need to know and be able to do beginning in kindergarten. The foundational and later research showed correlations among keys, and described postsecondary success for students who met the keys (Von Secker, 2009; Von Secker, 2010; Von Secker & Liu, 2010; Von Secker & Rethinam, 2010).

This study builds on previous MCPS research in several ways. To start, the report provides further evidence of predictive validity for the four secondary keys of the MCPS Seven Keys to College Readiness. Higher percentages of MCPS students who met the four secondary keys consistently outperformed those students who did not, and higher percentages of students who met the MCPS keys attained a bachelor's degree within six years regardless of their ethnicity.

This is the first longitudinal study to examine the relationship between college readiness and postsecondary educational outcomes for MCPS graduates in a more systematic way beyond correlation analyses. More rigorous multivariate statistical methods, including multiple regression, logistic regression, and structural equation modeling were used to examine the impact of the Seven Keys on postsecondary educational outcomes.

In addition to the four academic keys, the report provides useful information for counseling students on some important predictors for success in college: weighted high school GPA, high school attendance, enrollment in a four-year college in the fall immediately after high school, second year college retention, and the number of transfers in college. It is important to look at behavioral readiness in conjunction with academic factors because it gives a more holistic vision of preparing all of our students for success after they leave MCPS.

The research questions for this study are:

1. How did MCPS 2003 high school graduates perform on four out of seven keys to college readiness?
2. How did demographics, educational aspiration, academic experience, high school curriculum rigor including keys to college readiness relate to SAT scores for MCPS 2003 graduates?
3. How were the keys to college readiness related to postsecondary educational outcomes as measured by college enrollment, college retention, and bachelor's degree attainment within six years after high school graduation for MCPS 2003 graduates? What were the factors that associated with these educational outcomes?
4. Is behavioral readiness, as well as academic readiness, associated with postsecondary success as measured by time spent on the first bachelor's degree? Are results consistent for different racial/ethnic groups?

Summary of Key Findings

MCPS 2003 graduates who were ready for college were more likely to enroll, persist, and graduate from college than those who were not. The major findings of the study are summarized below.

Attainment of MCPS Keys for College Readiness

> Of 8,799 MCPS 2003 graduates, 26.9% completed Algebra 1 with a course grade of C or higher by Grade 8 (Key 4), 57.2% completed Algebra 2 with a grade of C or higher by Grade 11 (Key 5), 37.7% had at least one Advanced Placement (AP) exam with a score of 3 or higher (Key 6), and 41.6% scored 1100 or higher on the SAT verbal and mathematics tests or 24 or higher on the ACT composite (Key 7). A score of 1100 on the SAT was used as Key 7 because only two tests (reading and mathematics) were administered in 2003.

Factors Contributing to Performance on SAT

> MCPS 2003 graduates who had higher academic achievement prior to high school, had a greater number of AP exams with a score of 3 or higher, had more rigorous courses and a higher mathematics level in high school, completed Algebra 1 with a grade of C or higher by Grade 8 and Algebra 2 with a grade of C or higher by Grade 11, had a more positive academic experience and higher educational aspiration in high school, and were significantly more likely to have higher SAT scores, compared with those who did not.

College Enrollment

> Of MCPS 2003 graduates, 71.5% enrolled in college in the fall immediately after high school graduation, compared with 63.9% of 2003 high school graduates in the nation.

If graduates were ready on the Seven Keys trajectory, a higher percentage of them enrolled in college immediately after high school. MCPS keys, academic experience, attendance, and educational aspiration in high school are significant predictors of college enrollment. Based on the predictors, the prediction accuracy for fall college enrollment was 80.2%.

College Retention

MCPS students who enrolled in college within a year after high school graduation tended to stay in college. MCPS college freshman-to-sophomore retention rates were 98.6% for students enrolled in four-year colleges and 91.6% for students in two-year colleges. This compares to national retention rates of 76.5% and 53.2%, respectively.

Race/ethnicity, Free and Reduced-price Meals System (FARMS) or English for Speakers of Other Language (ESOL) services status, weighted grade point average (GPA), educational aspiration by the end of high school, high school attendance, and highest mathematic levels in high school were significant predictors for second year retention in college. The prediction accuracy was 81.6%. Graduates who had a higher weighted GPA, higher educational aspiration, higher school attendance, and higher mathematics levels were significantly more likely to persist in college compared to those who did not. High school weighted GPA has the largest impact on second year college retention, followed by educational aspiration in high school.

Achievement Gap

African American and Hispanic students were less ready for college, less likely to enroll in college immediately after high school, and less likely to persist in college from freshman to sophomore standing, compared with their Asian American and White counterparts.

College Graduation

Graduates who met the MCPS keys were more likely to get a bachelor's degree within six years after high school than those who did not. The more prepared a student was for college, the shorter time it took to get the first bachelor's degree regardless of race and ethnicity.

Of the 8,805 graduates in the MCPS Class of 2003, which represents a 92% graduation rate, the National Student Clearinghouse provided MCPS with records for 7,396 students who enrolled in college at some time during the six years post graduation (2003–04 through 2008–09). These 7,396 students represent 84% of the graduating class. Taking this conservative approach with only the records we have, we know that 4,494 (60.8%) of those who enrolled in college were awarded an associate's degree or higher within six years. Of the 7,396 graduates, 4,079 earned a bachelor's degree or higher for a success rate of 55.2%.

When examining only the records of students who enrolled in college sometime in the first year after graduating from high school, twice as many (59.8%) MCPS graduates obtained a bachelor's degree or higher within six years than did students nationally (30.7%). This is even more remarkable when viewed within the fact that 71.5% of MCPS graduates enrolled in college in the fall immediately after high school graduation compared to 63.9% of high school students nationally.

Significant predictors for bachelor's degree attainment within six years after high school included weighted GPA in high school, high school attendance, fall enrollment in a 4-year college immediately after high school, second year college retention, and number of transfers for the first bachelor's degree in college. The prediction accuracy was 96% for college enrollees.

Students who had a higher weighted GPA and a higher attendance rate in high school, enrolled in a 4-year college in the fall immediately after high school, persisted in college from freshman to sophomore years, and had fewer college transfers were significantly more likely to attain the first bachelor's degree within six years after high school.

Both academic readiness and behavioral readiness were significantly related to time (in months) students needed to complete their first bachelor's degree. High school course rigor had the largest positive impact on academic readiness followed by SAT scores and AP exams. Students who had more rigorous high school courses, higher SAT scores and more AP exams with a score of 3 or higher spent less time pursuing their first bachelor's degree than those who did not.

In addition to academic preparedness, behavioral readiness such as a student's effort in high school courses, high school attendance, and positive high school experience also had a significant impact on bachelor's degree attainment. MCPS graduates who took more rigorous high school courses, had a higher weighted GPA, and a more positive high school experience spent less time in pursuit of their first bachelor's degree compared to their peers who did not.

Recommendations

Based on this study as well as other educational research literature (Conley, 2007; ACT, 2010a; Roderick, Nagaoka, Caca, Moeller, Roddie, Gilliam, & Patton, 2008; Bowen, Chingos, & McPherson, 2009; and Symonds, Schwartz, & Ferguson, 2011), the researchers recommend that schools continue to:

1. Monitor student academic progress towards college readiness from kindergarten to Grade 12.
2. Institutionalize a college-going culture from elementary to secondary schools.
3. Expose students to rigorous academic content and help them develop higher thinking skills.

4. Help students develop behavioral readiness (e.g., school attendance, time management, study skills, self-monitoring) from kindergarten to Grade 12.
5. Provide students specific information about the college admission system, financial aid, and skills to succeed in college as soon as students arrive in high school. Inform students of the steps they need to take for their educational goals and emphasize the importance of postsecondary education.

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BACKGROUND

Learning Milestone from Goal 1: All graduates will be prepared for postsecondary education and employment (MCPS, 2010).

In recent years, there has been an intensified interest in college readiness specifying what students should know and be able to do in order to succeed in entry-level college courses. College readiness can be defined as the level of preparation a student needs in order to enroll and succeed in college without remediation (Conley, 2007). Although about 75 percent of the nation's high school graduates enter college, about one half of college freshmen are required to take one or more remedial courses (College Board, 2009b). In Maryland, remediation rates are increasing even among students who complete a college-preparatory curriculum in high school (Maryland Higher Education Commission, 2009). Nearly one third of Maryland high school graduates are required to take remedial courses in English or mathematics upon entry to college (Martino & Wilson, 2009). The consequences of underpreparation for college coursework are expensive and time consuming. Unprepared students must pay tuition for remedial courses, and the credits earned cannot be applied towards a degree. Lack of readiness limits postsecondary success. Nationally, only about one third of students who are required to take remedial courses upon entry to college remain in college and earn four-year degrees (Graves, 2008). A study by the ACT (2009a) shows that strong academic achievement, certainty of occupational choice, and college readiness promote college degree attainment and job satisfaction. These results reinforce the need for all high school graduates to be prepared for college and careers.

The Montgomery County Public Schools (MCPS) Seven Keys to College Readiness (Appendix A) is a framework that was launched in 2008. The college-readiness trajectory identifies important benchmarks, along the trajectory, to help students attain the knowledge and skills needed for college and career readiness beginning in kindergarten.

MCPS developed the college-readiness trajectory "by looking backwards from the goal of college and career readiness and linking successful attainment of one key with the likelihood of successful attainment of a subsequent key" (Von Secker, 2009, p.1). The foundational research for the Seven Keys began with the final key—1650 on the SAT or a composite score of 24 on the ACT—and

back-mapped to what students need to know and be able to do beginning in kindergarten. The foundational and later research showed correlations among keys, and described postsecondary success for students who met the keys (Von Secker, 2009; Von Secker & Rethinam, 2010; Von Secker, 2010; Von Secker & Liu, 2010).

To be academically ready for college, MCPS students are expected to read and understand passages at the advanced level on the MCPS primary reading assessments from kindergarten to Grade 2 (Key 1). In Grades 3–8, students are expected to score at the advanced level on Maryland School Assessments in reading (Key 2). In Grade 5, students are expected to take advanced mathematics courses (Key 3). By Grade 8, students are expected to complete Algebra 1 with a course grade of C or higher (Key 4). By Grade 11, students are expected to complete Algebra 2 with a course grade of C or higher (Key 5). During high school, students are expected to take at least one Advanced Placement (AP) exam with a score of 3 or higher or an International Baccalaureate (IB) exam with a score of 4 or higher (Key 6). The last key (Key 7) refers to a combined score of 1650 on the SAT or a composite score of 24 on the ACT.

Purpose and Educational Significance of this Study

This study builds on previous MCPS research in several ways. To start, this is the first longitudinal study to examine relationship between college readiness and postsecondary educational outcomes for MCPS graduates in a more systematic way beyond correlation analyses. More rigorous multivariate statistical methods, including multiple regression, logistic regression and structural equation modeling, were used to examine the impact of MCPS keys to college readiness on postsecondary educational outcomes. The study provides validity evidence for the Seven Keys.

A second way in which this study builds on the foundational research for the Seven Keys is that it goes beyond academic readiness. This study investigates how behavioral college readiness affects bachelor's degree attainment. Behavioral college readiness includes academic experience in high school, high school attendance rate, and effort in high school courses. It is important to look at behavioral readiness in conjunction with academic factors because it gives a more holistic vision of preparing all of our students for success after they leave MCPS.

In addition, this study also contributes to the educational research by developing a high school course rigor index based on actual course history records rather than self-reported data.

Research Questions

The research questions for this study are:

1. How did MCPS 2003 high school graduates perform on four out of seven keys to college readiness?
2. How did demographics, educational aspiration, academic experience, and high school curriculum rigor including keys to college readiness relate to SAT scores for MCPS 2003 graduates?

3. How were the keys to college readiness related to postsecondary educational outcomes as measured by college enrollment, college retention, and bachelor's degree attainment within six years after high school graduation for MCPS 2003 graduates? What were the factors that associated with these educational outcomes?
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Literature Review

This section focuses on factors that affect college readiness and postsecondary outcomes such as college enrollment, college retention, and degree attainment.

Demographics and Family Background

The Wisconsin socioeconomic attainment model describes and explains an individual's social mobility and its determinants. The model receives its name from the state of Wisconsin where a significant amount of research was completed. The model was first advanced by Blau and Duncan (1967). Essentially, the model depicts family background characteristics and ability as determinants of individual scholastic achievement. According to Blau-Duncan's model, there are direct and positive relationships among fathers' education and occupation and children's education and occupational status. An individual's demographics, ability, and achievement in turn shape the views of significant others regarding the person's academic potential (Sewell, Haller, & Ohlendorf, 1970; Haller & Portes, 1973; Hurst, 2007). The model was later modified by adding school curriculum. The addition of curriculum into the model detected significant school influence in terms of academic performance (Alexander & McDill, 1976; Campbell, 1983).

Coleman's study (1966), "Equality of Educational Opportunity," suggested that family socioeconomic status and peer influence had the largest influence on student's academic performance. The disparity on educational measures was observed between the performance of groups of students defined by gender, race, ability, and socioeconomic status. While the racial achievement gap is well documented, there is little agreement regarding why the difference exists (Smith & Allen, 1984).

The culture and environment in which children are raised play important roles in the achievement gap (Lareau, 1987; Jencks & Phillips, 1998). Schools tend to place students in different programs as a means of tailoring lesson plans for different types of learners. Hispanic and African American students are more likely to be placed into lower tracks (Hallinan, 1994). Once students are in these lower tracks, they tend to have a less challenging curriculum and few opportunities to advance into a higher level. Hispanic students from immigrant families have difficulty getting help with their homework because there may not be an English speaker at home to offer assistance (Suarez-Orozco & Suarez-Orozco, 2009).

Achievement Prior to High School

In addition to family and demographic characteristics, prior academic achievement in middle school is also an important predictor of high school performance (Adelman 1999; Hauser, Simmons, & Pager, 2004). The focus on the middle school years is crucial because early adolescent years may be filled with negative changes in academic behavior and motivation (Eccles, Lord, & Midgley, 1991). A study by the ACT (2008a) indicates that the level of academic achievement that students attain by Grade 8 has a larger impact on their college and career readiness by the time they graduate from high school than anything that happens academically in high school.

Expectation and Educational Aspiration

Expectations of individuals can predict the outcome of the world around them. A self-fulfilling prophecy is a prediction that directly or indirectly causes itself to become true due to feedback between beliefs and behaviors. Sociologist Robert K. Merton is credited with coining the expression and formalizing its structure and consequences (Merton, 1968).

Expectations may change behaviors in ways one may not notice. People often pick up non-verbal behaviors that affect attitudes (Brameld, 1972; Rosenthal, 2003). Even though parental expectations influence a student's educational aspiration, school dynamics, such as teacher support, contact with counselors, and encouragement from school staff, can have a significant impact on a student's educational aspiration (Oakes, Gamoran, & Page, 1992). Schools are the institutions through which educational goals are crystallized and realized. When students perceive support from teachers and a school climate conducive to learning, they are more likely to have high aspirations and pursue their educational goals (Gamoran, 1987).

High School Course Taking Patterns and Academic Performance

The most common approach to defining college readiness is in terms of high school course taking patterns, including course titles, perceived challenge level and the number of units required for graduation, combined with the grades students received in those courses (Conley, 2007). The College Board developed a composite measure of students' course rigor in high schools based on self-reported responses to the SAT questionnaire. The academic rigor index is calculated by the completed courses in the subject areas of English, math, science, social science/history, and foreign and classical language during high school (Wiley, Wyatt, & Camara, 2010).

Three out of seven MCPS keys to college readiness are associated with high school curricula and courses. Students with high educational aspiration take more academically challenging courses (Alexandra & Cook, 1982; Hotchkiss & Dorsten, 1987). A WestEd study (Finkelstein & Fong, 2008) finds that the high school program for college preparation begins in Grade 9, and making up missed preparatory courses and academic content is likely to be difficult for students who put off college-preparatory work until later in their high school years. Students who take Algebra 1 or higher, English, and a language other than English in Grade 9 are more likely to attend a four-year college.

