

**Unmasking the Effects of Student Engagement
on College Grades and Persistence**

George D. Kuh
Ty Cruce
Rick Shoup
Jillian Kinzie
Robert M. Gonyea

Center for Postsecondary Research
Indiana University Bloomington
1900 East Tenth Street
Eigenmann Hall Suite 419
Bloomington, IN 47406-7512
Phone: 812-856-5824

Paper presented at the annual meeting of
the American Educational Research Association, Chicago, April 2007

Abstract

Unmasking the Effects of Student Engagement on College Grades and Persistence

This study examines the relationships between student engagement, college GPA, and persistence for 11,000 students attending 18 baccalaureate-granting institutions. Data sources included student-level information from the National Survey of Student Engagement, academic transcripts, merit aid, and ACT/SAT score reports. Engagement had positive, statistically significant effects on grades and persistence between the first and second year of study for students from different racial and ethnic backgrounds. Equally important, engagement had compensatory effects for historically underserved students in that they benefited more from participating in educationally purposeful activities in terms of earning higher grades and being more likely to persist.

Unmasking the Effects of Student Engagement on College Grades and Persistence

A college degree has replaced the high school diploma as a mainstay for economic self-sufficiency and responsible citizenship. In addition, earning a bachelor's degree is linked to long-term cognitive, social, and economic benefits to individuals, benefits that are passed onto future generations, enhancing the quality of life of the families of college-educated persons, the communities in which they live, and the larger society.

Unfortunately, too many students who begin college leave before completing a degree. Only half (51%) of students who enrolled at four-year institutions in 1995–96 completed a bachelor's degree within six years at the institution at which they started. Another 7% obtained a baccalaureate degree within six years after attending two or more institutions (Berkner, He & Cataldi, 2002). Degree completion rates are considerably lower for historically underserved students (Carey, 2004). The six-year completion rate for African American students and Latinos is only about 46 percent (Berkner et al., 2002). Although greater numbers of minority students are entering college than in previous years, fewer earn degrees compared with non-minorities. Stagnant college completion rates and unacceptable racial-ethnic gaps in college graduation rates coupled with external pressures for institutional accountability for student learning (Bok, 2006) have intensified the need to better understand the factors that influence student success in college.

Students leave college for a mix of individual and institutional reasons – change of major, lack of money, family demands, and poor psycho-social fit among others (Astin, Korn, & Green, 1987; Bean, 1990; Cabrera, Nora, & Casteneda, 1992; Pascarella,

1980; Peltier, Laden, & Matranga, 1999; Tinto, 1993). Most models that examine student success, broadly defined, include five sets of variables: (1) student background characteristics including demographics and pre-college academic and other experiences, (2) structural characteristics of institutions such as mission, size and selectivity, (3) interactions with faculty and staff members and peers, (4) student perceptions of the learning environment, and (5) the quality of effort students devote to educationally purposeful activities.

To better understand the causes and consequences of student success in college, more must be discovered about how these factors interact with gender, race and ethnicity, and first generation status (Allen, 1999; Gaither, 2005; Person & Christensen, 1996). Race and ethnicity along with family income are especially important because the nature of the undergraduate experience of historically underserved students can differ markedly from that of majority White students in Predominantly White Institutions (PWIs) (Allen, 1999; Gloria, Robinson Kurpius, Hamilton, & Willson, 1999).

For example, in some studies race emerges as a significant factor in persistence (Astin, 1977; Murtaugh, Burns, Schuster, 1999; Peltier et al., 1999). High school rank, first-year college GPA, and a self-reported measure of desire to complete college accounted for 68% of the variance in the retention of minority students from the first to second year of college (Allen, 1999). For non-minority students, however, high school rank, first-year college GPA, and parental education were significant, accounting for 38% of the variance in retention. Some research indicates that students of color perceive the campus environment to be less supportive than their White peers (Loo & Rolison, 1986; Pascarella, Edison, Nora, Hagedorn, & Terenzini, 1996; Schwitzer, Griffin, Ancis, &

Thomas, 1999) and are less likely to persist to graduation (Carey, 2004; National Center for Education Statistics, 1995). Studies using multivariate analytical models suggest that the impact of race or ethnicity on persistence is less consistent (Murtaugh et al., 1999; St. John, Hu, Simmons, & Musoba, 2001), especially those that control for socioeconomic status and pre-college experiences (Peltier et al., 1999).

Another line of inquiry is the research linking student engagement in educationally purposeful activities to such desired outcomes as grades and persistence and graduation rates (Astin, 1993; Kuh, 2001, 2003; Pascarella & Terenzini, 2005). Student engagement represents both the time and energy students invest in educationally purposeful activities and the effort institutions devote to using effective educational practices (Kuh, 2001). However, most of the research examining the connections between student engagement and college outcomes are based on single institution studies that do not always control for student background characteristics or other factors or institution-level data that can mask the effects of student-level variables. Few studies are based on large, multi-institution data sets using student-level data. In addition, it is not clear to what extent student engagement and other measures of effective educational practice contribute to achievement and persistence over and above student ability.

Purpose of the Study

This study sought to determine the relationships between key student behaviors and the institutional practices and conditions that foster student success. To do so, we merged student-level records from different types of colleges and universities to examine the links between student engagement and two key outcomes of college: academic achievement and persistence. A second goal was to determine the effects of engaging in

educationally purposeful activities on these outcomes for students from different racial and ethnic backgrounds. Three questions guided the study:

- ◆ Does engagement during the first year of college have a significant impact on first-year grade point average and chances of returning for a second year of college, net of the effects of student background, pre-college experiences, prior academic achievement, and other first-year experiences?
- ◆ Does engagement during the senior year have a significant impact on senior-year grade point average, net of the effects of student background, prior academic achievement, and other senior-year experiences in college?
- ◆ Are the effects of engagement general or conditional? That is, do the effects of engagement on the outcomes under study differ by such student characteristics as race and ethnicity (for GPA and persistence) and prior academic achievement (for GPA only)?

Methods

Data Sources

The data for this study are from 18 baccalaureate degree-granting colleges and universities that administered the National Survey of Student Engagement (NSSE) at least once between 2000 and 2003. These institutions were selected because they met two key criteria: an ample number of respondents to insure enough cases for the analytical methods used to answer the research questions and reasonable racial and ethnic diversity among the respondents. Eleven schools are Predominantly White Institutions (PWIs), four are historically Black Colleges and Universities (HBCUs), and three are Hispanic Serving Institutions (HSIs). Seven of the schools focus exclusively on

undergraduate education, seven are master's granting universities, and four are doctoral granting institutions.

Multiple sources of information were used in the analysis: student responses to the NSSE, campus institutional research records including student academic and financial aid, and information about students' background and pre-college experiences including academic achievement. Only those students who had complete data for the variables of interest are included in the analysis. They include 6,193 first-year student and 5,227 seniors.

Student Engagement Data. NSSE is an annual survey of undergraduate students at four-year institutions that measures students' participation in educationally purposeful activities that prior research shows are linked to desired outcomes of college (Chickering & Gamson, 1987; Pascarella & Terenzini, 2005). The validity and reliability of the instrument have been extensively tested (Kuh, 2002; Kuh, Kinzie, Cruce, Shoup, & Gonyea, 2006; Pike, 2006). It is typically administered via the web or paper versions to randomly sampled first-year and senior students. In 2006, the NSSE database represented more than 1,000,000 students from about 1,100 colleges and universities.