Students who take AP or International Baccalaureate (IB) classes benefit from participating in college-level courses while in high school. A score of 3 or higher on an AP exam or 4 or higher on an IB exam may qualify students for college credits. AP participation and performance are positively related to college readiness and degree completion (Byrd, 2007; Camara & Michaelides, 2005; DiYanni, 2008; Geiser & Santelices, 2004). Graduates who earn credits for AP courses and exams not only perform as well or better than non-AP graduates upon entry to college, but also are more likely to complete a bachelor's degree (College Board, 2009b; Hargrove, Godin, & Dodd, 2008; Morgan & Klaric, 2007; Scammacca & Dodd, 2005).

Standardized Tests and College Readiness Indicators

Besides high school courses, college admission tests are used to define college readiness by relating test scores with the probability of postsecondary success. The SAT and ACT are the two most commonly used standardized college admission tests.

SAT. The SAT measures knowledge of reading, writing, and mathematics—subjects taught in high school. The knowledge measured on the SAT has been identified as essential for college-level academic study (College Board, 2005). Most students take the SAT during their junior and/or senior year of high school. The score range for each SAT section is between 200 and 800 with a mean of 500 and standard deviation of 100 on a normal distribution. Before January 2005, the SAT consisted of two sections: verbal and mathematics. Since March 2005, the SAT includes three sections: critical reading, writing, and mathematics. In 2010, the College Board identified a combined score of 1550 (rounded from 1556) on SAT reading, mathematics and writing tests as the college readiness indicator. The SAT score of 1550 is associated with a 65% probability of obtaining a B- in first-year college courses (Wiley, Wyatt, & Camara, 2010).

The MCPS Key 7 is 1650 on the SAT, higher than the College Board college readiness indicator. A composite score of 1650 on critical reading, mathematics, and writing corresponds to the 67 national percentile rank (College Board, 2010). A score of 550 on SAT critical reading, mathematics and writing corresponds to the 66, 61, and 69 national percentile ranks respectively, for 2010 college-bound seniors.

MCPS Grade 10 students take the Preliminary SAT/National Merit Scholarship Qualifying Test (PSAT/NMSQT). The College Board also established college readiness indicators on the PSAT/NMSQT (Proctor, Wyatt, & Wiley, 2010). As shown in Table 1, Grade 11 students who scored 152 on the PSAT/NMSQT had a 65% likelihood of scoring 1550 on the SAT. Additional information by the College Board indicates that among Grade 11 students who scored between 155 and 159 on the PSAT/NMSQT composite score, 80% achieved college readiness scores on the SAT. Of Grade 10 students who scored between 155 and 159 on the the PSAT/NMSQT, 93.8% of them were college ready (Proctor, Wyatt, & Wiley, 2010).

Table 1
Test Scores with 65 Percent Likelihood of Meeting SAT College Benchmark by
PSAT/NMSQT Test Section and Composite Scores

	Critical Reading	Mathematics	Writing	Composite
Grade 11 PSAT	50	50	49	152
Grade 10 PSAT	49	47	48	145

Note. The composite score is slightly higher than the sum of the three section scores (Proctor, Wyatt, & Wiley, 2010).

ACT. The ACT is another standardized test commonly used for college admission. The ACT assesses high school students' general educational development and their ability to complete college-level work. Many students are taking the ACT during their junior or senior year of high school. The ACT has four sections: English, mathematics, reading, and science (optional) with a score range from 1 to 36 for each section. The ACT's college readiness benchmarks are the minimum test scores required for students to have a high probability of success in credit-bearing college courses—English composition, social sciences, college algebra, or biology.

Table 2 shows the ACT college readiness benchmark scores required for students to have a 50% chance of obtaining a course grade of B or higher or about a 75% chance of obtaining a C or higher in the corresponding credit-bearing first-year college course (ACT, 2008b). For example, a student who scored 18 on the ACT English test will have a 50% chance of getting a course grade of B or higher in a college English composition course. The score of 18 on the ACT English is also associated with a 75% chance of getting a grade of C or higher in a college English composition course.

Table 2
ACT Benchmark Scores for College Readiness

College Course	Test	ACT Test Scores
English Composition	English	18
Social Sciences	Reading	21
College Algebra	Mathematics	22
Biology	Science	24

MCPS uses a composite score of 24 on the ACT as an indicator for college readiness. A composite score of 24 on ACT (2010b) corresponds to the 74 national percentile rank.

Since MCPS Key 7 comprises both the SAT and ACT scores, a concordance table for the two tests may be useful for schools (Appendix B). The College Board and the ACT produced the concordance tables based on students who took both the ACT and the SAT (College Board, 2009a). The SAT and ACT are different tests, and it is not possible to predict exactly what score a student would get on one test, based solely on the score obtained on the other. However, the concordance tables provide the best possible estimated comparison between the SAT and the ACT. For example, a composite score of 24 on the ACT is estimated to be close to a combined score of 1100 on SAT critical reading and mathematics scores. An ACT writing score of 24 corresponds to 550 on the SAT writing test.

Conley's College Readiness Model

It is important to realize that college readiness is multidimensional. Conley's comprehensive definition of college readiness (2007) includes four components: key cognitive strategies, key content, academic behavior, and contextual skills and awareness. First, key cognitive strategies reflect critical thinking, reasoning, problem solving and "intellectual openness." Second, key content includes academic skills for writing; research; and academic knowledge or skills in English, mathematics, science, world languages, social studies and arts. Third, academic behaviors include self-monitoring, self-control, and study skills. Self-monitoring is critical because it allows students to work through a topic independently and transfer learning from familiar settings to new ones. Study skills include time management, note taking, prioritizing tasks, and communicating with teachers. Last, contextual skills and awareness emphasize knowledge and ability to understand the university system. The knowledge about universities includes college application, admission, financial system, placement, and curriculum.

College Enrollment, Retention, and Completion

The longer a student waits before he/she enrolls in a college after high school, the less likely the student will attain a college degree (Tuma & Geis, 1995). While students' socioeconomic status and ability to pay tuition are important variables in college retention, academic preparation, educational aspiration, and social interaction in college also play a salient role (Terenzini, Cabrera, & Bernal, 2001).

Even though the economic value of higher education has long been known, it has proven much easier to get Americans into college than to guide them to degree completion. In addition to college readiness, college culture, work intensity, family responsibilities, and the economy may also influence a student's decision to stay enrolled and to complete a degree (Horn & Premo, 1995).

Tinto (1993) proposed a multivariate model of student retention in postsecondary institutions to explain why students leave college prior to graduation. His model includes a comprehensive set of demographic, cognitive, psychosocial, and institutional factors that account for a student's decision to persist or withdraw from college. Tinto's "Model of Institutional Departure" identifies three major sources of student departure: academic difficulties, the inability of individuals to resolve their educational and occupational goals, and their failure to become incorporated in the intellectual and social life of college.

Since the mid-1960s, an increasing number of high school graduates began their postsecondary education at two-year institutions. Although the initial enrollment in a two-year college can yield substantial financial savings, the transfer from a two-year college to a four-year college poses a risk for attaining a bachelor's degree (Bowen, Chingos, & McPherson, 2009). The data from a national representative survey indicates that initial enrollment at a two-year college decreases the bachelor's degree attainment rate by roughly 30 percentage points (Reynolds, 2006).

Certain student behaviors in college reduce the likelihood of completing a bachelor's degree, including delayed enrollment after high school, enrollment in a two-year institution, part-time or

non-degree enrollment, and transfer between colleges. College retention is related to educational expectation in the senior year of high school (Carroll, 1989). A student's academic preparedness, skills, and career goal through K–12 schooling are related to persistence in college and graduation from college (Tinto, 1993).

METHODOLOGY

Procedures for Analyses

Descriptive statistics were calculated to answer the first research question about attainment of the Seven Keys for MCPS 2003 high school graduates when data were available. No data for the first three keys were available for MCPS 2003 graduates. To address all the other research questions, both descriptive and multivariate statistical analyses were conducted.

For the second research question, multiple regression was used to predict SAT scores from a set of predictors such as demographics, previous achievement, attendance rates, high school course rigor, and the Seven Keys.

To answer the third research question, logistic regression was used to identify factors that contribute to postsecondary success as measured by college enrollment, college retention, and bachelor's degree attainment within six years after high school graduation for MCPS 2003 graduates. Logistic regression is a useful way of describing the relationship between one or more variables (e.g., sex, race, achievement, etc.) and a binary dependent variable such as "enrolled" or "not enrolled" in college. Since college retention and degree attainment are binary variables, the logistic regression estimates probability of college enrollment, college retention, and degree attainment as a function of several predictors including demographics, high school course rigor, standardized test scores and others.

To answer the fourth research question, Structural Equation Modeling (SEM) was used to examine the relationships among high school academic readiness, behavior readiness for college, and time to complete the first bachelor's degree. SEM is a combination of factor analyses and multiple regression or path analyses. SEM is an appropriate statistic procedure to use when an important construct such as college readiness cannot be directly measured. In addition, SEM can simultaneously estimate the strength of direct, indirect, and total effects among latent (unobserved) constructs such as college readiness when the observed college readiness indicators (keys) contain measurement errors. It is a "more comprehensive and flexible approach to research design and data analyses than any other single statistical procedure in standard use by social and behavior scientists" (Holye, 1995, p. 15). The SEM model was applied to students of different racial/ethnic groups. African American, American Indian, and Hispanic students were combined as one group in order to have sufficient sample size for analyses.

Based on Conley's college readiness model (2007), the SEM model in this study contains two components—academic readiness and behavioral readiness. No data are available to include all four components in Conley's model. Figure 1 below shows the conceptual diagram for the SEM model.
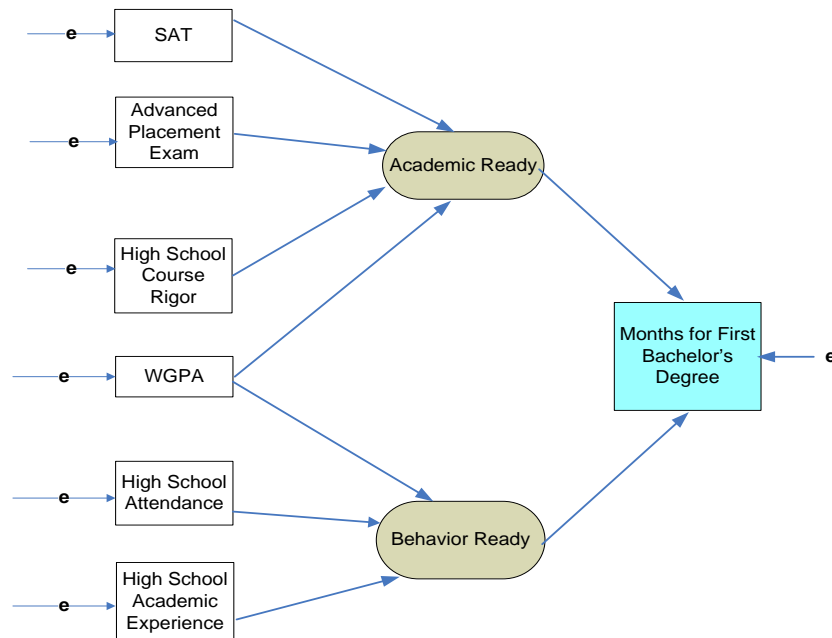
Figure 1. Conceptual Diagram for College Readiness and Postsecondary Outcome.

Multiple regression and logistic regression analyses were conducted with Statistical Package for the Social Sciences (SPSS) Version 15. Stepwise method was selected for variable entry because it yielded the smallest but most important set of predictors. Linear Structural Relations (LISREL) Version 8.8 was used for SEM analyses.

Data Samples

The MCPS 2003 graduating class was chosen because this was the most recent cohort with the most complete postsecondary educational data, seven years after high school. In MCPS, all students are assigned unique identification numbers upon entry into the school system so the district can track them during the time they are in MCPS. The unique identification numbers also allow researchers to merge data from different sources.

The postsecondary educational outcomes for MCPS graduates were based on information from the StudentTracker Data of National Student Clearinghouse (NSC) as of August 2010. The NSC is a nonprofit organization that collects and verifies students' academic achievement in higher education at a national level. StudentTracker Data are available for 92% of American collegiate enrollment. About 3,300 participating colleges and universities provide data to the NSC. School districts, universities, and agencies can obtain information about students' postsecondary educational outcomes from the NSC (NSC, 2009). The NSC data do not include students who decline to release their information in order to comply with the Family Educational Rights and Privacy Act. From 2002–2010, more than 80% of MCPS high school graduates had college enrollment records in the StudentTracker Data. The NSC postsecondary data file for 2003 graduates had MCPS identification numbers. With the unique identification numbers, all students who had postsecondary outcomes were matched with their MCPS records.

The original MCPS 2003 graduating class had 8,805 students. After examining their postsecondary outcomes, the researchers found errors for six records. The time between college enrollment and graduation was too short to be true (less than a year), so these six students were excluded, with 8,799 students remaining.

In SEM, it is important to validate the model so that the stability of the results can be investigated. For validation, the 2003 cohort was randomly split into two subsets in SPSS. One subset was used to test the conceptual model and the other to check robustness of the identified model.

As shown in Table 3, the two samples were very similar in demographic characteristics such as gender, race, Free and Reduced-price Meals System (FARMS), special education, and English for Speakers of Other Language (ESOL) services.

Table 3
Characteristics of Students for 2003 Graduating Cohort and Two
Randomly Split Samples

	2003 Cohort		Sample 1		Sample 2	
	N	%	N	%	N	%
All Students	8,799	100.0	4,425	100.0	4,374	100.0
Female	4,481	50.9	2,234	50.5	2,247	51.4
Male	4,318	49.1	2,191	49.5	2,127	48.6
African American	1,604	18.2	813	18.4	791	18.1
American Indian	20	0.2	13	0.3	7	0.2
Asian American	1,348	15.3	677	15.3	671	15.3
Hispanic	1,103	12.5	548	12.4	555	12.7
White	4,724	53.7	2,374	53.6	2,350	53.7
Ever FARMS	2,633	29.9	1,338	30.2	1,295	29.6
Ever Special Education	1,275	14.5	645	14.6	630	14.4
Ever ESOL	1,490	16.9	743	16.8	747	17.1

Note. Results are reported separately for graduates who ever received Free and Reduced-price Meals System (FARMS), special education, and English for Speakers of Other Language (ESOL) services.

Measures

Several important measures will be discussed in this section. In addition, Appendix C provides a detailed description of all variables used for this study.

Demographics

Besides gender and race/ethnicity, the MCPS student record file indicates whether a student ever received FARMS, special education, or ESOL services, or was ever suspended during the time he/she was in MCPS. These variables were used as measures of demographics.

Previous Achievement

The state assessment for 2003 graduates was the Maryland Functional Tests. The tests were developed in the 1980s to measure only the most basic skills and functional knowledge for Maryland's high school graduates. At the beginning of the test program, students were tested for the first time in Grade 9 and continued to take the test until they passed. By the end of the program, most students were taking and passing the tests in middle school. Therefore, the scale scores in reading and mathematics tests were combined as an indicator for academic achievement prior to high school.

High School Curriculum Rigor

In 2003, Maryland students could earn a high school diploma if they met the graduation requirement of four-year enrollment beyond Grade 8 with 22 credits, courses in required content areas, student service learning, and passing competency tests. Four years of English (4 credits), four years of mathematics (4 credits), three years of science (3 credits), three years of social studies (3 credits) and two years of foreign languages (2 credits) were required in core content areas. Students could earn a high school diploma by meeting graduation requirements or earn a high school certificate through a special program. In MCPS, a student's high school courses and credits earned in the courses are maintained in a longitudinal course history file. This data source provides rich information about high school curriculum and grades earned in each course.

The researchers of this study developed a high school course rigor index according to actual courses taken and credits earned in high schools. In the course rigor index, each graduate was awarded at least 10 points (2 for each of the five core content areas) regardless of whether they earned a high school diploma or a certificate. Regular courses were not counted beyond the 10 points in the course rigor index. If a student took an advanced/honors course and passed the course, he/she was awarded 2 points. If a student took an advanced/honors course but failed it, he/she only received 1 point. If a student took an AP or IB course and passed the course, 4 points were awarded. If the student took but failed an AP or IB course, he/she received only 2 points.