Student Academic and Financial Aid Information.¹ To minimize the time and effort required of participating institutions, we asked for student information readily available from the registrar, financial aid, and admissions offices that permitted us to account for the potential confounding influences of financial aid and pre-college academic achievement on the relationships between student engagement, college academic achievement, and persistence. We also used this information to create reliable

measures of the two key outcome variables: academic year grade point average and college persistence.

Student Background and Pre-College Experiences. We originally asked institutions to provide us with ACT/SAT score reports for students who met the criteria for inclusion in the study. These reports, provided to colleges and universities at the applicant's expense, contain a wealth of information students provide when they register to take the respective college entrance exam, including background characteristics, high school experiences, prior academic achievement, educational needs, and college preferences. Because only a few of the participating institutions preserved complete ACT/SAT score reports, we obtained this information with permission from the participating institutions from ACT and the College Board.

Variable Specification

Student engagement. For this study, student engagement is represented by three separate measures from the NSSE survey: time spent studying, time spent in co-curricular activities, and a global measure of engagement in effective educational practices made up of responses to 19 other NSSE items² (Appendix A). Each of the items on the global engagement measure contributes equally. These behaviors include asking questions in class, working with other students on projects inside or outside of class, discussing ideas from class or readings outside of class, among others. We chose these items because previous research shows that all are positively related to desired outcomes of college in studies of student development over the years (Pascarella & Terenzini, 2005). Also, these questions represent student behaviors and activities that institutions can influence to

varying degrees through teaching practices and creating other conditions that foster student engagement.

Academic and financial aid information. Academic year grade point average and persistence from the first to second year of college were based on aggregated information taken from detailed student course-taking records provided by the participating institutions.³ We calculated these measures to insure that both were computed in the same way for all students in the study. Although computing grade point average is fairly straightforward, institutions sometime differ as to whether or how certain courses are represented in the computation (i.e., substituting the passing grade when retaking a failed course). Returning to the same institution for the second year of study was defined as enrolling in one or more courses the following academic year.

Appendix B contains the operational definitions of the variables used in these analyses. Appendices C and D provide descriptive statistics for all study variables.

Data Analyses

The data were analyzed in two stages. In the first stage, we used ordinary least squares or logistic regression to estimate separate models for first-year and senior students of the general effects of time on task and engagement in educationally purposeful activities on academic year grade point average and persistence to the second year of college (for first-year students only). For the first-year student analysis, the first model estimated the effects of student background characteristics, high school academic and extracurricular involvement, and prior academic performance (high school grades and ACT score) on the students' first-year GPA and persistence to the second year at the same institution. In the second model, first-year experiences (including time on task and

the global engagement scale), and first-year grades and unmet need (in the persistence model only) were added to the variables in the first model to examine the impact of these experiences on GPA and persistence.

For the senior student analysis, the first model estimated the effects of background characteristics, pre-college academic performance, and senior year experiences (including time on task and engagement) on academic year GPA. In the second model, junior academic year GPA was added to determine whether engagement adds value to academic performance, over and above one's established academic record in college.

In the second stage of the analysis, we estimated models to test for the presence of conditional or interaction effects. Conditional effects represent the extent to which the influence of study time and engagement on academic year grade point average and persistence (for first-year students only) differed by student background characteristics. To estimate these effects, we entered a series of cross-product variables into the general effects equation. Statistically significant increases in explained variance (R^2 change) or model fit (likelihood ratio) resulting from the addition of these cross-product terms would indicate that the net effects of engagement or time on task differed for certain sub-groups of students. If the R^2 change or likelihood ratio was not statistically significant, we examined the model coefficients for statistically significant effects that may have been masked by the significance test for the R^2 change or likelihood ratio. This approach allows us to determine whether there are differences in the effects of student engagement on college achievement and persistence by prior academic achievement and racial or ethnic background.

Results

The findings yield a detailed portrait of the relationships between students' background and pre-college characteristics, college experiences, and the two outcomes measures. Here we focus primarily on the results that illuminate the influence of engagement and other college experiences on outcomes, after controlling for student characteristics and pre-college variables.

First-Year Students

General Effects. To determine the net impact of time on task and engagement during the first year of college, we estimated two models by regressing first-year grade point average on student background characteristics and first-year experiences. Model 1 in Table 1 includes students' demographic characteristics, pre-college experiences, and prior academic achievement as predictors of GPA; together, they account for 29% of the variance in first-year grades. Prior academic achievement had the strongest influence on first-year GPA.

Insert Table 1 about here

Adding student engagement measures to the model accounted for an additional 13% of the variance in first-year GPA, increasing the total variance explained to 42% (Table 1, Model 2). After entering first-year experiences to the model, the effects of demographic characteristics, pre-college experiences, and prior academic achievement remained statistically significant, but decreased in magnitude. Also, the influence of parents' education essentially disappeared. The change in the influence of the pre-college characteristics with the addition of first-year experiences in the model mirrors findings from a steady stream of research over the past several decades (Pascarella &

Terenzini, 2005) suggesting that *who students are when they start college* – their background characteristics and pre-college behavior – is associated to a non-trivial degree with what they do in the first college year. At the same time, pre-college characteristics do not explain everything that matters to student success in college (Astin, 1993; Pace, 1990; Pascarella & Terenzini, 2005).

One of the stronger predictors of first-year grade point average was the number of credits earned during the academic year. Part-time enrollment decreased first-year GPA by about three quarters of a grade point (.75). The lower academic performance of part-time students in part may be because a single course grade carries more weight in their GPA; thus poor performance in one course can have a dramatic influence on GPA.

In general, the effects of the multiple measures of time on task (hours spent studying, participating in co-curricular activities, working off-campus, relaxing or socializing) on first-year GPA were in the expected direction. Studying more hours per week had a positive effect on first-year GPA. Compared with students who studied five hours or less per week, students who studied six to 20 hours per week realized about a .04 point advantage in first-year GPA. Students who studied 21 or more hours per week enjoyed a .12 point advantage.

Students who spent more time participating in co-curricular activities, working off-campus, and relaxing or socializing had *lower* first-year grades. For example, compared to students involved in co-curricular activities for five or fewer hours per week, those who participated between six and 20 hours per week had a .06 point disadvantage in their first-year GPA; students who spent 21 or more hours per week earned a GPA .11 point lower. Relative to students who worked off-campus for five hours or less, students

who worked off-campus a moderate number of hours per week (i.e., 6-20) had a similar first-year GPA. But students who worked off-campus 21 hours or more had a lower GPA (- .14 points). Finally, as the number of hours spent socializing increased, first-year GPA decreased; for example, compared to students who relaxed or socialized only 5 or fewer hours per week, those who spent 21 or more hours socializing had a GPA that was lower by .13 points.

On balance, net of a host of confounding pre-college and college influences, student engagement in educationally purposeful activities had a small, but statistically significant effect on first-year grades. Specifically, a one-standard deviation increase in “engagement” during the first year of college increased a student’s GPA by about .04 points.