The MCPS high school course rigor index is the sum of all points earned in English, mathematics, science, social studies, and foreign language based on the actual high school course history. Appendix D provides the information about the index calculation. A list of honors/advanced or AP/IB courses for the index is provided in Appendix E.

Other Measures

For 2003 graduates, no information was available for the first three keys; therefore, only four out of seven keys were included in the study. Academic performance on high school courses can be measured by grade point average (GPA). GPA is a comprehensive measure of a student's performance. In MCPS, cumulative GPA is based on all credit-bearing courses in high school. GPA is calculated in two ways—unweighted and weighted. For unweighted GPA, A is equal to 4, B to 3, C to 2, D to 1, and E to 0. The weighted GPA ranges from 0 to 5 with more weights for advanced and honors courses. Highest mathematic course level by Grade 12 is another measure of challenging mathematics courses because it provides information beyond Algebra 2.
Academic Readiness Construct

For SEM, the academic readiness construct includes the highest combined SAT scale scores for reading and mathematics during one administration, number of AP exams with a score of 3 or higher, high school course rigor index, and high school weighted GPA. No SAT writing test was administered in 2003 (College Board, 2005). No graduates in the study sample took IB exams so only AP exams were included for the academic readiness construct.

Behavioral Readiness Construct

For SEM, behavior readiness construct included academic experience in high school, high school attendance rate, and high school weighted GPA. The sum of the 12 items on the 2003 High School Senior Exit Survey is the score for the academic experience in high school (Appendix F). The higher numbers reflect a more positive experience. Besides survey items, the average school attendance rate during high school years is another indicator of behavioral readiness. Weighted GPA also indicates a student's effort in rigorous courses.

Postsecondary Educational Success Measures

Postsecondary success was measured by college enrollment, second year retention, bachelor's degree attainment within six years after high school graduation, and time spent on the first bachelor's degree. College enrollment and second year retention were based on the NSC's calculation.

College enrollment indicates whether a high school graduate enrolled in a two-year or four-year postsecondary institution with an enrollment status of full-time or part-time immediately in the fall semester after high school graduation. According to NSC, the fall semester is defined as any term that begins before October 1 of the high school graduating year.

The second year retention indicates whether a high school graduate who enrolled in college anytime within a year after high school graduation remained enrolled in the second academic year. Students may retain in any postsecondary institution in the second year, not necessary their first-enrolled institution.

The third measure of college success is whether 2003 graduates completed a bachelor's degree within six years after their high school graduation by August 15, 2009. For SEM, college success is measured by time spent (in months) on the first bachelor's degree from first enrollment to graduation.[1]

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[1] Months for first bachelor's degree = graduation date of the first bachelor's degree – the first enrollment date in college.

Missing Values

How to handle missing values in a longitudinal study is not unique to regression and SEM analyses. In this study, list-wise deletion was used to select cases with complete information on relevant variables for multiple regression, logistic regression and SEM,[2] respectively.

RESULTS

Results are presented for college readiness and postsecondary educational outcomes for MCPS 2003 high school graduates. The results are displayed in the order of research questions.

Attainment of College Readiness Indicators by the End of High School

This section presents results to answer the first research question: How did MCPS 2003 high school graduates perform on four out of seven MCPS Keys to College Readiness? Number and percentage of students who attained each key (for the four that were available) are shown in Table 4.

Of 8,799 MCPS 2003 graduates, 26.9% completed Algebra 1 with a course grade of C or higher by Grade 8, 57.2% completed Algebra 2 with a grade of C or higher by Grade 11, 37.7% had at least one AP exam with a score of 3 or higher, and 41.6% scored 1100 or higher on the SAT verbal and mathematics tests or 24 or higher on the ACT composite (Table 4). African American and Hispanic students, and students who have ever received FARMS, special education, or ESOL services were less college ready as measured by the keys.

Table 4
Performance of MCPS 2003 Graduates on MCPS Keys for College Readiness

	Total	Key 4 Alg 1 with C/+ by Grade 8		Key 5 Alg 2 with C/+ by Grade 11		Key 6 AP exams with 3 or higher		Key 7 SAT 1100 ACT 24	
		N	%	N	%	N	%	N	%
All Graduates	8,799	2,369	26.9	5,034	57.2	3,318	37.7	3,662	41.6
Male	4,318	1,168	27.0	2,293	53.1	1,466	34.0	1,845	42.7
Female	4,481	1,201	26.8	2,741	61.2	1,852	41.3	1,817	40.5
African American	1,604	156	9.7	560	34.9	209	13.0	220	13.7
Asian American	1,348	524	38.9	952	70.6	678	50.3	719	53.3
Hispanic	1,103	97	8.8	329	29.8	245	22.2	146	13.2
White	4,724	1,588	33.6	3,181	67.3	2,181	46.2	2,570	54.4
Ever FARMS	2,633	268	10.2	945	35.9	464	17.6	381	14.5
Ever Special Ed.	1,275	183	14.4	444	34.8	248	19.5	290	22.7
Ever ESOL	1,490	209	14.0	624	41.9	362	24.3	261	17.5

Note. Results for American Indian students were included with all graduates but were not reported separately due to their small number.

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[2] Reliance on pairwise deletion may yield a non-positive covariance matrix that cannot be analyzed in SEM. Replacing missing values with mean imputation may result in heteroscedastic errors (Schumaker & Lomax, 2010).

Factors Related to SAT Scores

The results in this section answer the second question: How did demographics, educational aspiration, academic experience, high school curriculum rigor including MCPS keys for college readiness relate to SAT scores for MCPS 2003 graduates? Since SAT and ACT are different in scale score ranges, only 24 graduates took ACT in 2003, and no students had IB exams, the multivariate regression analyses included SAT not ACT scores and AP not IB exams.

The results, shown in Table 5, identified factors that contribute significantly to SAT scores. The standardized beta [3] (β) values are regression coefficients that measure how strongly each predictor variable influences a criteria variable such as SAT scores. The higher the beta value, the stronger the relationship is between the predictor and SAT scores. R^2 indicates the proportion of variance in SAT scores accounted for by predictors. It is a measure of how good the prediction is based on the predictors. The closer the R^2 is towards 1, the better the prediction.

Of 5,901 students with complete data on all variables in Table 5, previous achievement as measured by Maryland Functional Test scores had the largest impact ($\beta = 0.293$) on SAT scores, followed by high school course rigor index ($\beta = 0.268$), highest mathematic level ($\beta = 0.180$), and number of AP exams with a score of 3 or higher ($\beta = 0.132$). The R^2 of 0.766 means that the set of all variables in the model can explain 76.6% of the variance in SAT scores. P values smaller than 0.05 indicate the variable contributes significantly to the SAT prediction.

Table 5
Multivariate Linear Regression Results of SAT
Scores for MCPS 2003 Graduates

Predicators	Standardized Beta (β)	p value
Minority[4]	-0.092	0.000***
Ever FARMS	-0.085	0.000***
Ever ESOL	-0.065	0.000***
Ever suspended	-0.033	0.000***
MD functional test	0.293	0.000***
N AP exam 3 or higher	0.132	0.000***
HS course rigor index	0.268	0.000***
Highest math level	0.180	0.000***
Academic experience	0.013	0.051**
Alg 1 C/+ by G8	0.032	0.000***
Alg 2 C/+ by G11	0.041	0.000***
Edu. aspiration	0.140	0.048**

Note. $F_{12,5889} = 1605.359$, $R^2 = 0.766$, Adjusted $R^2 = 0.765$[5],
$N = 5,901$, *$p < 0.05$, **$p < 0.01$, ***$p < 0.001$.

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[3] The standardized beta values are measured in units of standard deviations. For example, a beta value of 2.6 indicates that a change of one standard deviation in the predictor variable will result in a change of 2.6 standard deviation in the criteria variable.

[4] Includes African American, Hispanic, and American Indian students compared with White and Asian American students.

[5] Adjusted R square takes into account the numbers of variables and number of observations or participants and provides the most useful measure.

There is a correlation between lower SAT scores and being African American, Hispanic or American Indian, having received FARMS or ESOL services; or having received suspension during the time in MCPS. Higher SAT scores are associated with higher prior achievement, more AP exams with a score of 3 or higher, greater school course rigor, higher mathematic levels, more positive academic experience in high school, Algebra 1 with a grade of C or higher by Grade 8, Algebra 2 with a C or higher by Grade 11, and higher educational aspiration in high school. It is worth noticing that highest mathematic level has a stronger relationship with SAT scores than Algebra 1 with C or higher by Grade 8 or Algebra 2 with C or higher Grade 11 (Keys 4 and 5). High school mathematics levels in 2003 ranged from pre-algebra to calculus.

College Enrollment, Retention, and Degree Attainment

This section presents results for the third research question: How were MCPS keys to college readiness related to postsecondary educational outcomes as measured by college enrollment, college retention, and bachelor's degree attainment within six years after high school graduation for MCPS 2003 graduates? What were the factors that associated with these educational outcomes? Descriptive analyses results are followed by logistic regression results.

College Enrollment in Fall Immediately After High School Graduation

Table 6 displays college enrollment in the fall immediately after high school. Of 8,799 MCPS 2003 graduates, 4,219 (47.9%) enrolled in four-year colleges and 2,074 (23.6%) in two-year colleges. More Hispanic students were enrolled in two-year (31.5%) than four-year (19%) colleges.

Table 6
Number and Percentage of MCPS 2003 Graduates Who Enrolled in College Immediately in Fall
after High School Graduation by Institutional Level and Race/Ethnicity

	N	*N* Enrolled in Fall			% Enrolled in Fall		
	Graduates	All	4-Year College	2-Year College	All	4-Year College	2-Year College
All Students	8,799	6,293	4,219	2,074	71.5	47.9	23.6
African American	1,604	937	575	362	58.4	35.8	22.6
Asian American	1,348	1,048	683	365	77.7	50.7	27.1
Hispanic	1,103	557	210	347	50.5	19.0	31.5
White	4,724	3,735	2,740	995	79.1	58.0	21.1

Note. Results for American Indian students are included with all students but are not reported separately.

As shown in Figure 2, 71.5% of MCPS graduates enrolled in college in the fall immediately after high school compared to 63.9% of 2003 high school graduates in the nation (U.S. Department of Labor, 2004). Among the graduates, a higher percentage of students who met the MCPS keys to college readiness enrolled in college in the fall immediately after high school compared with those who did not.
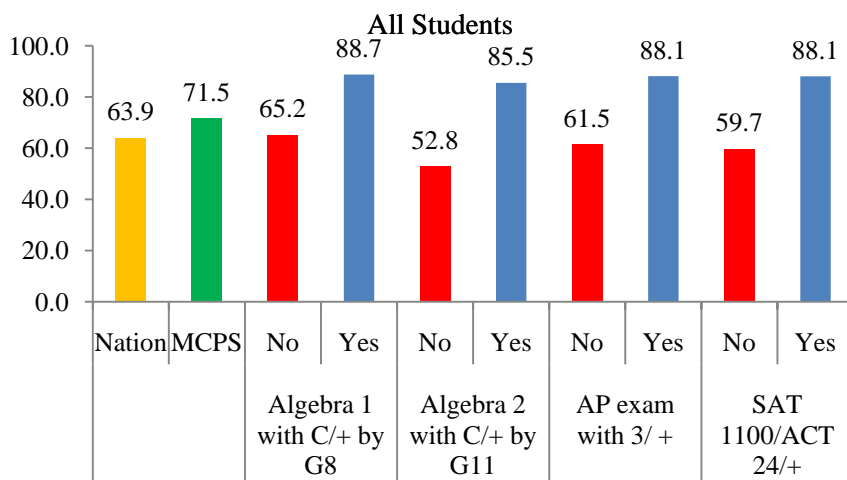
Figure 2. Percentage of MCPS 2003 graduates who enrolled in any college in the fall immediately after high school graduation.

In Figures 3 through 6, fall college enrollment is shown for students of different racial/ethnic groups. The same pattern is consistent across racial/ethnic groups. If students were ready on MCPS keys to college readiness, a higher percentage of them enrolled in college immediately after high school regardless of their race and ethnicity. Enrollment rate is not shown for American Indian students due to their small numbers. For instance, 87.3% of African American students and 82.9% Hispanic students who scored at 1100 or higher on the SAT or 24 or higher on the ACT, enrolled in college in the fall immediately after high school, compared with 53.8% and 45.6% of their counterparts who scored below 1100 on the SAT or 24 on the ACT.
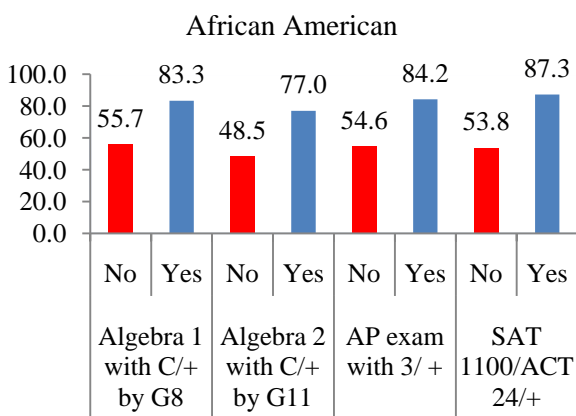
Figure 3. Percentage of MCPS 2003 African American graduates who enrolled in any college in the fall immediately after high school graduation.

Figure 4. Percentage of MCPS 2003 Asian American graduates who enrolled in any college in the fall immediately after high school graduation.
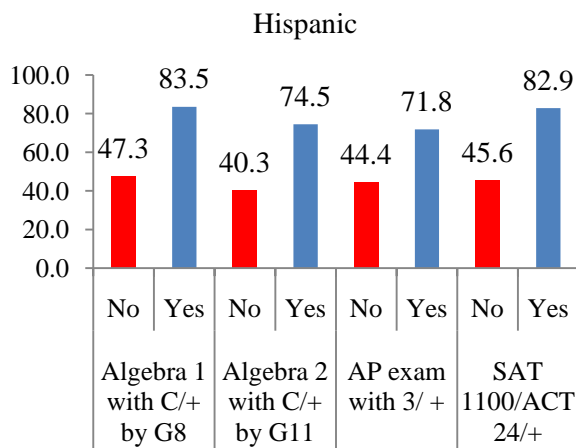
Figure 5. Percentage of MCPS 2003 Hispanic graduates who enrolled in any college in the fall immediately after high school graduation.
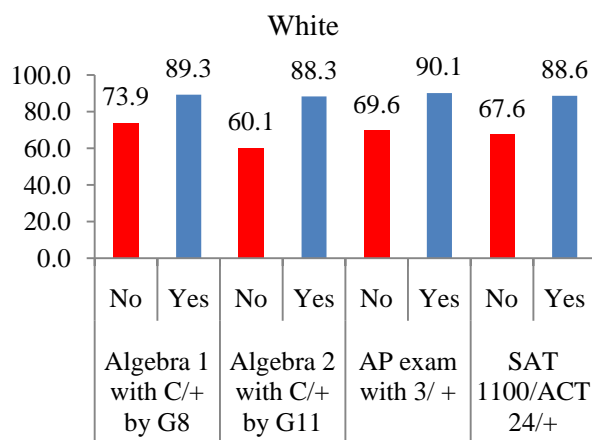
Figure 6. Percentage of MCPS 2003 White graduates who enrolled in any college in the fall immediately after high school graduation.

As illustrated in Table 7, students who were African American, American Indian, Hispanic, or ever received FARMS or ESOL services were significantly less likely to enroll in college in the fall immediately after high school. Attainment of the Seven Keys, academic experience, high school attendance, and educational aspiration were significantly related to college enrollment. Based on the predictors in Table 7, the overall prediction accuracy for fall enrollment in any college immediately after high school was 80.2%.

Table 7
Logistic Regression Results of Fall Enrollment in Any College Immediately
After High School for MCPS 2003 Graduates

Predictors	Standardized Beta	Standard Error	Wald's $\chi2$	df	P value	e^{β} (odd ratio)
Minority[6]	-0.416	0.077	28.776	1	0.000***	0.659
Ever FARMS	-0.438	0.081	29.287	1	0.000***	0.644
Ever ESOL	-0.191	0.091	4.336	1	0.037*	0.826
Met Key 4	0.002	0.001	3.811	1	0.050	1.002
Met Key 5	0.007	0.001	93.520	1	0.000***	1.007
Met Key 6	0.002	0.001	4.916	1	0.026*	1.002
Met Key 7	0.001	0.001	3.916	1	0.047*	1.002
Academic Experience	0.029	0.013	4.605	1	0.031*	1.030
HS Attendance	0.073	0.008	80.709	1	0.000***	1.075
Edu. Aspiration	0.373	0.034	117.266	1	0.000***	1.452
Constant	-7.515	0.772	94.7169	1	0.000***	0.000

Note. N = 6,644, Overall prediction accuracy = 80.2%, *p < 0.05, **p < 0.01, ***p < 0.001.

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[6] Includes African American, Hispanic, and American Indian students compared with White and Asian American students.

College Retention

Of 6,664 MCPS 2003 graduates who enrolled in college within a year after high school as freshmen, 6,403 (96.1%) returned for the second year in any college (Table G6, Appendix G). Retention rates for MCPS 2003 graduates were calculated for four-year and two-year colleges in order to compare with the national average.

According to the National Center for Higher Education Management Systems Information for State Higher Education Policymaking and Analysis (2004), the national retention rates for 2003–04 beginning college students were 76.5% in four-year colleges and 53.2% in two-year colleges.

As shown in Figures 7 and 8, the freshmen-to-sophomore retention rates for MCPS 2003 graduates were 98.6% for students enrolled in 4-year colleges, and 91.6% for students in 2-year colleges. The retention rates for MCPS 2003 graduates of different racial and ethnic groups were much higher than the national average.

4-year College Retention Rate
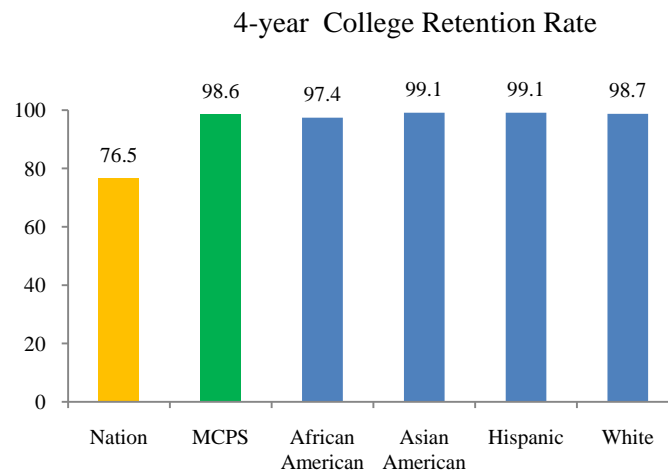
Figure 7. Freshmen-to-sophomore retention rate for MCPS 2003 graduates enrolled in 4-year colleges by race/ethnicity.

2-year College Retention Rate
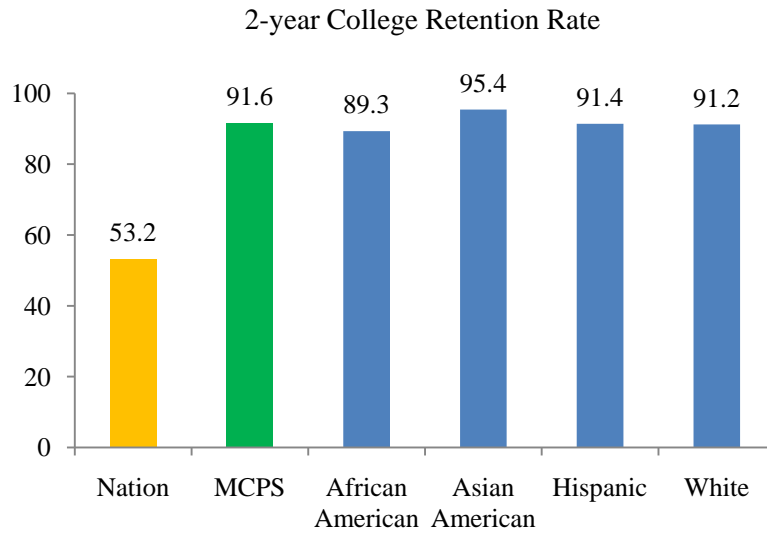
Figure 8. Freshmen-to-sophomore retention rate for MCPS 2003 graduates enrolled in 2-year colleges by race/ethnicity.

In Figures 9 through 12, the freshmen-to-sophomore retention rate is shown for MCPS graduates by race/ethnicity. Among all racial/ethnic groups, over 90% of graduates who enrolled in college within the first year after high school stayed in college as sophomores. The retention rate is not shown for American Indian students due to their small numbers. A slightly higher percentage of students who met the MCPS keys to college readiness stayed in college as sophomores compared with those who did not meet the keys.
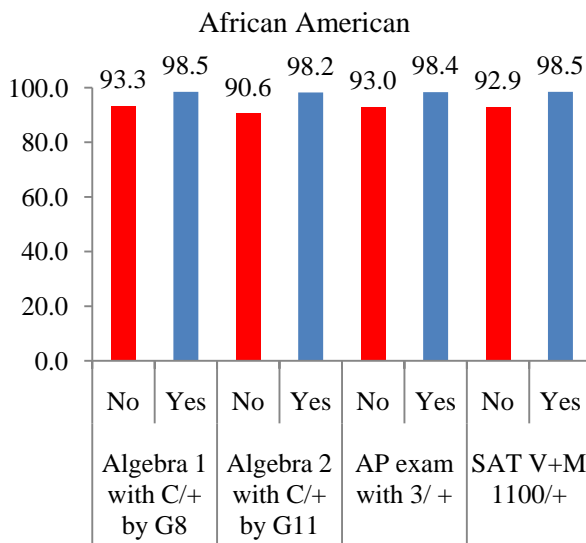
Figure 9. Freshmen-to-sophomore retention rate for MCPS 2003 African American graduates enrolled in any college.
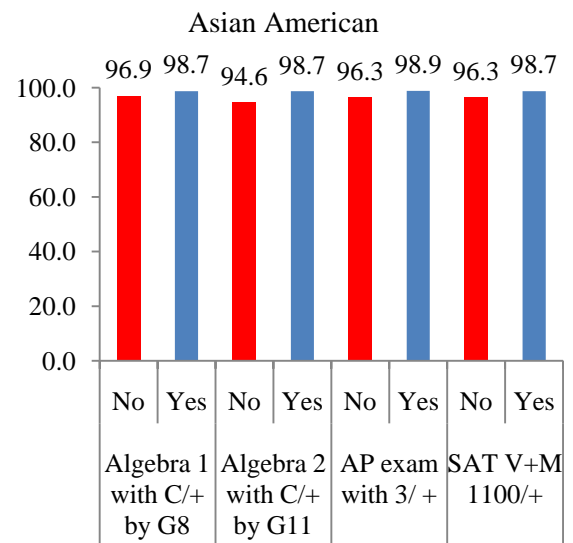
Figure 10. Freshmen-to-sophomore retention rate for MCPS 2003 Asian American graduates enrolled in any college.
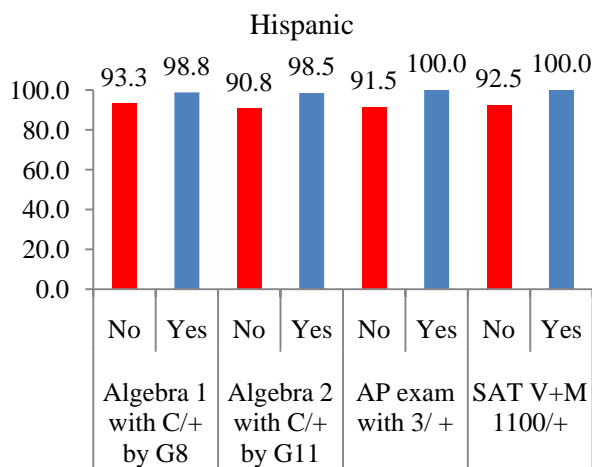
Figure 11. Freshmen-to-sophomore retention rate for MCPS 2003 Hispanic graduates enrolled in any college.
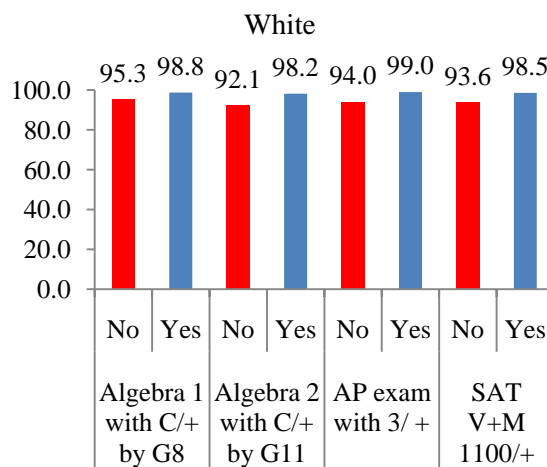
Figure 12. Freshmen-to-sophomore retention rate for MCPS 2003 White graduates enrolled in any college.

In Table 8, the logistic regression results show that race, FARMS or ESOL status, educational aspiration, high school weighted GPA, high school attendance rate, and highest mathematics level in high school are all significant predictors for college retention. Students who are African American, American Indian, or Hispanic, and have ever received FARMS or ESOL services are significantly less likely to stay in college from freshman to sophomore years. As indicated by standardized beta in Table 8, weighted GPA has the largest impact on college retention ($\beta = 0.527$), followed by educational aspiration ($\beta = 0.328$). With high school weighted GPA and highest mathematics level already in the model, keys are no longer significant.

Table 8

Logistic Regression Results of the Second Year College Retention for MCPS 2003 Graduates

Predictors	Standardized Beta (β)	Standard Error	Wald's $\chi2$	df	P value	e^{β} (odd ratio)
Minority[7]	-0.228	0.080	8.032	1	0.005**	0.796
Ever FARMS	-0.285	0.083	11.685	1	0.001***	0.752
Ever ESOL	-0.184	0.094	3.850	1	0.050*	0.832
Edu. Aspiration	0.328	0.035	85.795	1	0.000***	1.389
WGPA	0.527	0.063	69.389	1	0.000***	1.694
HS attendance	0.039	0.009	20.726	1	0.000***	1.040
highest math level	0.177	0.022	64.758	1	0.000***	1.194
Constant	-6.237	0.775	64.767	1	0.000***	0.002

Note. N = 6,644, Overall prediction accuracy = 81.6%, *p < 0.05, **p < 0.01, ***p < 0.00.

Based on all the predictors, 81.6% of students were identified correctly whether or not they returned to college the second year. More information on the second year retention by institution level, MCPS keys, weighted GPA, highest mathematics level, and educational aspiration by the end of high school is presented in Table G8 (Appendix G).

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[7] Includes African American, Hispanic, and American Indian students compared with White and Asian American students.

Degree Attainment in Six Years

Of 6,664 MCPS 2003 high school graduates who enrolled in college within the first year after high school, 3,984 (59.8%) obtained a bachelor's degree or higher within six years (Table 9).

Table 9

Number and Percent of MCPS 2003 Graduates Who Enrolled in College the First Year After High School and Earned a Bachelor's Degree or Higher within Six Years by Race/Ethnicity

	Graduates N	N Enrolled in College the First Year after High School N	N Earned BA by College Enrollees within Six Years N	Percent Earned BA by College Enrollees within Six Years %
All	8,799	6,664	3,984	59.8
African Am.	1,604	1,024	453	44.2
Asian	1,348	1,098	696	63.4
Hispanic	1,103	633	198	31.3
White	4,724	3,893	2,631	67.6

Note. Results for American Indian students are included with all students but are not reported separately.

According to a recent study by the National Center for Educational Statistics (Radford, Berkner, Wheeless, & Shepherd, 2010), only 30.7% of undergraduates who entered college for the first time in 2003–2004 obtained a bachelor's degree within six years (Figure 13).

Students who met the MCPS keys to college readiness were more likely to get a bachelor's degree within six years (Figure 13). For instance, 80.7% of students who scored 1100 or higher on the SAT or 24 or higher on the ACT received a bachelor's degree in six years, compared with 39.4% of those who scored lower. The same pattern exists for different racial groups (Figures 14–17). Higher percentages of students who met the MCPS keys attained a bachelor's degree within six years regardless of their ethnicity.
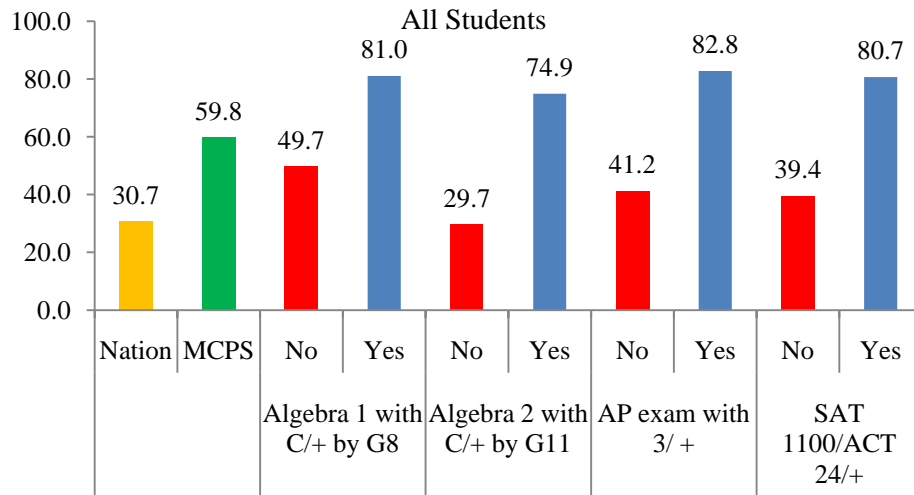
Figure 13. Percentage of all MCPS 2003 graduates who enrolled in college within a year after high school graduation and attained a bachelor's degree or higher within six years compared with the nation and by key.
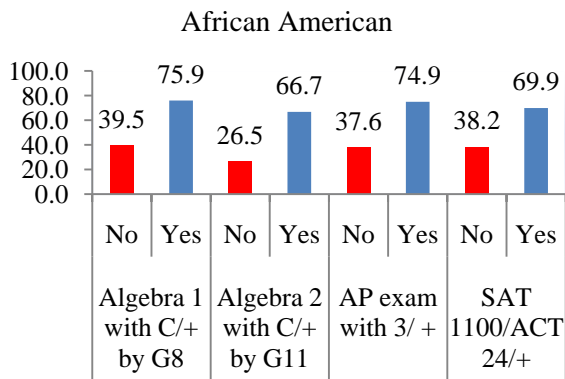
Figure 14. Percentage of MCPS 2003 African American graduates who enrolled in college within a year after high school graduation and attained a bachelor's degree or higher within six years by key.
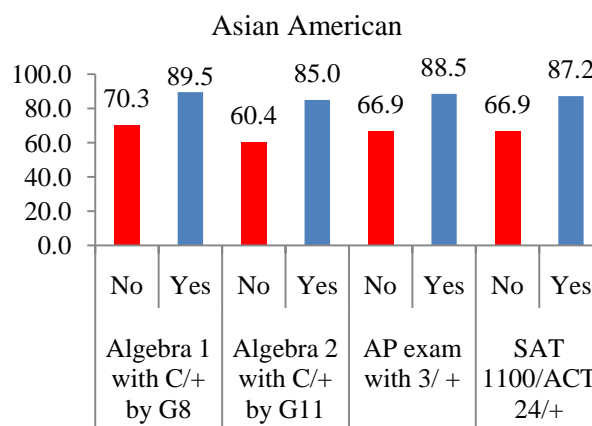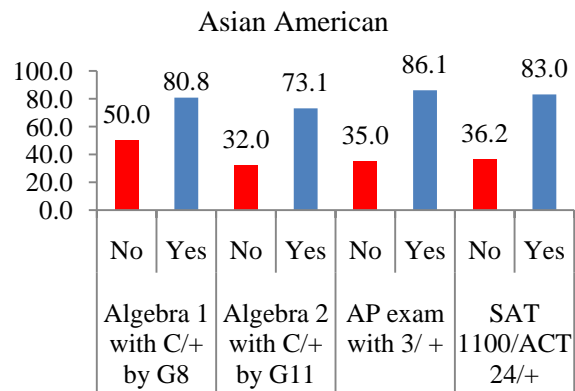