Conditional Effects. To determine if the impact of time spent studying varied by pre-college achievement, a set of cross-product terms representing the interaction between study time and prior academic achievement was entered into the general effects model. The statistically significant increase in explained variance (R^2 change) indicated that the direct effects of time spent studying differed by ACT score, which was the proxy for student pre-college academic performance. As Figure 1 illustrates, for every category of study time, ACT score and first-year GPA were positively related. Moreover, at any point along the distribution of ACT scores, students who studied more hours per week earned higher first-year GPAs.

Figure 1 shows two other subtle patterns. First, while the lines indicating the relationship between ACT and first-year GPA for students in the ‘6 to 20’ and ‘21 or more’ hours per week categories appear roughly parallel, the line for students in the ‘5 or

fewer' hours per week category has a smaller slope. This suggests that the advantage in first-year GPA for students who had higher high school grades is not as pronounced for those students who only studied for five or fewer hours per week during their first year of college. Perhaps the amount of effort sufficient to attain high grades in high school is not enough to achieve similarly high marks during the first college year.

Insert Figure 1 about here

Second, first-year students with higher ACT scores do not seem to have to study as many hours to earn comparable or even higher grades as do students with lower ACT scores. For example, students with an ACT score of 28 who studied only 5 or fewer hours per week during the first college year earned marks about one fifth of a grade point higher compared with students with an ACT score of 20 who studied for 21 hours or more per week. This finding helps to explain why the general effect of study time on first-year GPA is relatively small in magnitude -- some high achievers have to study only a few hours per week to attain relatively high grades, while some low achievers who study many hours per week earn lower grades than their high achieving peers. Apparently, what matters to grades is not only the amount of the time spent studying, but also how efficiently that time is used (Hu & Kuh, 2003).

A cross-product term for the interaction between educationally purposeful activities and pre-college academic achievement was entered into the general effects model to determine if the impact of educationally purposeful activities on first-year GPA differed by prior levels of academic achievement. The statistically significant increase in explained variance (R^2 change) indicated that the direct effect of educationally purposeful activities differed by achievement. As Figure 2 suggests, *student engagement in*

educationally purposeful activities had a small, compensatory effect on first-year GPA of students who entered college with lower levels of academic achievement. That is, students with an ACT score of 20 realized an increase in GPA of .06 for every standard deviation increase in their participation in educationally purposeful activities. Students with an ACT score of 24 realized only about .04 point GPA advantage for the same increase in engagement; students with a 28 ACT score had an advantage of only .02 points.

Insert Figures 2 and 3 about here

A set of cross-product terms representing the interaction between engagement in educationally purposeful activities and race was entered into the general effects model to determine if the impact of engagement on first-year GPA differed by the students' race or ethnicity. A statistically significant increase in explained variance (R^2 change) again indicated that the direct effect of educationally purposeful activities differed somewhat by race and ethnicity, but only for Hispanic and White students. Figure 3 shows that, all else being equal, a one standard deviation increase in student involvement in educationally purposeful activities resulted in about .11 advantage in first-year GPA for Hispanic students compared with only .03 benefit for White students.

Persistence to the Second Year of College

General Effects. To measure the net impact of time on task and engagement during the first year of college on persistence, we estimated two models (Table 2), regressing persistence to the second year of college on student background characteristics and first-year experiences. Model 1 in Table 2 includes only students' demographic characteristics, pre-college experiences, and prior academic achievement, and correctly

classified 58% percent of the students. Tables 3 and 4 show the predicted probabilities of returning for the second year of college associated with each statistically significant variable in the model. The predicted probability associated with any particular independent variable was calculated while holding all other variables at their mean value.

Insert Tables 2 and 3 about here

All else being equal, females had a greater probability ($prob = .89$) than males ($prob = .83$) of returning to the same institution for the second year of college (Table 3). Hispanic students had a lower probability of returning ($prob = .82$) than White students ($prob = .87$). Net of other pre-college influences in the model, students with high school grades of mostly Bs had a greater probability of returning for the second year of college ($prob = .89$) than students who earned mostly A grades ($prob = .86$), whereas students with mostly C or lower high school grades had roughly the same probability of persisting as students who earned mostly A grades, suggesting a curvilinear relationship between pre-college academic achievement and persistence (Table 3). That is, all else being equal, students with average high school grades had the greatest odds of returning, while students with the lowest or highest grades are less likely to return. This apparent curvilinear relationship is corroborated in part by the statistically significant, nonlinear effect of the students' pre-college achievement score on persistence (Figure 4). That is, every point increase in ACT score up to 21 (three points below the sample average of 24) had a positive though diminishing effect on a students' probability of returning. But for every point increase in ACT beyond a score of 21, the students' probability of returning *decreased* exponentially.

Insert Figure 4 about here

Receiving a merit grant had a strong positive effect on persistence, in that merit grant holders were about 10% more likely of returning ($prob = .93$) compared with non-recipients' ($prob = .83$). While gift aid may be enough of an incentive to persist at the same institution, perhaps the recognition of one's academic merit has a salutary psychological effect manifested as a deepened commitment to the institution.

Model 2 in Table 2 represents what happens when students' first year experiences, first-year GPA, and unmet need are included to predict persistence to the second college year at the same institution. This model correctly assigned 72% of the students, a 25% increase over Model 1. Again, for ease of interpretation, model coefficients were used to calculate predicted probabilities of returning for the second year of college associated with each statistically significant variable in the model (Table 4). The predicted probability associated with any particular independent variable was calculated while holding all other variables at their mean value. When these variables were added to the model, no differences were found in the probabilities of persistence for Hispanic and White students, but the probability of returning for African Americans ($prob = .93$) became greater than the probability for White students ($prob = .89$) (Table 4).

Insert Table 4 about here

After entering first-year experiences into the model, the curvilinear effect of ACT on returning for the second year was no longer statistically significant. However, the effect of first-year grades was curvilinear and statistically significant (Figure 5). That is, first-year GPA has a positive but diminishing effect on the probability of returning for students whose GPA is no greater than about 3.25, which is above the average first-year

GPA of 3.04. But for students who achieve grades above 3.25, the probability of returning *decreases* exponentially.

Insert Figure 5 about here

Whether students spent their time on academic tasks such as studying or off task such as relaxing and socializing or working off-campus did not affect their probability of returning to the same institution for the second year (Table 4). This is not surprising, given the off-setting effects of these experiences (positive for studying, negative for working off campus) on first-year GPA which was also included in the model. Being involved in co-curricular activities, however, had a strong positive impact on the students' probability of returning for the second year. Whereas students involved in co-curricular activities five or fewer hours per week had a probability of returning of .88, the probability of returning was .94 for students who were involved six to 20 hours weekly; students who devoted 21 or more hours per week in such activities had a .95 probability of returning. The link between extracurricular involvements and persistence is well documented, both empirically (Astin, 1993; Feldman & Newcomb, 1969; Pascarella & Terenzini, 2005) and theoretically (Astin, 1984, Tinto, 1993). This traditionally positive relationship appears to hold for the current generation of students from different racial and ethnic backgrounds attending different types of four-year colleges and universities.

Student engagement in educationally purposeful activities during the first year of college had a positive, statistically significant effect on persistence, even after controlling for background characteristics, other college experiences during the first college year, academic achievement, and financial aid. To put this in perspective, students who were engaged at a level one standard deviation *below* the average had a probability of returning

of .85, whereas students engaged at a level one standard deviation *above* the average had a probability of returning of .91 (Table 4). This is another piece of evidence consistent with the large body of research indicating that engagement matters to student success in college.

Conditional Effects. A set of cross-product terms representing the interaction between engagement in educationally purposeful activities and race and ethnicity were entered into the general effects model to determine if the impact of educationally purposeful activities varied by race or ethnicity. No differences were found. However, the coefficient representing the differential effect of engagement for African American and White students was statistically significant. As Figure 6 illustrates, *African American students benefited more than White students from increasing their engagement in educationally effective activities.* That is, although African American students at the lowest levels of engagement were less likely to persist than their White counterparts, as their engagement increased to within about one standard deviation below the mean, they had about the same probability of returning as Whites. As African American student engagement reached the average amount, they became *more likely* than White students to return for a second year.

Insert Figure 6 about here

Senior Students

General Effects. To measure the net effects of time on task and engagement, we estimated two models regressing senior year grade point average on student background characteristics and senior year experiences. Model 1 in Table 5 shows that student

background characteristics, pre-college academic achievement, and senior year experiences accounted for about 19% of the variance in senior year GPA.

In general, the effects of the multiple measures of how students spent their time on senior year GPA were in the expected direction. Studying more hours per week positively affected senior year GPA. While co-curricular involvements were strongly linked to persistence for first-year students, time spent in such pursuits had a negative effect on senior year GPA as did hours worked off-campus. For example, compared to students who participate in co-curricular activities for five or fewer hours per week, students who devoted between six and 20 hours per week to these activities had a senior year GPA about .07 points lower; the disadvantage grew to .09 for those who spent 21 or more hours in extracurricular activities. Working 21 hours or more off-campus decreased GPA by .07 points. Hours spent relaxing or socializing had a negative effect on senior year GPA, though the magnitude did not reach statistical significance.

Entering junior academic year GPA into the model explained an additional 36% of the variance in senior year GPA, increasing the total variance accounted for to 55% (Table 5, Model 2). Two engagement measures – hours spent studying and the global student engagement scale – had a small positive impact on senior year grades, *even after controlling for prior academic year GPA*. For example, students who studied for 21 or more hours per week had a senior year GPA that was .04 points higher than their peers who studied for five or fewer hours per week. For every one standard deviation increase in student engagement in educationally purposeful activities, senior year GPA increased by .03 points.

Insert Figure 7 about here

Conditional Effects. The effects of engagement in educationally purposeful activities on senior year GPA did not vary by student race or ethnicity. The effect of time spent studying on senior year GPA was consistent for students with different prior academic year GPAs. Unlike the compensatory effect of engagement found for first-year students, Figure 7 shows that a greater level of engagement during the senior year actually widens the gap between junior and senior year GPA. For example, students who had a junior academic year GPA of 2.50 had an estimated increase in GPA of .01 for every one standard deviation increase in their participation in educationally purposeful activities, compared with an estimated gain of .02 for students with a junior academic year GPA of 3.00, and an estimated gain of .03 for students with a prior GPA of 3.50. Although these differences are small in magnitude, they suggest that the effects of engagement and GPA may be compounding over the period of college. That is, students who benefit from greater levels of engagement early on in their college experience may be reinforced by their grades, and may become more selective and better practiced at the experiences that have greater payoff academically.

Limitations

This study has some limitations that must be taken into account when interpreting the findings. First, different institutions participated in the NSSE project in different years. Although the results across different years of NSSE administrations are generally consistent, if other years of data were examined the results might differ in unknown ways. Also, the NSSE instrument is relatively short and does not measure all the relevant aspects of engagement. In addition, this study used selected items from the survey; if

different aspects of engagement measured by the survey were analyzed, the results might differ or if additional engagement behaviors were used, the findings might change. In addition, while different types of colleges and universities were included in the study, the patterns of results reported here may not reflect what occurs at other colleges and universities that were not included in the study. Finally, about 85% of the students in the study returned to the same school for the second year of college. This persistence rate across the participating schools is so high because some unknown number of first-year students likely left the institutions prior to the spring term when NSSE was administered. Also, some students who may be considering transferring to another institution or dropping out of college may not have been motivated enough to complete the survey. The extent to which the prediction of achievement and persistence is biased by this self selection is not known.

Conclusions, Discussion and Implications

The findings from this study point to two conclusions.

First, *student engagement in educationally purposeful activities is positively related to academic outcomes as represented by first-year and senior student grades and by persistence between the first and second year of college.* Pre-college characteristics such as academic achievement represented by ACT or SAT score matter to first-year grades and persistence. However, once college experiences are taken into account – living on campus, enrollment status, working off campus and so forth -- the effects of pre-college characteristics and experiences diminish considerably. Student engagement – a range of behaviors that institutions can influence with teaching practices and programmatic interventions such as first-year seminars, service-learning courses, and

learning communities (Zhao & Kuh, 2004) -- positively affects grades in both the first and last year of college as well as persistence to the second year at the same institution, even after controlling for host of pre-college characteristics and other variables linked with these outcomes, such as merit aid and parental education. Equally important, the effects of engagement are generally in the same positive direction for students from different racial and ethnic backgrounds. While the positive coefficients generally are small in magnitude, the patterns of salutary effects are consistent and appear to be cumulative over time, as evidenced by the findings for seniors.

Second, *engagement has a compensatory effect on first-year grades and persistence to the second year of college at the same institution.* That is, while exposure to effective educational practices generally benefits all students, the effects are even greater for lower ability students and students of color compared with White students. The compensatory effect of engagement has also been noted by others (Cruce, Wolniak, Seifert, & Pascarella, 2006), suggesting that institutions should seek ways to channel student energy toward educationally effective activities, especially for those who start college with two or more “risk” factors – being academically underprepared or first in their families to go to college or from low income backgrounds.

Because most students benefit from early interventions and sustained attention at key transition points, faculty and staff should clarify institutional values and expectations early and often to prospective and matriculating students. To do this effectively, a school must first understand who its students are, what they are prepared to do academically, and what they expect of the institution and themselves. For example, far fewer students use campus learning and support services than say they will when starting college (NSSE,

2005). To address these concerns, faculty members, advisors, and student affairs professionals must clearly and consistently communicate to students what is expected and provide periodic feedback as to the quality of students' performance.

Faculty and staff must use effective educational practices throughout the institution to help compensate for shortcomings in students' academic preparation and create a culture congenial to student success. How and why many of these practices work in different institutional settings with different types of students are discussed by others (Chickering & Gamson, 1987; Chickering & Reisser, 1993; Education Commission of the States, 1995; Kuh, Douglas, Lund, & Ramin-Gyurnek, 1994; Kuh, Kinzie, Schuh, Whitt & Associates, 2005; Kuh, Schuh, Whitt & Associates, 1991; Pascarella & Terenzini, 2005). Other promising practices specific to particular groups or activities also are available, such as working with adult learners (Cook & King, 2005), undergraduate teaching and learning (Sorcinelli, 1991), developmental education for underprepared students (Boyland, 2002; Grubb, 2001), and student affairs work (Blimling & Whitt, 1999).