Figure 15. Percentage of MCPS 2003 Asian American graduates who enrolled in college within a year after high school graduation and attained a bachelor's degree or higher within six years by key.
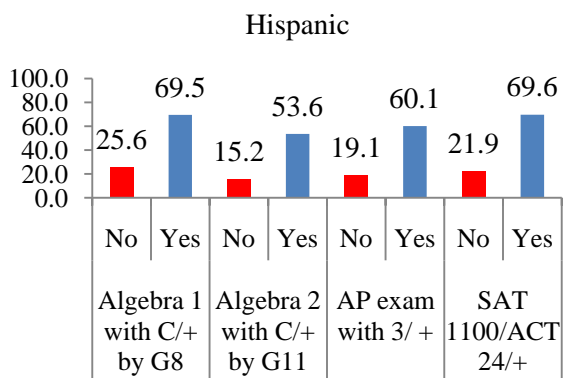
Figure 16. Percentage of MCPS 2003 Hispanic graduates who enrolled in college within a year after high school graduation and attained a bachelor's degree or higher within six years by key.
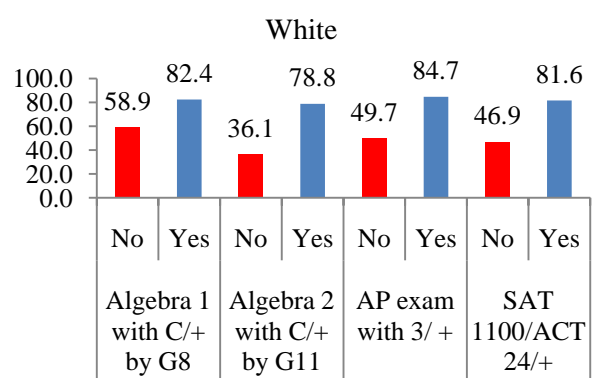
Figure 17. Percentage of MCPS 2003 White graduates who enrolled in college within a year after high school graduation and attained a bachelor's degree or higher within six years by key.

The logistic regression results for attaining a bachelor's degree or higher within six years are presented in Table 10. Students who remained in college in the second year are 4 times as likely (odd ratio = 4.010) to receive a bachelor's degree or higher within six years, compared with those who did not return the second year. Students with a higher weighted GPA were 2.3 times more likely to attain a bachelor's degree or higher in six year (odd ratio = 2.324), compared with those with a lower weighted GPA. In addition, students who immediately enrolled in four-year college after high school were 1.7 times (odd ratio = 1.716) more likely to obtain a bachelor's degree or higher within six years. Time of transfer in college was negatively related to degree attainment in six years. The more times a student transferred in college, the longer it took to get a bachelor's degree. The second year retention has the largest impact on bachelor's degree attainment in six years (β = 1.389), followed by times transferred (β = -0.915) and weighted GPA (β = 0.843). Based on the predictors in Table 10, the overall prediction accuracy for bachelor's or higher degree attainment within six years after high school was 96%.

Table 10
Logistic Regression Results for Bachelor's/Higher Degree Attainment within
Six Years for MCPS 2003 Graduates

Predictors	Standardized Beta (β)	Standard Error	Wald's $\chi 2$	df	P value	e^{β} (odd ratio)
HS attendance	0.044	0.022	4.007	1	0.045*	1.045
Weighted GPA	0.843	0.156	29.241	1	0.000***	2.324
Fall enroll 4yr college	0.540	0.207	6.810	1	0.009**	1.716
2nd yr retained	1.389	0.299	21.526	1	0.000***	4.010
Times transfer for BA	-0.915	0.103	79.550	1	0.000***	0.400
Constant	-3.793	1.997	3.607	1	0.058*	0.023

Note. N = 3,887, Overall prediction accuracy = 96%, * $p < 0.05$, **$p < 0.01$, ***$p < 0.001$.

As shown in Table G10 (Appendix G), no students who had only Algebra 1 in high school earned a bachelor's degree in six years, compared to 83.1% of students who had calculus or higher in high school. Additional information about bachelor's degree attainment in six years by MCPS keys, weighted GPA, highest mathematics level, and educational aspiration by the end of high school are presented in Tables G9 and G10 (Appendix G).

SEM Results

The SEM results shown in this section address the last research question: Is behavioral readiness, as well as academic readiness, associated with postsecondary success as measured by time spent on the first bachelor's degree? Are results consistent for different racial/ethnic groups?

Overall Model Fit Results

If the relationships specified in the model exist in the data, overall model fit indices should be within a certain range.[8] Overall model fit indexes presented in Table 11 are all within the acceptable range for Sample 1 and Sample 2 which include all students. Two additional samples for African American, American Indian, and Hispanic students are selected to test the same model. The three ethnic groups are combined so the sample sizes are large enough for SEM analyses.

Overall fitting indices, such as $\chi 2$, *p* value, Non-Normed Fit Index (NNFI), and Comparative Fit Index (CFI) and Root Mean Square Error of Approximation (RMSEA) are indicators of how the model fits the data. The results show that relationships among variables specified in the model exist across samples.

Table 11
Fit Indexes for the Same Model Tested on Different Data Samples of MCPS 2003 Graduates

Model	N	$\chi 2$	*P value*	df	NNFI	CFI	RMSEA
All Students in Sample 1	1,727	14.57	0.068	8	1.00	1.00	0.022
All Students in Sample 2	1,651	11.23	0.189	8	1.00	1.00	0.016
African Am./Am. Indian & Hispanic in Sample 1	267	4.52	0.807	8	1.00	1.00	0.000
African Am./Am. Indian & Hispanic in Sample 2	250	4.38	0.822	8	1.00	1.00	0.000

Parameter Estimate Results

The parameter estimates focus on relationships among college readiness indicators and months for the first bachelor's degree. Academic readiness and behavioral readiness are latent (unobservable) variables. Academic readiness in this study is measured by high school course rigor index, SAT scores, number of AP exams with a score of 3 or higher, and weighted GPA, while behavioral readiness is measured by average attendance in high school years, high school academic experience, and weighted GPA. Weighted GPA is included in behavior readiness because it is also a measure of a student's effort. Since high school rigor index is not as well-known as SAT and AP scores, standardized coefficients are presented so all variables are in a common metric scale (z-score). The variable that has the largest standardized coefficient contributes most to academic readiness. More SEM results are available upon request.

Figures 18 and 19 show the conceptual model and standard coefficients in Sample 1 and Sample 2. It is obvious that high school course rigor has the highest coefficients (0.92 in Sample 1 and 0.93 in Sample 2). This suggests that high school course rigor had the largest positive impact on academic readiness, followed by SAT, AP exams with 3 or higher, and weighted

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[8] A small $\chi 2$ and a p value larger than 0.05, NNFI and CFI above 0.90, and RMSEA smaller than .06 also indicates that the model fits the data.

GPA. Higher school attendance, more positive high school academic experience, and higher weighted GPA all have a positive impact on behavioral readiness.

The relationship between college readiness (academic and behavior) and months for the first bachelor's degree is negative (-0.40 and -0.53 in Sample 1 and -0.39 and -0.45 in Sample 2). As expected, the results show that the more prepared a student is for college, the shorter time it takes for him/her to get the first bachelor's degree. The parameter estimates are consistent across the two samples. The estimation consistency increased our confidence in the relationships specified in the model.
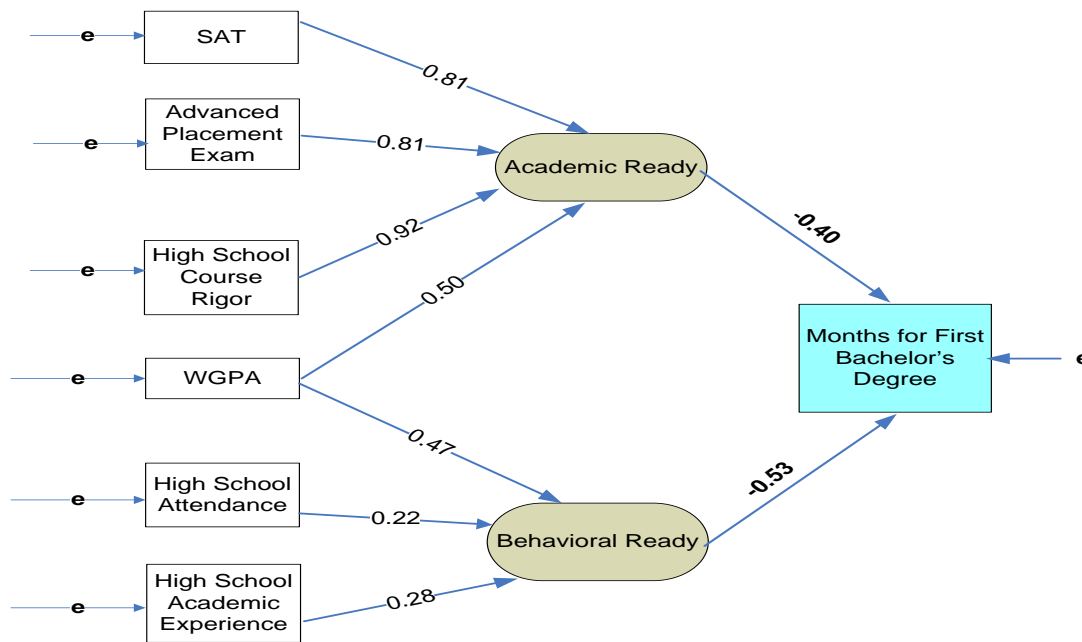
Figure 18. College Readiness and Postsecondary Outcome Model on Sample 1 (N = 1,727, $\chi 2$ = 14.57, df = 8, *p* value = 0.06797, and RMSEA = 0.022).
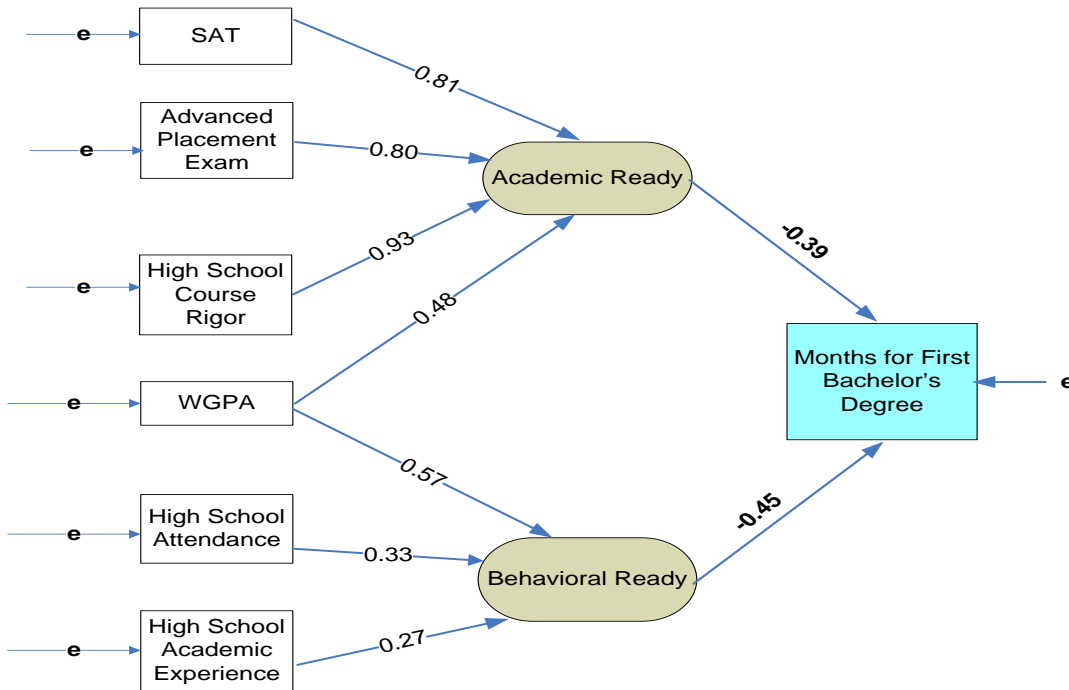
Figure 19. College Readiness and Postsecondary Outcome Model on Sample 2 (N = 1,651, $\chi2 = 11.23$, df = 8, *p* value = 0.18895, and RMSEA = 0.016).

In Table 12, standardized coefficients are summarized to compare results across different data samples. The coefficients are relatively stable across Sample 1 and Sample 2. For African American, American Indian, and Hispanic students, high school course rigor has the highest coefficients (0.91 in Sample 1 and 0.95 in Sample 2), followed by SAT, AP, and weighted GPA. This suggests that high school course rigor had the largest positive impact on academic readiness for African American, American Indian, and Hispanic students as well as for all students.

Table 12
Standardized Coefficients in SEM for Different Samples of MCPS 2003 Graduates

	All Students Sample 1	All Students Sample 2	African Am./ Indian/Hispanic in Sample 1	African Am./ Indian/Hispanic in Sample 2
SAT–Academic ready	0.81	0.81	0.83	0.78
AP–Academic ready	0.81	0.80	0.78	0.72
HS course Rigor–Academic ready	0.92	0.93	0.91	0.95
WGPA–Academic ready	0.50	0.48	0.67	0.35
WGPA–Behavioral ready	0.47	0.57	0.27	0.67
HS attendance–Behavioral ready	0.22	0.33	0.13	0.36
HS experience–Behavior ready	0.28	0.27	0.33	0.29
Academic ready–Months for 1st BA	-0.40	-0.39	-0.41	-0.33
Behavioral ready–Months for 1st BA	-0.53	-0.45	-0.55	-0.43

The coefficients for behavioral readiness are also consistent across Sample 1 and Sample 2 (Table 12). Despite sampling fluctuation, high school attendance, positive high school experience, and high school weighted GPA contribute significantly to behavioral readiness.

The relationship between behavioral readiness and months for the first bachelor's degree is also negative (-.53 in Sample 1, -.45 in Sample 2; -.55 and -.43 for African American, American Indian, and Hispanic students in Sample 1 and Sample 2). This means that the more prepared a student is for college, the shorter time it takes for him/her to get the first bachelor's degree regardless of race or ethnicity.

The coefficients between behavioral readiness and months for the first bachelor's degree are higher than the coefficients between academic readiness and the months for the first bachelor degree. This suggests that behavioral readiness as measured by the three indicators has a larger impact on postsecondary outcome. This pattern is consistent across different samples. It is also worth noticing that the measurement errors for behavioral readiness are larger than the academic readiness based on LISREL outputs (not included but available upon request). The large errors may be due to imprecision of survey data.

The average number of months for students to attain their first bachelor's degree by postsecondary institution level, MCPS college readiness indicators, weighted GPA, highest mathematics level, and educational aspiration at the end of high school are presented in Table G11 (Appendix G). To sum up, students who met MCPS college readiness indicators, had a higher weighted GPA, higher-level mathematics courses, and higher educational aspiration took less time to receive their first bachelor's degrees, compared with those who did not.

Discussion

The Federal Bureau of Labor Statistics (2009) reports that unemployment rates fall and wages rise as educational attainment increases. Even though the economic value of higher education has been recognized, a growing number of students take longer to complete college and many drop out of college during their first year. The low college completion rate may deprive our nation of a college-educated workforce to compete in a global economy (The National Center for Public Policy and Higher Education, 2008). Even if many factors contribute to college degree attainment, college preparation through elementary and secondary education is no doubt very important.

MCPS Keys

MCPS 2003 graduates who met the MCPS keys for college readiness were more likely to succeed in postsecondary education. The more prepared students were, the more likely they were to enroll, persist, and graduate from college with a bachelor's degree.