Students attending institutions that employ a comprehensive system of complementary initiatives based on effective educational practices are more likely to perform better academically, to be more satisfied, and to persist and graduate. These practices include well-designed and implemented orientation, placement testing, first-year seminars, learning communities, intrusive advising, early warning systems, redundant safety nets, supplemental instruction, peer tutoring and mentoring, theme-based campus housing, adequate financial aid including on-campus work, internships, service learning, and demonstrably effective teaching practices (Forest, 1985, Kuh et al.,

2005; Wang & Grimes, 2001). However, simply offering such programs and practices does not guarantee that they will have the intended effects on student success; institutional programs and practices must be of high quality, customized to meet the needs of students they are intended to reach, and firmly rooted in a student success-oriented campus culture (Kuh et al., 2005). Institutions should insure that interconnected learning support networks, early warning systems, and safety nets are in place and working as intended.

The classroom is the only regular venue that most commuting and part-time students have for interacting with other students and with faculty. Thus, using the classroom to create communities of learning must be a high priority in terms of creating a success-oriented campus culture. Faculty members in partnership with student affairs professionals and other staff familiar with culture-building strategies can work together to fashion a rich, engaging classroom experience that complements the institution's academic values and students' preferred learning styles. This means that faculty members must also be more intentional about teaching institutional values and traditions and informing students about campus events, procedures, and deadlines such as registration. Faculty members also could design cooperative learning activities that bring students together to work together after class on meaningful tasks. Because peers are very influential to student learning and values development, institutions must harness and shape this influence to the extent possible so it is educationally purposeful and helps to reinforce academic expectations. A well-designed first-year seminar, freshman interest group, or learning community (where students take two or more courses together) can serve this purpose (Kuh et al., 2005; Matthews, 1994; Muraskin, 2003; Price, 2005;

Tinto, 1996; Tinto, Love, & Russo, 1995). Working on campus, writing for the student newspaper, or conducting research with a faculty member can be a life-changing experience. When students are required to take responsibility for activities that require daily decisions and tasks, they become invested in the activity and more committed to the college and their studies. Advisors, counselors, and others who have routine contact with students must persuade or otherwise induce them to get involved with one or more of these kinds of activities or with a faculty or staff member. Academic advisors must also encourage students to become involved with peers in campus events and organizations and invest effort in educational activities known to promote student learning and development (Braxton & McClendon, 2001–02; Kuh et al., 2005).

The results from this study also behoove institutions to examine whether they can make the first year more challenging and satisfying for a group of students who seemingly come from backgrounds that indicate they can perform well in college. Perhaps as Heist (1968) discovered four decades ago, some of the most creative, highly able students leave before earning a degree. This is unacceptable at a time when the nation needs to maximize human capital to seek solutions to the challenges of the day and maintain America's competitive advantage and influence in the world order.

Several findings warrant additional research. For example, why are students with high ACT or SAT scores and high first-year grades less likely to return to the same college for a second year of study? It is also puzzling that students from the highest income bracket are somewhat less likely to return for a second year. Even students who appear to be well prepared and do not face financial hardships do not necessarily persist, at least at the college at which they started. As with other studies (Kuh, Kinzie, Buckley,

Bridges, & Hayek, 2006; Pascarella & Terenzini, 2005), transfer status was negatively related to persistence. We cannot tell from the results from the present study to what extent the multiple institution-transfer-swirl phenomenon may be at work, whereby students may be committed to earning a baccalaureate but not necessarily by doing all their degree work at the same institution. Student tracking systems that allay privacy concerns would help determine whether these students complete their baccalaureate degree elsewhere.

Notes:

¹The registrar's office from each institution provided detailed student course-taking records, instructional program information, and graduation records. To accurately measure these outcomes, we requested the full, disaggregated academic transcript of each student. This included every individual course that is represented on each student's academic record, including any withdrawals. Every academic record included the student's identification number; academic year and term; course code and title; credit hours attempted, awarded and received; and the letter grade received. The registrar's office also provided graduation records, including graduation date, degree code (BA, BS, etc.), and primary and secondary major. To accommodate different financial aid management systems, we developed a financial aid template based on that used for the Common Dataset Initiative which many campuses use to respond to higher education surveys. Five categories of financial aid were listed: (a) need-based grants, (b) merit-based grants, (c) subsidized loans, (d) unsubsidized loans, and (e) work-study. Each type of aid was flagged as aid awarded, accepted, and actually dispersed. Only aid dispersed was used in this study, as some participating institutions did not maintain longitudinal records of financial aid awarded and accepted. We also asked institutions provide a need value for each student, defined as total cost of attending the institution minus expected family contribution (EFC). This information was only requested for the year the student took the survey and the following academic year.

²Minor changes were made to the NSSE survey instrument every year between 2000 and 2003, including changes in response set modifications, minor wording edits, item additions or deletions, and the reordering of items on the survey. In instances where changes to response sets made items less compatible across years, response options were recoded to represent the lowest common denominator to reach a sufficient level of compatibility. Such a task accordingly compressed the amount of recorded variation in student responses, which may likely reduce the size of the effect of engagement measures on the outcomes under study. Thus, these minor year-to-year changes in the NSSE survey could affect the findings in unknown ways.

³The number of credit hours attempted was multiplied by quality points for a measure of “gpa points.” To create grade point average for a particular academic term, the sum of the GPA points (credit hrs attempted x quality points) was divided by the sum of credit hours attempted). Grade point averages were calculated for each academic year. Grades for summer courses were not incorporated in GPA calculations. While grades are commonly used as an outcome measure (Pascarella & Terenzini, 2005), reasonable people disagree about whether they represent an authentic measure of learning; thus, there are limitations associated with using grades to understand the effects of engagement on student learning and personal development. We asked participating schools to provide other outcome measures such as results from standardized instruments, but none had systematically collected such information. Thus, first-year and senior grades are the only measures of academic achievement and learning available for the analysis.

References

- Allen, D. (1999). Desire to finish college: An empirical link between motivation and persistence. *Research in Higher Education, 40*, 461–485.
- Astin, A. W. (1977). *Four critical years*. San Francisco: Jossey-Bass.
- Astin, A. W. (1984). Student involvement: A developmental theory for higher education. *Journal of College Student Personnel, 25*, 297–308.
- Astin, A. W. (1993). *What matters in college? Four critical years revisited*. San Francisco: Jossey-Bass.
- Astin, A. W., Korn, W., & Green, K. (1987). Retaining and satisfying students. *Educational Record, 68*, 36–42.
- Bean, J.P. (1990). Why students leave: Insights from research. In D. Hossler, J.P. Bean, and Associates (Eds.), *The strategic management of college enrollments* (pp. 147-169). San Francisco: Jossey-Bass.
- Berkner, L., He, S., & Cataldi, E.F. (2002). *Descriptive summary of 1995–96 Beginning Postsecondary Students: Six years later (NCES 2003–151)*. Washington, DC: U.S. Department of Education. National Center for Education Statistics.
- Blimling, G. S., & Whitt, E. J. (1999). Identifying the principles that guide student affairs practice. In G. S. Blimling & E. J. Whitt (Eds.), *Good practice in student affairs: Principles to foster student learning* (pp. 1-20). San Francisco: Jossey-Bass.
- Bok, D.C. (2006). *Our underachieving colleges: A candid look at how much students learn and why they should be learning more*. Princeton, NJ: Princeton University Press.
- Boyland, H. R. (2002) *What works: A guide to research-based best practices in developmental education*. Boone, NC: Appalachian State University, Continuous Quality Improvement Network with the National Center for Developmental Education.
- Braxton, J. M., & McClendon, S. A. (2001-02). The fostering of social integration and retention through institutional practice. *Journal of College Student Retention: Research, Theory & Practice, 3*(1), 57-71.
- Cabrera, A. F., Nora, A., & Castaneda, M. B. (1992). The role of finances in the persistence process: A structural model. *Research in Higher Education, 33*(5), 571–593.
- Carey, K. (2004, May). *A matter of degrees: Improving graduation rates in four-year colleges and universities*. Washington, DC: Education Trust.
- Chickering, A. W., & Gamson, Z. F. (1987). Seven principles for good practice in undergraduate education. *AAHE Bulletin, 39*, 3–7.

Chickering, A. W., & Reisser, L. (1993). *Education and identity*. San Francisco: Jossey-Bass.

Cook, B., & King, J. E. (2005). *Improving lives through higher education: Campus programs and policies for low-income adults*. Washington, DC: Lumina Foundation for Education and American Council on Education Center for Policy Analysis.

Cruce, T., Wolniak, G.C., Seifert, T.A., & Pascarella, E.T. (2006). Impacts of good practices on cognitive development, learning orientations, and graduate degree plans during the first year of college. *Journal of College Student Development*, 47, 365-383.

Education Commission of the States (ECS). (1995). *Making quality count in undergraduate education*. Denver, CO: ECS Distribution Center.

Feldman, K. A., & Newcomb, T. M. (1969). *The impact of college on students* (1st ed.). San Francisco: Jossey-Bass.

Forest, A. (1985). Creating conditions for student and institutional success. In L. Noel, R. S. Levitz, D. Saluri, & Associates (Eds.), *Increasing student retention: Effective programs and practices for reducing dropout rate*. San Francisco: Jossey-Bass.

Gaither, J. (2005). *Minority retention: What works? New Directions for Institutional Research, No. 125*, San Francisco: Jossey Bass.

Gloria, A.M., Robinson Kurpius, S.E., Hamilton D.K., & Willson M.S. (1999). African American student persistence at a predominately white university: Influences of social support, university comfort, and self-beliefs. *Journal of College Student Development*, 40(3), 267-268.

Grubb, W. N. (2001, February). *From black box to Pandora's box: Evaluating remedial/developmental education*. New York: Columbia University, Teachers College, Community College Research Center.

Heist, P. (Ed.). (1968). *The creative college student: An unmet challenge*. San Francisco: Jossey-Bass.

Hu, S. & Kuh, G.D. (2003). Maximizing what students get out of college: Testing a learning productivity model. *Journal of College Student Development*, 44(2), 185-203.

Kuh, G.D. (2001). Assessing what really matters to student learning: Inside the National Survey of Student Engagement. *Change*, 33(3), 10-17, 66.

Kuh, G.D. (2002, July). *The National Survey of Student Engagement: Conceptual framework and overview of psychometric properties*. Bloomington, IN: Center for Postsecondary Research and Planning, Indiana University School of Education. http://www.indiana.edu/~nsse/html/2002_NSSE_report/html/conceptual_1.htm

Kuh, G. D. (2003). What we're learning about student engagement from NSSE. *Change*, 35(2), 24–32.

Kuh, G. D., Douglas, K. B., Lund, J. P., & Ramin-Gyurnek, J. (1994). *Student learning outside the classroom: Transcending artificial boundaries*. (ASHE-ERIC Higher Education Report No. 8). Washington, DC: The George Washington University, Graduate School of Education and Human Development.

Kuh, G.D., Kinzie, J., Buckley, J., Bridges, B., & Hayek, J.C. (2006). *What matters to student success: A review of the literature*. Final report for the National Postsecondary Education Cooperative and National Center for Education Statistics. Bloomington, IN: Indiana University Center for Postsecondary Research.

<http://nces.ed.gov/npec/papers.asp>

Kuh, G.D., Kinzie, J., Cruce, T., Shoup, R., & Gonyea, R.M. (2006, July). *Connecting the dots: Multifaceted analyses of the relationships between student engagement results from the NSSE and the institutional policies and conditions that foster student success*. Final report to Lumina Foundation for Education. Bloomington, IN: Indiana University Center for Postsecondary Research.

http://nsse.iub.edu/pdf/Connecting_the_Dots_Report.pdf

Kuh, G.D., Kinzie, J., Schuh, J.H., Whitt, E.J., & Associates (2005). *Student success in college: Creating conditions that matter*. San Francisco: Jossey-Bass.

Kuh, G. D., Schuh, J. H., Whitt, E. J., & Associates. (1991). *Involving colleges: Successful approaches to fostering student learning and personal development outside the classroom*. San Francisco: Jossey-Bass.

Kuh, G. D., & Whitt, E. J. (1988). *The invisible tapestry: Culture in American colleges and universities*. ASHE-ERIC Higher Education Report, No. 1. Washington, DC: Association for the Study of Higher Education.

Loo, C. M., & Rolison, G. (1986). Alienation of ethnic minority students at a predominantly white university. *Journal of Higher Education* 57, 58-77.

Matthews, R. S. (1994). Enriching teaching and learning through learning communities. In T. O'Banion (Ed.), *Teaching and learning in the community college* (pp. 179-200). Washington, DC: Community College Press.

Muraskin, L. (2003). *National evaluation of GEAR UP: A summary of the first two years*. Washington, DC: Department of Education.

Murtaugh, P. A., Burns, L. D., & Schuster, J. (1999). Predicting the retention of university students. *Research in Higher Education*, 40, 355–371.

National Center for Education Statistics (1995). *Minority undergraduate participation in postsecondary education*. Washington, DC: U.S. Department of Education, Office of Educational Research and Improvement.

National Survey of Student Engagement (2006). *Engaged learning: Fostering success of all students*. Bloomington, IN: Indiana University Center for Postsecondary Research.

Pace, C. R. (1990). *The undergraduates: A report of their activities and college experiences in the 1980s*. Los Angeles: Center for the Study of Evaluation, UCLA Graduate School of Education.

Pascarella, E. T. (1980). Student-faculty informal contact and college outcomes. *Review of Educational Research*, 50, 545-595

Pascarella, E. T., Edison, M., Nora, A., Hagedorn, L. S., & Terenzini, P. T. (1996). Influences on students' openness to diversity and challenge in the first year of college. *Journal of Higher Education* 67, 174-195.

Pascarella, E. T., & Terenzini, P. T. (2005). *How college affects students: A third decade of research* (Vol. 2). San Francisco: Jossey-Bass.

Peltier, J.W., Laden, R., & Matranga, M. (1999). Student persistence in college: A review of research. *Journal of College Student Retention*, 1(4), 357-75.

Person, D. R., & Christensen, M. C. (1996, Fall). Understanding Black student culture and Black student retention. *NASPA Journal*, 34 (1), 47-56.

Pike, G. R. (2006). The convergent and discriminant validity of NSSE scalelet scores. *Journal of College Student Development*, 47, 551-564.