MCPS 2003 graduates who had higher academic achievement prior to high school, had a greater number of AP exams with a score of 3 or higher, took more rigorous courses in high school, had higher mathematics levels in high school, met Key 4 and Key 5, had a more positive academic experience, and higher educational aspirations in high school performed higher on the SAT, compared to their peers who did not.

Postsecondary Success

Among MCPS 2003 graduates, students who met the MCPS keys, had a higher weighted GPA, more positive academic experience, and higher high school attendance were significantly more likely to enroll in college immediately after high school. Students who are African American, American Indian, or Hispanic, or have ever received FARMS or ESOL services are significantly less likely to enroll in college immediately after high school. Weighted GPA has the largest impact on the fall college enrollment. The findings are consistent with previous studies (Scammacca & Dodd, 2005; Morgan & Klaric, 2007; Finkelstein & Fong, 2008; Hargrove, Godin, & Dodd, 2008; Wiley, Wyatt & Camara, 2010).

Among MCPS 2003 graduates, students with a higher weighted GPA, higher educational aspiration, higher high school attendance, and higher mathematics levels were significantly more likely to stay in college. Weighted GPA had the largest impact on the second year college retention, followed by educational aspiration in high school. High school weighted GPA was a more comprehensive indicator for college retention rate than the MCPS keys beyond high school because it included all courses in high school. These results add more evidence to previous research (Gamoran, 1987; Carroll, 1989; Oakes, Gamoran, & Page, 1992; Tinto, 1993).

Students who had a higher weighted GPA and higher high school attendance, enrolled in a four-year college in fall immediately after high school, persisted in college from freshman to sophomore year, and had fewer college transfers are significantly more likely to attain the first bachelor's degree within six years after high school. The finding is consistent with the previous

studies (Terenzini, Cabrera & Bernal, 2001; Reynolds, 2006; Bowen, Chingos, & McPherson, 2009).

Academic and Behavior Readiness for College

Academic readiness was significantly related to time (in months) students took to attain their first bachelor's degree. High school course rigor had the largest positive impact on academic readiness. Students who had more rigorous high school courses, higher SAT scores, and more AP exams with a score of 3 or higher spent fewer months in pursuit of their first bachelor's degree.

In addition to academic readiness, behavioral readiness as measured by attendance rate, positive academic school experience, and effort in high school courses played an important role on how long students took to get their bachelor's degree. The less prepared a student was behaviorally, the longer it took for him/her to graduate with a bachelor's degree regardless of race and ethnicity.

High school GPA summarizes a student's content knowledge as well as his/her motivation and perseverance. In order to earn good grades in high school, students need to acquire good study habits and time management skills. Students' academic preparation, college readiness, and educational aspiration through K–12 schooling were significantly related to persistence and graduation from college.

Achievement Gap

The study results showed the existence of an achievement gap in college readiness and college success for MCPS 2003 graduates. Students who were African American, American Indian, or Hispanic, or had ever received FARMS or ESOL services were less likely to attain MCPS keys, enroll, persist, and graduate from college. The findings are consistent with other studies (Sewell, Haller, & Ohlendorf, 1970; Haller & Portes, 1973; Hurst, 2007; Suarez-Orozco & Suarez-Orozco, 2009). Due to the small number of special education students who went to college after high school, their postsecondary outcome measures need to be interpreted with caution.

However, the SEM results suggest that the connection between college readiness and bachelor's degree attainment showed a consistent pattern across racial/ethnic groups. In other words, the more prepared a student is for college, the shorter it takes for him/her to attain the first bachelor's degree regardless of race and ethnicity.

Other Studies Related to Postsecondary Success

Other factors that are related to postsecondary success but not measured in this study include a strong college-oriented culture and guidance program in high school; structure and support for students during the college search, planning, and application process; knowledge of college costs; and effective participation in the Free Application for Federal Student Aid (Roderick, Nagaoka, Coca, & Moeller, 2008).

After students enter college, college culture, work intensity, family responsibilities, financial aid, and economy all play crucial roles in a student's decision to persist in college and complete a degree. College persistence is related to pre-college experience, attributes, commitment, college experience, and campus-life involvement (Horn & Premo, 1995; Laura, Berger and Carroll, 2004).

In analyses of postsecondary success, the U.S. Department of Education identified seven "risk factors" or undergraduates' attributes that negatively relate to persistence and degree attainment: delayed postsecondary enrollment, part-time enrollment, not having a regular high school diploma, working full-time, being self-responsible financially, having children or dependents, and being a single parent (National Center for Educational Statistics, 2002). Parents, teachers, and leadership should work together to identify students' strengths and career aspirations and to support students' college readiness and postsecondary success from elementary to postsecondary education.

Recently, a Harvard study questioned the value of 'college for all' (Symonds, Schwartz, & Ferguson, 2011) and the authors offered their vision of multiple pathways for young adults including vocational educational programs. The MCPS pathway to college readiness is one of the options focusing on academic success. However, institutionalizing a strong college-going culture can help students acquire a solid foundation of literacy and numeracy skills so they continue learning regardless of their career or educational choices.

Recommendations

Based on this study as well as other educational research literature (Conley, 2007; ACT, 2010; Roderick et al., 2008; Bowen et al., 2009; & Symonds, et al., 2011), the researchers recommend that schools continue to:

1. Promote and monitor student academic progress towards college readiness from kindergarten to Grade 12.
2. Institutionalize a college-going culture from elementary to secondary schools.
3. Expose students to rigorous academic content and help them develop higher thinking skills.
4. Help students develop behavioral readiness (e.g., school attendance, time management, study skills, self-monitoring) from kindergarten to Grade 12.
5. Provide students specific information about the college admission system, financial aid, and skills to succeed in college as soon as students arrive in high school. Inform students of the steps they need to take for their educational goals and emphasize the importance of postsecondary education.

Limitations

The study has several limitations. First, postsecondary data from Student Tracker Data of National Student Clearinghouse provide only limited information such as enrollment date, degree type, degree name, institution types, retention, and graduation date. As a result, other important postsecondary variables are not available, such as remediation courses, college GPA, campus

culture, and social interaction on campus. Second, the NSC file does not include all MCPS 2003 graduates who went to college. Third, the SEM model examined in this study did not have all four components of Conley's college readiness model due to lack of data. However, validation on different samples has increased our confidence. Last, the measures based on the senior exit survey had larger measurement errors than other measures.

ACKNOWLEDGEMENTS

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APPENDIX A
MCPS Seven Keys to College Readiness

APPENDIX B
SAT and ACT Concordance Tables

Table B1 Concordance between ACT Composite Score and Sum of SAT Critical Reading and Mathematics Scores		
SAT CR+M (Score Range)	**ACT Composite Score**	**SAT CR+M (Single Score)**
1600	**36**	1600
1540–1590	**35**	1560
1490–1530	**34**	1510
1440–1480	**33**	1460
1400–1430	**32**	1420
1360–1390	**31**	1380
1330–1350	**30**	1340
1290–1320	**29**	1300
1250–1280	**28**	1260
1210–1240	**27**	1220
1170–1200	**26**	1190
1130–1160	**25**	1150
1090–1120	**24**	1110
1050–1080	**23**	1070
1020–1040	**22**	1030
980–1010	**21**	990
940–970	**20**	950
900–930	**19**	910
860–890	**18**	870
820–850	**17**	830
770–810	**16**	790
720–760	**15**	740
670–710	**14**	690
620–660	**13**	640
560–610	**12**	590
510–550	**11**	530

Table B2 Concordance between ACT Combined English/Writing Score and SAT Writing Score		
SAT Writing (Score Range)	**ACT English/Writing Score**	**SAT Writing (Single Score)**
800	**36**	800
800	**35**	800
770–790	**34**	770
730–760	**33**	740
710–720	**32**	720
690–700	**31**	690
660–680	**30**	670
640–650	**29**	650
620–630	**28**	630
610	**27**	610
590–600	**26**	590
570–580	**25**	570
550–560	**24**	550
530–540	**23**	530
510–520	**22**	510
480–500	**21**	490
470	**20**	470
450–460	**19**	450
430–440	**18**	430
410–420	**17**	420
390–400	**16**	400
380	**15**	380
360–370	**14**	360
340–350	**13**	340
320–330	**12**	330
300–310	**11**	310

Source: College Board

APPENDIX C
Variable Definition

The variables used in this report are described below. The demographic and high school indicators were from MCPS student records and the senior exit survey for the Class of 2003. The college variables were from StudentTracker Data provided by the National Student Clearinghouse as of August 2010.

Variable Name	Description
Demographic	
MCPS Student ID Number	Each MCPS student receives a unique student identification number that links his/her student record to survey and postsecondary information. The 2003 graduating class refers to high school graduates from July 1, 2002, to June 30, 2003.
Gender	Male Female
Race/Ethnicity	African American American Indian Asian or Pacific Islander Hispanic White
Ever FARMS	Students may qualify for Free or Reduced-price Meals Systems (FARMS) services if the total household income was below certain thresholds. This variable indicates a high school graduate who ever received meal benefits while enrolled in MCPS.
Ever Special Education	Indicates a high school graduate who ever received special education services while enrolled in MCPS.
Ever ESOL	Indicates a high school graduate who ever received English for Speakers of Other Languages (ESOL) services while enrolled in MCPS.
Ever Suspended	Indicates a high school graduate who was ever suspended in school or out of school while enrolled in MCPS.
High School Indicator	
Algebra 1 with C or Higher by Grade 8 (Key 4)	Indicates a high school graduate who completed Algebra 1 with a course mark C or higher by the end of Grade 8. This is one of the MCPS college readiness indicators for middle school students.

Variable Name	Description (continued)
Algebra 2 with C or Higher by Grade 11 (Key 5)	Indicates a high school graduate who completed Algebra 2 with a course mark C or higher by the end of Grade 11. This is one of the MCPS college readiness indicators for high school students.
AP Exam with a Score 3 or Higher (Key 6)	Indicates a high school graduate who earned a score of 3 or higher on at least one AP exam. This variable may include the IB exam with a score of 4 or higher. It is one of the MCPS college readiness indicators for high school students.
SAT 1100 or Higher or ACT 24 or Higher (Key 7)	Indicates a high school graduate who earned a SAT combined score of 1100 or higher or an ACT composite score of 24 or higher. This variable is one of the MCPS college readiness indicators for high school students.
Highest Mathematics Level	Indicates the highest mathematics level that a high school graduate ever attained by the end of Grade 12. The levels are: Pre-Algebra Algebra 1 Geometry Algebra 2 Precalculus or Statistics Calculus or Higher
Educational Aspiration	Indicates the highest degree a high school graduate expected to receive after high school in the senior exit survey. The categories are: High School Diploma/Certificate Trade, Technical, or Business Degree Associate Degree Bachelor's Degree Master's Degree No Response
Average Attendance Rate During High School	This variable is calculated by the following formula: average attendance rate during high school = (total days present in high school/total days enrolled in high school)*100
High School Course Rigor Index	Indicates the academic intensity of high school curriculum that a high school graduate completed. See Appendix B and Appendix C for more information.

Variable Name	Description (continued)
High School Weighted GPA	The weighted GPA is a recalculation of the GPA by giving more weight in the grade points for the courses designated as honors or advanced level according to the following scale: A = 5, B = 4, C = 3, D = 1, and E = 0. This is the weighted GPA by the end of Grade 12.
Maryland Functional Reading and Mathematics	Indicates the combined score of Maryland Functional reading and mathematics subtests. Maryland functional test was the graduation requirement test from early 1980s to 2004.
PSAT Verbal and Math	Indicates the combined score of PSAT verbal and math subtests in one test administration.
SAT Verbal and Math	Indicates the combined score of SAT verbal and math subtests. This variable uses the highest combined score in one test administration.
Number of AP Exams with Score of 3 or Higher	Indicates the total number of AP exams that a high school graduate earned with a score of 3 or higher.
Academic Experience in High School	Indicates a high school graduate's satisfaction for his/her academic experience in high school on 2003 senior exit survey. See more information in Appendix F.
College Indicator	
First-enrolled Postsecondary Institution was a Four-Year College	Indicates the first postsecondary institution that a high school graduate attended was a four-year college.
First-enrolled Postsecondary Institution was a Two-Year College	Indicates the first postsecondary institution that a high school graduate attended was a two-year college.
Students Enrolled in College Immediately in Fall after High School Graduation	Indicates a high school graduate who enrolled in a two-year or four-year postsecondary institution with an enrollment status of full-time, part-time, or less than half-time immediately in the fall semester after high school graduation. According to NSC, the fall semester immediately after high school graduation is defined as any term that begins before October 1st of the high school graduating year and ends after October 1st of the graduating year.

Variable Name	Description (continued)
Students Enrolled in College Anytime Within a Year after High School Graduation	Indicates a high school graduate who enrolled in a two-year or four-year postsecondary institution with an enrollment status of full-time, part-time, or less than half-time in the academic year after high school graduation. According to NSC, the first year after high school graduation is defined as any term that ends after August 15 of the high school graduating year and before August 14 of the following year.
Freshman-to-Sophomore Retention	Indicates a high school graduate who enrolled in college anytime within a year after high school graduation and remained enrolled in a two-year or four-year postsecondary institution with an enrollment status of full-time, part-time, or less than half-time in the second academic year after high school graduation. Students may retain in any postsecondary institution in the second year, not necessary retain in their first-enrolled institution.
Associate's Degree or Higher	Indicates a high school graduate who attained a college degree in a two-year or four-year postsecondary institution anytime after high school graduation. This variable only refers to an associate's, a bachelor's, or an advanced degree.
Associate's Degree	Indicates a high school graduate who attained an associate's degree in a two-year or four-year postsecondary institution anytime after high school graduation.
Bachelor's Degree	Indicates a high school graduate who attained a bachelor's degree anytime after high school graduation.
Bachelor's Degree within Six Years of MCPS Graduates	Indicates a high school graduate who attained a bachelor's degree within six years after high school graduation.
Bachelor's Degree within Six Years of Fall Enrollees	Indicates a high school graduate who enrolled in college immediately in the fall semester after high school graduation and attained a bachelor's degree within six years by August 15, 2009.
Bachelor's Degree within Six Years of First Year Enrollees	Indicates a high school graduate who enrolled in college anytime within a year after high school graduation and attained a bachelor's degree within six years.
Times of Transfer for First Bachelor's Degree	Indicates how many times a high school graduate transferred among any postsecondary institutions before attaining his/her first bachelor's degree.

Variable Name	Description (continued)
Months to First Bachelor's Degree	Indicates how many months a high school graduate took to attain his/her first bachelor's degree. The variable is calculated by the following formula: months to first bachelor's degree = graduation date of the first bachelor's degree – the first enrollment date in college.

APPENDIX D
MCPS High School Course Rigor Index Based on
Actual Course History for 2003 Graduates

In 2003, the high school graduation requirements included completing 4-year courses in mathematics, 4-year courses in English, 2-year courses in foreign languages, 3-year courses in science, and 3-year courses in social studies in MCPS.

In developing a course rigor index, each graduate was awarded at least 10 points (2 for each of the five core content areas) regardless of whether they earned a high school diploma or a certificate. Regular courses were not counted beyond the 10 points in the rigor index.

If a student took an advanced/honors course and passed the course, he/she was awarded 2 points. If a student took an advanced/honors course but failed it, he/she only received 1 point. If a student took an AP or IB course and passed the course, 4 points were awarded. If the student took but failed an AP or IB course, he/she received only 2 points. The MCPS high school course rigor index is the sum of all points earned in English, mathematics, science, social studies and foreign language courses based on the actual high school course history.