Price, D.V. (2005, December). *Learning communities and student success in postsecondary education: A background paper*. New York: MDRC.

Reyes, N. (1997). Holding on to what they've got. *Black Issues in Higher Education*, 13(26): 36-40.

St. John, E. P., Hu, S., Simmons, A. B., & Musoba, G. D. (2001). Aptitude vs. merit: What matters in persistence. *The Review of Higher Education*, 24, 131-152.

Schwitzer, A. M., Griffin, O. T., Ancis, J. R., & Thomas, C. (1999). Social adjustment experiences of African American college students. *Journal of Counseling and Development* 77, 189-197.

Sorcinelli, M. D. (1991). Research findings on the seven principles. *New Directions for Teaching and Learning*, (47), 13-25.

Tinto, V. (1993). *Leaving college: Rethinking the causes and cures of student attrition* (2nd ed.). Chicago: University of Chicago Press.

Tinto, V. (1996). Reconstructing the first year of college. *Planning for Higher Education*, 25(1), 1-6.

Tinto, V., Love, A. G, & Russo, P. (1995). *Building learning communities for new students: A summary of research findings of the collaborative learning project*. University Park, PA: National Center on Postsecondary Teaching, Learning, and Assessment.

Wang, H., & Grimes, J. W. (2001). A systematic approach to assessing retention programs: identifying critical points for meaningful interventions and validating outcomes assessment. *Journal of College Student Retention*, 2(1), 59-68.

Zhao, C-M., & Kuh, G.D. (2004). Adding value: Learning communities and student engagement. *Research in Higher Education*, 45, 115-138.

Table 1.
Results of OLS Regression of First-Year GPA on Student Background and First-Year Experiences

Variable	Model 1		Model 2		
	B	Sig.	B	Sig.	
Intercept	3.041	***	3.136	***	
Female	0.164	***	0.121	***	
African American/Black	-0.092	***	-0.053	*	
Asian/Pacific Islander	-0.028		-0.040		
Hispanic/Latino	-0.018		0.051		
Other race	-0.081		-0.046		
Number of parents with 4-year degree	0.022	*	0.016		
Parent income 30,000 or less	-0.098	***	-0.062	**	
Parent income 30,000 to 50,000	-0.026		-0.019		
Parent income 50,000 to 80,000	-0.007		0.006		
Pre-college graduate degree expectations	-0.037	*	-0.038	**	
Number of honors courses taken in high school	0.012	*	0.009	*	
Number of high school extracurricular activities	-0.007	*	-0.007	*	
Pre-college GPA of B	-0.308	***	-0.251	***	
Pre-college GPA of C	-0.494	***	-0.308	***	
Pre-college achievement score (centered)	0.048	***	0.046	***	
Received merit grant	0.087	***	0.046	***	
Earned less than full-time credit hours			-0.747	***	
Commuting residence			0.189	***	
Transfer status			-0.004		
6 to 20 hours per week worked off-campus			-0.024		
21 or more hours per week worked off-campus			-0.137	***	
6 to 20 hours per week relaxing/socializing			-0.048	**	
21 or more hours per week relaxing/socializing			-0.128	***	
6 to 20 hours per week studying			0.044	*	
21 or more hours per week studying			0.118	***	
6 to 20 hours per week co-curricular			-0.058	***	
21 or more hours per week co-curricular			-0.111	***	
Educationally purposeful activities (standardized)			0.038	***	
	R ²	0.289	***	0.421	***
	R ² Change			0.132	***

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

Table 2.
Results of Logistic Regression for Persistence to the Second Year on
Student Characteristics and Engagement

Variable	Model 1			Model 2			
	B	Sig.	OR	B	Sig.	OR	
Female	0.500	***	1.649	0.533	***	1.704	
African American/Black	0.045			0.410	**	1.507	
Asian/Pacific Islander	0.168			0.431			
Hispanic/Latino	-0.397	*	0.672	-0.050			
Other race	-0.465			-0.345			
Number of parents with 4-year degree	-0.025			-0.063			
Parent income 30,000 or less	-0.184			0.358	*	1.430	
Parent income 30,000 to 50,000	0.062			0.412	***	1.510	
Parent income 50,000 to 80,000	0.011			0.164			
Pre-college graduate degree expectations	0.131			0.119			
Number of honors courses taken in high school	0.012			0.003			
Number of high school extracurricular activities	-0.057	**	0.944	-0.068	***	0.934	
Pre-college GPA of B	0.214	*	1.239	0.399	***	1.490	
Pre-college GPA of C	-0.178			0.306			
Pre-college achievement score (centered)	-0.033	**	0.968	-0.043	***	0.957	
Pre-college achievement score (squared)	-0.006	***	0.994	0.000			
Received merit grant	0.951	***	2.589	0.731	***	2.077	
Earned less than full-time credit hours				-1.372	***	0.254	
Commuting residence				0.132			
Transfer status				-0.532	**	0.587	
6 to 20 hours per week worked off-campus				-0.121			
21 or more hours per week worked off-campus				0.210			
6 to 20 hours per week relaxing/socializing				-0.028			
21 or more hours per week relaxing/socializing				0.231			
6 to 20 hours per week studying				-0.020			
21 or more hours per week studying				-0.122			
6 to 20 hours per week co-curricular				0.731	***	2.077	
21 or more hours per week co-curricular				0.927	***	2.528	
Educationally purposeful activities (standardized)				0.154	***	1.167	
First-year cumulative GPA (centered)				0.107			
First-year cumulative GPA (squared)				-0.390	***	0.677	
Unmet need 10% or more of cost to attend				-0.685	***	0.504	
Constant			1.392			1.646	
	-2 Log		5085.50			4520.24	
	Likelihood		7	***		9	***
	Likelihood Ratio					565.258	***
	Cox & Snell R ²		.034			.118	
	Nagelkerke R ²		.060			.206	
	Percent correct		.577			.719	

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

Table 3.
 Predicted Probability of Persisting to the Second Year of College for Model 1^a

Characteristic	Prob.	Characteristic	Prob.
<i>Gender</i>		<i>High school grades</i>	
Female	0.887	Mostly As ^b	0.864
Male ^b	0.827	Mostly Bs	0.887
<i>Race</i>		<i>Pre-college achievement score^c</i>	
Hispanic/Latino	0.822	1 SD above mean (approx. score 28)	0.844
White ^b	0.873	1 SD below mean (approx. score 20)	0.875
<i>Number of high school co-curricular activities</i>		<i>Merit grant</i>	
1 SD above mean (approx. 7 activities)	0.856	Received merit grant	0.925
1 SD below mean (approx. 3 activities)	0.884	Did not receive merit grant ^b	0.827

^a Predicted probabilities are calculated with all other variables in the model held at their mean values

^b Reference group

^c Includes polynomial term

Table 4.
 Predicted Probability of Persisting to the Second Year of College for Model 2^a