Mathematics			
	Course	Pass	Total
4-year courses**	1	1	2
Trigonometry	1	1	2
Precalculus	1	1	2
Statistics	1	1	2
1st Honors/advanced	1	1	2
2nd Honors /advanced	1	1	2
3rd Honors/advanced	1	1	2
4th Honors/advanced	1	1	2
5th Honors/advanced	1	1	2
6th Honors/advanced	1	1	2
7th Honors/advanced	1	1	2
IB Precalculus	2	2	4
AP/IB Calculus	2	2	4
AP Statistics	2	2	4
IB/college math	2	2	4
Total points			38

MCPS High School Course Rigor Index Based on
Actual Course History for 2003 Graduates (Continued)

English	Course	Pass	Total	Foreign Language	Course	Pass	Total
4-year courses	1	1	2	2-year courses	1	1	2
1st Honors/advanced	1	1	2	1st Honors/advanced	1	1	2
2nd Honors/advanced	1	1	2	2nd Honors/advanced	1	1	2
3rd Honors/advanced	1	1	2	3rd Honors/advanced	1	1	2
4th Honors/advanced	1	1	2	4th Honors/advanced	1	1	2
1st AP/IB	2	2	4	5th Honors/advanced	1	1	2
2nd AP/IB	2	2	4	6th Honors/advanced	1	1	2
3rd AP/IB	2	2	4	1st AP/IB	2	2	4
				2nd AP/IB	2	2	4
				3rd AP/IB	2	2	4
				4th AP/IB	2	2	4
Total points			22				30

Science	Course	Pass	Total	Social Studies	Course	Pass	Total
3-year courses	1	1	2	3-year courses	1	1	2
Chemistry	1	1	2	1st Honors/advanced	1	1	2
1st Honors/advanced	1	1	2	2nd Honors/advanced	1	1	2
2nd Honors/advanced	1	1	2	3rd Honors/advanced	1	1	2
3rd Honors/advanced	1	1	2	4th Honors/advanced	1	1	2
4th Honors/advanced	1	1	2	1st AP/IB	2	2	4
5th Honors/advanced	1	1	2	2nd AP/IB	2	2	4
6th Honors/advanced	1	1	2	3rd AP/IB	2	2	4
7th Honors/advanced	1	1	2	4th AP/IB	2	2	4
AP/IB Biology	2	2	4	5th AP/IB	2	2	4
AP/IB Chemistry	2	2	4	6th AP/IB	2	2	4
AP/IB Physics	2	2	4	7th AP/IB	2	2	4
AP Environmental Science	2	2	4	8th AP/IB	2	2	4
Total points			34				42

APPENDIX E
List of Honors or Advanced Courses in High School
Course Rigor Index for MCPS 2003 Graduates

English	Mathematics	Social Studies	Science	Foreign Language
COLLEGE ENGLISH	AP STATISTICS	AP GOVT-NSL	AP BIOLOGY	AP FRENCH LANG
AP LANG & COMP	AP AB CALCULUS	AP US HISTORY	AP BIOLOGY DP	AP FRENCH LIT
AP LIT & COMP	AP BC CALCULUS	AP AMER GOVT/POL	AP ENVIR SCI	AP SPAN LANG
AP ENGLISH		AP COMP GOVT/POL	AP CHEMISTRY	AP SPANISH LIT
	IB AN/APP FUNC	AP EUROPN HIST	AP CHEMSTRY DP	AP LATIN LIT
IB ENGLISH	IB MATH STUDY	AP WORLD HIST	AP PHYSICS	AP LAT VERGIL
HON ENGLISH 9	IB PRECALC	AP ECONOMICS	AP PHYSICS DP	
HON ENGLISH 10	IB CALCULUS	AP PSYCHOLOGY		IB FRENCH
HON ENGLISH 11		AP GEOGRAPHY	IB BIOLOGY	IB CHINESE
HON ENGLISH 12	MAG GEOMETRY		IB BIOLOGY DP	IB SPANISH
ENG:NARR/DR	MAG FUNCTIONS	IB THRY KNOWL	IB CHEMISTRY	IB RUSSIAN
ENG:ESSAY/LYR	MAG ANALYSIS	IB CONT PRB SS		
PRAC WRT	MAGNET PRECALC	IB PSYCHOLOGY	INTERN AT NIH	HON FRENCH
COLLEGE ENGLISH	MV CALC/DIF EQ	IB ECONOMICS	ADV PHYS	HON SPANISH
HON ENGLISH	APPLIED STAT	IB HISTORY	ADV CHEM	HON LATIN
	HON GEOMETRY		ADV OPTICS	HON GERMAN
	PRE-IB GEOMTRY	HON US HISTORY	THERMODYNAMICS	ADV LVL SPANISH
	PCALC/ANALYSIS	HON NSL GOVERN	ANALYTICAL CHEM	ADV LVL CHINESE
	CALC W APPLIC	HON MOD WORLD	MATERIALS SCI	HON HEBREW
	DISCRETE MATH	HON ANCIENT HIST	ADV EARTH	HON SPAN SPKRS
	LINEAR ALGEBRA COMPLEX ANALYSIS	HON WORLD HIST	CELLULAR PHYSIOL	AP LATIN LIT
	HON ALGEBRA 1	HON SOCIAL STDS	MARINE BIOLOGY	HON JAPANESE
	HON MATH	HON MEDIEVAL HIST	INTRO GENETC ANL	HON RUSSIAN
	HON GEOMETRY	HON CULT ANTHR	QUANTUM PHYSICS	HON CHINESE
	ALGEBRA 2/TRIG		ORGNS OF SCIENCE	ADV GERMAN
	ADV LVL GEOM		HON NUTRI SCI	
	CALCULUS		ENGINEERNG SCI	
	HON ALGEBRA 2		HON BIOLOGY	
	HON PRECALCULUS		MOLEC BIO DP	
	HON ADV MATH		MOLECULAR BIO	
	HON COLLEGE MATH		HON PHS ENV SCI	
			HON ENV SCI BIO	
			HON EN SCI PHYS	
			HON CHEMISTRY	
			ADVLV CHEMISTRY	
			ANAT & PHYSIOL	
			HON MAT/ENERGY	
			HON EARTH SCI	
			HON PHYSICS	
			HON EARTH SCI	
			HON COLLEGE SCI	
			ADV LVL BIOLOGY	
			HON LAB SCIENCE	

Note. Courses may be offered for a semester or for the whole school year. MCPS 2002–03 Course Bulletin offers more detailed description.

APPENDIX F
Items from MCPS 2003 Senior Exit Survey

High school academic experience was extracted from items on the MCPS 2003 Senior Exit Survey. The higher numbers reflects a more positive experience. The educational aspiration is measured by a senior survey item. Below is the descriptive statistics for high school academic experience.

	N	Minimum	Maximum	Mean	Std. Deviation
Academic Experience in High School	8575	.00	11.00	3.9128	2.55069

Survey Items for Academic Experience in High School

Think about your high school education in MCPS, Which of the following experiences in high school would you rate as excellent or good?   (1=good/excellent experience)

- HS Experience—Math
- HS Experience—Science
- HS Experience—Social Science
- HS Experience—English
- HS Experience—Foreign Language
- HS Experience—Technology
- HS Experience—Career Education
- HS Experience—Grading procedures
- HS Experience—Textbooks/instructional materials
- HS Experience—Development of your 4-year plan
- HS Experience—Variety of course offered
- HS Experience—Flexibility to select courses

Survey Item for Educational Aspiration

What is the highest degree you expect to receive after high school?
- High School Diploma/Certificate
- Trade, Technical, or Business Degree
- Associate Degree
- Bachelor's Degree
- Master's Degree
- No Response

APPENDIX G
Descriptive Statistics for MCPS 2003 Graduates

Table G1
Number and Percentage of MCPS 2003 Graduates and the Two Random Samples
by Demographics, High School, and College Indicators

		Class of 2003		Sample 1		Sample 2	
		N	%	*N*	%	*N*	%
Demographics							
All Students		8799	100.0	4425	100.0	4374	100.0
Female		4481	50.9	2234	50.5	2247	51.4
Male		4318	49.1	2191	49.5	2127	48.6
African American		1604	18.2	813	18.4	791	18.1
American Indian		20	0.2	13	0.3	7	0.2
Asian American		1348	15.3	677	15.3	671	15.3
Hispanic		1103	12.5	548	12.4	555	12.7
White		4724	53.7	2374	53.6	2350	53.7
Ever FARMS		2633	29.9	1338	30.2	1295	29.6
Ever Special Education		1275	14.5	645	14.6	630	14.4
Ever ESOL		1490	16.9	743	16.8	747	17.1
High School Indicator							
Algebra 1 with C or Higher by Grade 8 (Key 4)		2369	26.9	1188	26.8	1181	27.0
Algebra 2 with C or Higher by Grade 11 (Key 5)		5034	57.2	2551	57.6	2483	56.8
AP Exam Score 3 or Higher (Key 6)		3318	37.7	1662	37.6	1656	37.9
SAT 1100 or Higher or ACT 24 or Higher (Key 7)		3662	41.6	1851	41.8	1811	41.4
Highest Math Level	Pre-Algebra	50	0.6	22	0.5	28	0.6
	Algebra 1	27	0.3	12	0.3	15	0.3
	Geometry	1265	14.4	622	14.1	643	14.7
	Algebra 2	1468	16.7	745	16.8	723	16.5
	Precalculus/Statistics	3494	39.7	1784	40.3	1710	39.1
	Calculus or Higher	2484	28.2	1234	27.9	1250	28.6
Educational Aspiration	High School Diploma/Certificate	187	2.1	95	2.1	92	2.1
	Trade/Technical/Business Degree	423	4.8	210	4.7	213	4.9
	Associate's Degree	1657	18.8	834	18.8	823	18.8
	Bachelor's Degree	3140	35.7	1576	35.6	1564	35.8
	Master's Degree	2094	23.8	1073	24.2	1021	23.3
	No Response	1298	14.8	637	14.4	661	15.1
College Indicator							
Fall Enrollment in College		6293	71.5	3170	71.6	3123	71.4
First Year Enrollment in College		6664	75.7	3359	75.9	3305	75.6
Freshman to Sophomore Retention		6403	96.1	3222	95.9	3181	96.2
College Degree Earned: Associate's Degree or Higher		4669	53.1	2349	53.1	2320	53.0
Associate's Degree		420	4.8	197	4.5	223	5.1
Bachelor's Degree		4249	48.3	2152	48.6	2097	47.9
Bachelor's Degree within Six Years of MCPS Graduates		4073	46.3	2058	46.5	2015	46.1
Bachelor's Degree within Six Years of Fall Enrollees		3918	62.3	1987	62.7	1931	61.8
Bachelor's Degree within Six Years of First Year Enrollees		3984	59.8	2014	60.0	1970	59.6

Note. See Appendix C for the definition of variables. Number may not add up to total due to missing data.
Source: Data are based on MCPS student records, Senior Exit Survey data, and StudentTracker Data provided by National Student Clearinghouse as of August 2010.

Table G2
Mean and Standard Deviation of MCPS 2003 Graduates and the Two Random Samples
by High School and College Indicators

	Class of 2003			Sample 1			Sample 2		
	N	Mean	Std. Dev.	N	Mean	Std. Dev.	N	Mean	Std. Dev.
High School Indicator									
Attendance Rate During Middle School	6392	95.6	3.6	3246	95.6	3.6	3146	95.6	3.6
Attendance Rate During High School	7572	94.4	4.1	3821	94.4	4.1	3751	94.4	4.0
High School Course Rigor Index	8799	40	19	4425	40	19	4374	40	19
Weighted GPA	8794	3.1	0.9	4423	3.1	0.9	4371	3.1	0.9
Maryland Functional Reading and Math	8518	736	49	4291	736	49	4227	736	49
PSAT Reading and Math	7061	92	23	3559	92	23	3502	92	23
SAT Verbal and Math	6731	1108	220	3405	1107	219	3326	1109	220
Number of AP Exam with Score 3 or Higher	3318	3	2	1662	3	2	1656	3	2
Academic Experience in High School	8082	4	3	4080	4	3	4002	4	3
College Indicator									
Months to First Bachelor's Degree	4249	49	9	2152	49	9	2097	49	9
Times of Transfer for First Bachelor's Degree	4249	1	1	2152	1	1	2097	1	1

Note. See Appendix C for the definition of variables.
Source: Data are based on MCPS student records, Senior Exit Survey data, and StudentTracker Data provided by National Student Clearinghouse as of August 2010.

Table G3
Number and Percentage of MCPS 2003 Graduates Who Enrolled in College Immediately in Fall after
High School Graduation by Institutional Level and Race/Ethnicity

	N Graduates	N Enrolled in Fall			% Enrolled in Fall		
		All	4-Year College	2-Year College	All	4-Year College	2-Year College
All Students	8799	6293	4219	2074	71.5	47.9	23.6
African American	1604	937	575	362	58.4	35.8	22.6
Asian American	1348	1048	683	365	77.7	50.7	27.1
Hispanic	1103	557	210	347	50.5	19.0	31.5
White	4724	3735	2740	995	79.1	58.0	21.1

Note. See Appendix C for the definition of variables. Results for American Indian students are included with all students but are not reported separately.
Source: Data are based on MCPS student records, Senior Exit Survey data, and StudentTracker Data provided by National Student Clearinghouse as of August 2010.

Table G4
Number and Percentage of MCPS 2003 Graduates Who Enrolled in College Immediately in Fall after High School Graduation
by Race/Ethnicity and MCPS College Readiness Indicator

		N Graduates					*N* Enrolled in Fall					% Enrolled in Fall				
		All	African Am.	Asian Am.	Hispanic	White	All	African Am.	Asian Am.	Hispanic	White	All	African Am.	Asian Am.	Hispanic	White
All Students		8799	1604	1348	1103	4724	6293	937	1048	557	3735	71.5	58.4	77.7	50.5	79.1
Algebra 1 with C or	Not Attained	6430	1448	824	1006	3136	4191	807	579	476	2317	65.2	55.7	70.3	47.3	73.9
Higher by Grade 8	Attained	2369	156	524	97	1588	2102	130	469	81	1418	88.7	83.3	89.5	83.5	89.3
Algebra 2 with C or	Not Attained	3765	1044	396	774	1543	1988	506	239	312	927	52.8	48.5	60.4	40.3	60.1
Higher by Grade 11	Attained	5034	560	952	329	3181	4305	431	809	245	2808	85.5	77.0	85.0	74.5	88.3
AP Exam Score 3 or	Not Attained	5481	1395	670	858	2543	3370	761	448	381	1769	61.5	54.6	66.9	44.4	69.6
Higher	Attained	3318	209	678	245	2181	2923	176	600	176	1966	88.1	84.2	88.5	71.8	90.1
SAT 1100 or Higher	Not Attained	5137	1384	629	957	2154	3068	745	421	436	1457	59.7	53.8	66.9	45.6	67.6
or ACT 24 or Higher	Attained	3662	220	719	146	2570	3225	192	627	121	2278	88.1	87.3	87.2	82.9	88.6

Note. See Appendix C for the definition of variables. Results for American Indian students are included with all students but are not reported separately.
Source: Data are based on MCPS student records, Senior Exit Survey data, and StudentTracker Data provided by National Student Clearinghouse as of August 2010.

Table G5
Number and Percentage of MCPS 2003 Graduates Who Enrolled in College Immediately in Fall after High School Graduation
by Race/Ethnicity and High School Weighted GPA, Highest Math Level, and Educational Aspiration

		N Graduates					N Enrolled in Fall					% Enrolled in Fall				
		All	African Am.	Asian Am.	Hispanic	White	All	African Am.	Asian Am.	Hispanic	White	All	African Am.	Asian Am.	Hispanic	White
All Students		8799	1604	1348	1103	4724	6293	937	1048	557	3735	71.5	58.4	77.7	50.5	79.1
Weighted GPA	Below 2.0	958	373	78	260	245	327	123	30	88	85	34.1	33.0	38.5	33.8	34.7
	2.00-2.49	1310	384	137	263	521	644	186	79	97	280	49.2	48.4	57.7	36.9	53.7
	2.50-2.99	1610	351	190	249	817	1106	234	135	125	609	68.7	66.7	71.1	50.2	74.5
	3.00-3.49	1683	267	267	172	971	1336	199	209	118	804	79.4	74.5	78.3	68.6	82.8
	3.5-3.99	1486	157	271	102	954	1300	134	231	80	853	87.5	85.4	85.2	78.4	89.4
	4.00 or higher	1752	72	405	57	1216	1580	61	364	49	1104	90.2	84.7	89.9	86.0	90.8
Highest Math Level	Pre-Algebra	50	19	3	9	19	--	--	--	--	--	--	--	--	--	--
	Algebra 1	27	12	1	5	9	--	--	--	--	--	--	--	--	--	--
	Geometry	1265	410	71	384	399	400	125	25	102	148	31.6	30.5	35.2	26.6	37.1
	Algebra 2	1468	421	134	282	625	862	240	71	139	409	58.7	57.0	53.0	49.3	65.4
	Precalculus/Statistics	3494	570	454	314	2150	2825	426	362	223	1808	80.9	74.7	79.7	71.0	84.1
	Calculus or Higher	2484	169	682	108	1518	2202	144	590	92	1369	88.6	85.2	86.5	85.2	90.2
Educational Aspiration	High School Diploma/Certificate	187	37	20	47	82	42	7	8	5	22	22.5	18.9	40.0	10.6	26.8
	Trade/Technical/Business Degree	423	93	39	85	205	145	24	21	22	78	34.3	25.8	53.8	25.9	38.0
	Associate's Degree	1657	284	172	183	1013	1204	165	125	103	807	72.7	58.1	72.7	56.3	79.7
	Bachelor's Degree	3140	488	479	330	1835	2520	330	381	198	1603	80.3	67.6	79.5	60.0	87.4
	Master's Degree	2094	421	470	190	1009	1689	293	408	128	856	80.7	69.6	86.8	67.4	84.8
	No Response	1298	281	168	268	580	693	118	105	101	369	53.4	42.0	62.5	37.7	63.6

Note. See Appendix C for the definition of variables. Results for American Indian students are included with all students but are not reported separately. Results are not reported (--) for groups with fewer than five enrollees. Number may not add up to total due to missing data.
Source: Data are based on MCPS student records, Senior Exit Survey data, and StudentTracker Data provided by National Student Clearinghouse as of August 2010.

Table G6
Number and Percentage of MCPS 2003 Graduates Who Enrolled in College Anytime Within a Year after High School Graduation and
Returned for a Second Year in Any Postsecondary Institution by Institutional Level and Race/Ethnicity

	N Enrolled in the First Year			*N* Returned for the Second Year			% Returned for the Second Year		
	All	4-Year College	2-Year College	All	4-Year College	2-Year College	All	4-Year College	2-Year College
All Students	6664	4257	2407	6403	4198	2205	96.1	98.6	91.6
African American	1024	584	440	962	569	393	93.9	97.4	89.3
Asian American	1098	684	414	1073	678	395	97.7	99.1	95.4
Hispanic	633	212	421	595	210	385	94.0	99.1	91.4
White	3893	2766	1127	3759	2731	1028	96.6	98.7	91.2

Note. See Appendix C for the definition of variables. Results for American Indian students are included with all students but are not reported separately.
Source: Data are based on MCPS student records, Senior Exit Survey data, and StudentTracker Data provided by National Student Clearinghouse as of August 2010.

Table G7
Number and Percentage of MCPS 2003 Graduates Who Enrolled in College Anytime Within a Year after High School Graduation and
Returned for a Second Year in Any Postsecondary Institution by Race/Ethnicity and MCPS College Readiness Indicator

		N Enrolled in the First Year					*N* Returned for the Second Year					% Returned for the Second Year				
		All	African Am.	Asian Am.	Hispanic	White	All	African Am.	Asian Am.	Hispanic	White	All	African Am.	Asian Am.	Hispanic	White
All Students		6664	1024	1098	633	3893	6403	962	1073	595	3759	96.1	93.9	97.7	94.0	96.6
Algebra 1 with C or	Not Attained	4522	891	620	551	2448	4288	831	601	514	2332	94.8	93.3	96.9	93.3	95.3
Higher by Grade 8	Attained	2142	133	478	82	1445	2115	131	472	81	1427	98.7	98.5	98.7	98.8	98.8
Algebra 2 with C or	Not Attained	2229	573	259	368	1025	2045	519	245	334	944	91.7	90.6	94.6	90.8	92.1
Higher by Grade 11	Attained	4435	451	839	265	2868	4358	443	828	261	2815	98.3	98.2	98.7	98.5	98.2
AP Exam Score 3 or	Not Attained	3686	841	488	445	1901	3455	782	470	407	1787	93.7	93.0	96.3	91.5	94.0
Higher	Attained	2978	183	610	188	1992	2948	180	603	188	1972	99.0	98.4	98.9	100.0	99.0
SAT 1100 or Higher	Not Attained	3379	828	461	508	1573	3164	769	444	470	1473	93.6	92.9	96.3	92.5	93.6
or ACT 24 or Higher	Attained	3285	196	637	125	2320	3239	193	629	125	2286	98.6	98.5	98.7	100.0	98.5

Note. See Appendix C for the definition of variables. Results for American Indian students are included with all students but are not reported separately.
Source: Data are based on MCPS student records, Senior Exit Survey data, and StudentTracker Data provided by National Student Clearinghouse as of August 2010.

Table G8

Number and Percentage of MCPS 2003 Graduates Who Enrolled in College Anytime Within a Year after High School Graduation and
Returned for a Second Year in Any Postsecondary Institution by Race/Ethnicity and Weighted GPA, Highest Math Level, and Educational Aspiration

| | | *N* Enrolled in the First Year | | | | | *N* Returned for the Second Year | | | | | % Returned for the Second Year | | | | |
		All	African Am.	Asian Am.	Hispanic	White	All	African Am.	Asian Am.	Hispanic	White	All	African Am.	Asian Am.	Hispanic	White
All Students		6664	1024	1098	633	3893	6403	962	1073	595	3759	96.1	93.9	97.7	94.0	96.6
Weighted	Below 2.0	404	146	36	106	115	347	123	32	93	98	85.9	84.2	88.9	87.7	85.2
GPA	2.00-2.49	738	213	87	121	315	666	195	83	109	277	90.2	91.5	95.4	90.1	87.9
	2.50-2.99	1202	254	149	149	647	1137	239	144	142	610	94.6	94.1	96.6	95.3	94.3
	3.00-3.49	1399	209	222	126	836	1359	204	217	120	813	97.1	97.6	97.7	95.2	97.2
	3.5-3.99	1328	140	236	82	868	1312	139	234	82	855	98.8	99.3	99.2	100.0	98.5
	4.00 or higher	1593	62	368	49	1112	1582	62	363	49	1106	99.3	100.0	98.6	100.0	99.5
Highest	Pre-Algebra	4	0	0	2	2	--	--	--	--	--	--	--	--	--	--
Math Level	Algebra 1	5	2	0	0	3	--	--	--	--	--	--	--	--	--	--
	Geometry	495	148	33	129	185	421	125	28	114	154	85.1	84.5	84.8	88.4	83.2
	Algebra 2	975	273	79	162	458	902	254	75	149	422	92.5	93.0	94.9	92.0	92.1
	Precalculus/Statistics	2949	456	383	247	1857	2862	438	374	240	1805	97.0	96.1	97.7	97.2	97.2
	Calculus or Higher	2236	145	603	93	1388	2214	144	596	91	1376	99.0	99.3	98.8	97.8	99.1
Educational	High School Diploma/Certificate	54	9	10	9	26	46	6	8	9	23	85.2	66.7	80.0	100.0	88.5
Aspiration	Trade/Technical/Business Degree	177	30	24	28	95	150	25	23	23	79	84.7	83.3	95.8	82.1	83.2
	Associate's Degree	1293	180	131	120	858	1223	163	128	109	819	94.6	90.6	97.7	90.8	95.5
	Bachelor's Degree	2626	358	403	216	1641	2546	337	395	206	1602	97.0	94.1	98.0	95.4	97.6
	Master's Degree	1753	314	419	141	875	1727	311	412	139	861	98.5	99.0	98.3	98.6	98.4
	No Response	761	133	111	119	398	711	120	107	109	375	93.4	90.2	96.4	91.6	94.2

Note. See Appendix C for the definition of variables. Results for American Indian students are included with all students but are not reported separately. Results are not reported (--) for groups with fewer than five returnees.
Number may not add up to total due to missing data.
Source: Data are based on MCPS student records, Senior Exit Survey data, and StudentTracker Data provided by National Student Clearinghouse as of August 2010.

Table G9
Number and Percentage of MCPS 2003 Graduates Who Enrolled in College Anytime Within a Year after High School Graduation and
Earned a Bachelor's Degree or Higher Within Six Years by Race/Ethnicity and MCPS College Readiness Indicator

| | | *N* Enrolled in the First Year | | | | | *N* Earned BA Within Six Years | | | | | % Earned BA Within Six Years | | | | |
		All	African Am.	Asian Am.	Hispanic	White	All	African Am.	Asian Am.	Hispanic	White	All	African Am.	Asian Am.	Hispanic	White
All Students		6664	1024	1098	633	3893	3984	453	696	198	2631	59.8	44.2	63.4	31.3	67.6
Algebra 1 with C or	Not Attained	4522	891	620	551	2448	2248	352	310	141	1441	49.7	39.5	50.0	25.6	58.9
Higher by Grade 8	Attained	2142	133	478	82	1445	1736	101	386	57	1190	81.0	75.9	80.8	69.5	82.4
Algebra 2 with C or	Not Attained	2229	573	259	368	1025	662	152	83	56	370	29.7	26.5	32.0	15.2	36.1
Higher by Grade 11	Attained	4435	451	839	265	2868	3322	301	613	142	2261	74.9	66.7	73.1	53.6	78.8
AP Exam Score 3 or	Not Attained	3686	841	488	445	1901	1518	316	171	85	944	41.2	37.6	35.0	19.1	49.7
Higher	Attained	2978	183	610	188	1992	2466	137	525	113	1687	82.8	74.9	86.1	60.1	84.7
SAT 1100 or Higher	Not Attained	3379	828	461	508	1573	1333	316	167	111	737	39.4	38.2	36.2	21.9	46.9
or ACT 24 or Higher	Attained	3285	196	637	125	2320	2651	137	529	87	1894	80.7	69.9	83.0	69.6	81.6

Note. See Appendix C for the definition of variables. Results for American Indian students are included with all students but are not reported separately.
Source: Data are based on MCPS student records, Senior Exit Survey data, and StudentTracker Data provided by National Student Clearinghouse as of August 2010.

Table G10

Number and Percentage of MCPS 2003 Graduates Who Enrolled in College Anytime Within a Year after High School Graduation and
Earned a Bachelor's Degree or Higher Within Six Years by Race/Ethnicity and High School Weighted GPA, Highest Math Level, and Educational Aspiration

		N Enrolled in the First Year					*N* Earned BA Within Six Years					% Earned BA Within Six Years				
			African Am.	Asian Am.	Hispanic	White		African Am.	Asian Am.	Hispanic	White		African Am.	Asian Am.	Hispanic	White
		All					All					All				
All Students		6664	1024	1098	633	3893	3984	453	696	198	2631	59.8	44.2	63.4	31.3	67.6
Weighted GPA	Below 2.0	404	146	36	106	115	24	11	--	--	8	5.9	7.5	--	--	7.0
	2.00-2.49	738	213	87	121	315	129	44	13	9	63	17.5	20.7	14.9	7.4	20.0
	2.50-2.99	1202	254	149	149	647	439	103	32	31	273	36.5	40.6	21.5	20.8	42.2
	3.00-3.49	1399	209	222	126	836	830	119	119	53	536	59.3	56.9	53.6	42.1	64.1
	3.5-3.99	1328	140	236	82	868	1084	117	182	58	726	81.6	83.6	77.1	70.7	83.6
	4.00 or higher	1593	62	368	49	1112	1478	59	349	43	1025	92.8	95.2	94.8	87.8	92.2
Highest Math Level	Pre-Algebra	4	0	0	2	2	--	--	--	--	--	--	--	--	--	--
	Algebra 1	5	2	0	0	3	--	--	--	--	--	--	--	--	--	--
	Geometry	495	148	33	129	185	46	18	--	6	21	9.3	12.2	--	4.7	11.4
	Algebra 2	975	273	79	162	458	261	65	14	27	155	26.8	23.8	17.7	16.7	33.8
	Precalculus/Statistics	2949	456	383	247	1857	1819	254	186	96	1280	61.7	55.7	48.6	38.9	68.9
	Calculus or Higher	2236	145	603	93	1388	1858	116	495	69	1175	83.1	80.0	82.1	74.2	84.7
Educational Aspiration	High School Diploma/Certificate	54	9	10	9	26	15	--	--	--	8	27.8	--	--	--	30.8
	Trade/Technical/Business Degree	177	30	24	28	95	34	--	--	--	26	19.2	--	--	--	27.4
	Associate's Degree	1293	180	131	120	858	689	56	67	38	528	53.3	31.1	51.1	31.7	61.5
	Bachelor's Degree	2626	358	403	216	1641	1672	165	247	78	1180	63.7	46.1	61.3	36.1	71.9
	Master's Degree	1753	314	419	141	875	1244	191	320	59	670	71.0	60.8	76.4	41.8	76.6
	No Response	761	133	111	119	398	330	37	54	20	219	43.4	27.8	48.6	16.8	55.0

Note. See Appendix C for the definition of variables. Results for American Indian students are included with all students but are not reported separately. Results are not reported (--) for groups with fewer than five college graduates. Number may not add up to total due to missing data.
Source: Data are based on MCPS student records, Senior Exit Survey data, and StudentTracker Data provided by National Student Clearinghouse as of August 2010.

Table G11
Mean and Standard Deviation of the Months that MCPS 2003 Graduates Took to Earn the First
Bachelor's Degree by Demographics, High School, and College Indicators

		Months to First Bachelor's Degree		
		N	Mean	Std. Dev.
Demographics				
All Students		4249	49	9
Female		2429	48	9
Male		1820	50	10
African American		489	51	9
American Indian		7	53	13
Asian American		741	49	9
Hispanic		223	52	11
White		2789	49	9
Ever FARMS		643	52	10
Ever Special Education		383	50	10
Ever ESOL		420	52	11
High School Indicator				
Algebra 1 with C or Higher by	Not Attained	2446	51	10
Grade 8 (Key 4)	Attained	1803	47	7
Algebra 2 with C or Higher by	Not Attained	759	54	11
Grade 11 (Key 5)	Attained	3490	48	8
AP Exam Score 3 or Higher	Not Attained	1681	53	10
(Key 6)	Attained	2568	47	7
SAT 1100 or Higher or ACT 24	Not Attained	1483	53	10
or Higher (Key 7)	Attained	2766	47	8
	Below 2.0	33	59	13
	2.00–2.49	169	60	11
Weighted High School GPA	2.50–2.99	499	56	10
	3.00–3.49	899	51	10
	3.50–3.99	1119	48	7
	4.00 or Higher	1530	45	6
	Pre-Algebra	--	--	--
	Algebra 1	--	--	--
Highest Mathematics Level	Geometry	60	58	12
	Algebra 2	309	56	11
	Precalculus/Statistics	1952	50	9
	Calculus or Higher	1927	47	7
	High School Diploma/Certificate	19	52	10
	Trade/Technical/Business Degree	41	56	11
Educational Aspiration	Associate's Degree	734	51	9
	Bachelor's Degree	1780	49	9
	Master's Degree	1316	48	9
	No Response	359	51	10
College Indicator				
First-enrolled Postsecondary Institution was a Two-Year College		761	56	11
First-enrolled Postsecondary Institution was a Four-Year College		3475	48	8
Fall Enrollment in College		4061	49	9
First Year Enrollment in College		4139	49	9
Freshman-to-Sophomore Retention		4116	49	9
Bachelor's Degree within Six Years of MCPS Graduates		4073	48	7
Bachelor's Degree within Six Years of Fall Enrollees		3918	48	7
Bachelor's Degree within Six Years of First Year Enrollees		3984	48	7

Note. Results are not reported (--) for groups with fewer than five graduates. Number may not add up to total due to missing data.
Source: Data are based on MCPS student records, Senior Exit Survey, and StudentTracker Data from National Student Clearinghouse as of August 2010.