Characteristic	Prob.	Characteristic	Prob.
<i>Gender</i>		<i>Enrollment status</i>	
Female	0.913	Less than full-time credits earned	0.723
Male ^b	0.860	Full-time credits earned ^b	0.911
<i>Race</i>		<i>Transfer status</i>	
African American	0.927	Transfer student	0.841
White ^b	0.893	Non-transfer student ^b	0.900
<i>Parents' income</i>		<i>Time spent in co-curricular activities</i>	
Parent income 30,000 or less	0.912	5 hours or less per week ^b	0.876
Parent income 30,000 to 50,000	0.917	6 to 20 hours per week	0.936
Parent income greater than 80,000 ^b	0.879	21 or more hours per week	0.947
<i>Number of high school co-curricular activities</i>		<i>Educationally purposeful activities</i>	
1 SD above mean (approx. 7 activities)	0.885	1 SD above mean	0.912
1 SD below mean (approx. 3 activities)	0.911	1 SD below mean	0.884
<i>High school grades</i>		<i>First-year GPA^c</i>	
Mostly As ^b	0.886	1 SD above mean (approx. 2.5)	0.890
Mostly Bs	0.921	1 SD below mean (approx 3.5)	0.876
<i>Pre-college achievement score^c</i>		<i>Unmet need</i>	
1 SD above mean (approx. score 28)	0.881	10% or more of cost to attend	0.849
1 SD below mean (approx. score 20)	0.913	Less than 10% of cost to attend ^b	0.918
<i>Merit grant</i>			
Received merit grant	0.934		
Did not receive merit grant ^b	0.872		

^a Predicted probabilities are calculated with all other variables in the model held at their mean values

^b Reference group

^c Includes polynomial term

Table 5.
Results of OLS Regression of Senior Year GPA on Student Background
and Senior-Year Experiences

Variable	Model 1		Model 2		
	B	Sig.	B	Sig.	
Intercept	3.383	***	3.369	***	
Female	0.149	***	0.072	***	
African American/Black	-0.155	***	-0.039	*	
Asian/Pacific Islander	-0.145	**	-0.093	**	
Hispanic/Latino	-0.091	**	-0.024		
Other race	-0.004		0.016		
Number of parents with 4-year degree	-0.030	***	-0.014	*	
Parent income 30,000 or less	-0.090	***	-0.046	*	
Parent income 30,000 to 50,000	-0.015		-0.011		
Parent income 50,000 to 80,000	0.013		0.005		
Pre-college graduate degree expectations	-0.044	**	-0.023		
Pre-college achievement score (centered)	0.028	***	0.002		
Received merit grant	0.102	***	0.020		
Earned less than full-time credit hours	-0.287	***	-0.171	***	
Commuting residence	0.016		0.010		
Transfer status	-0.039	*	-0.038	**	
6 to 20 hours per week worked off-campus	0.024		0.010		
21 or more hours per week worked off-campus	-0.073	***	-0.016		
6 to 20 hours per week relaxing/socializing	-0.015		-0.003		
21 or more hours per week relaxing/socializing	-0.011		0.001		
6 to 20 hours per week studying	0.021		0.017		
21 or more hours per week studying	0.077	***	0.035	*	
6 to 20 hours per week co-curricular	-0.068	***	-0.018		
21 or more hours per week co-curricular	-0.094	**	-0.007		
Educationally purposeful activities (standardized)	0.066	***	0.027	***	
Prior academic year GPA (centered)			0.671	***	
	R ²	0.190	***	0.547	***
	R ² Change			0.357	***

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

Figure 1.
Impact of Hours Per Week Studying on First-Year GPA
By Pre-College Achievement Level

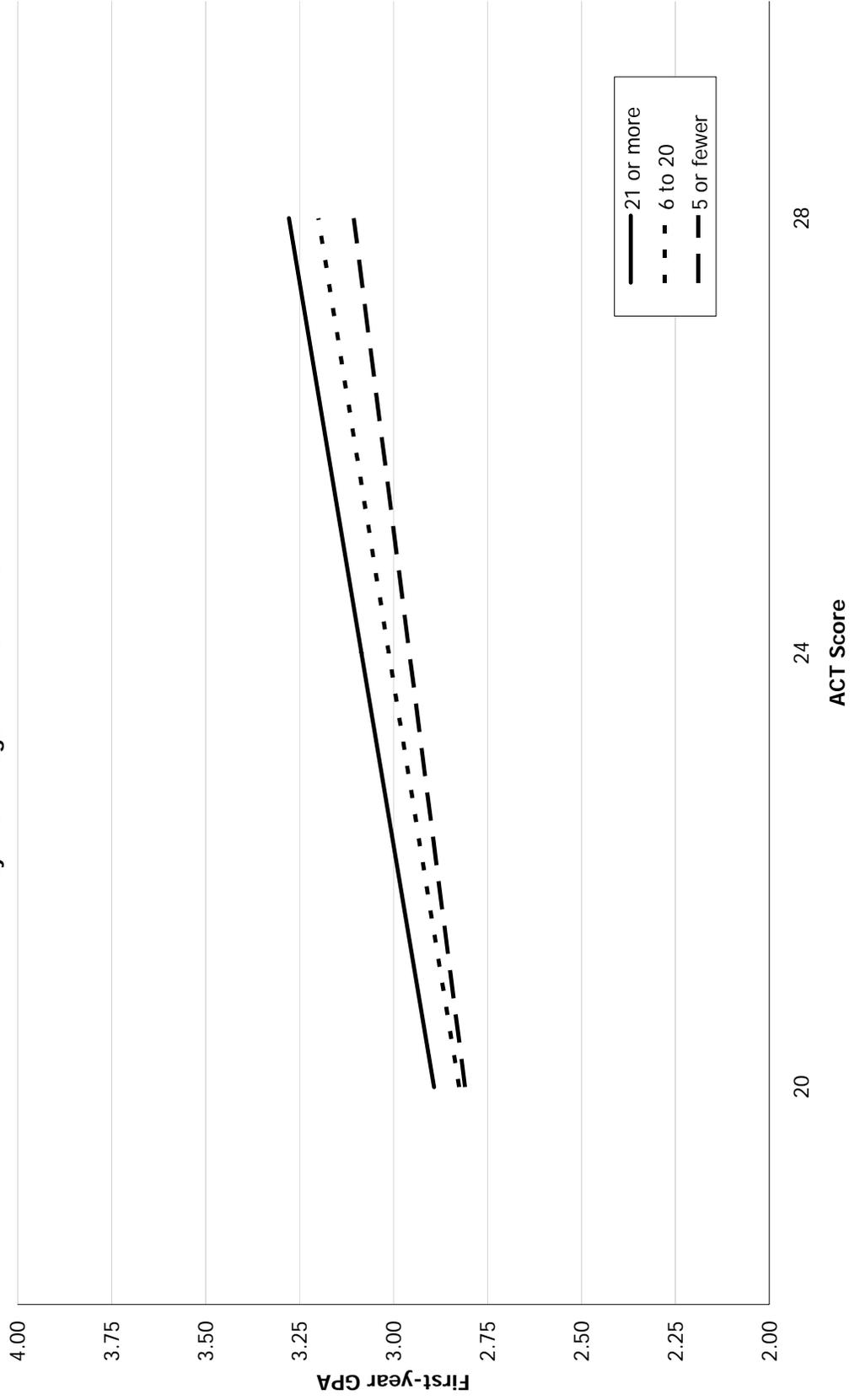


Figure 2.
Impact of Educationally Purposeful Activities on First Academic Year GPA
By Pre-College Achievement Level

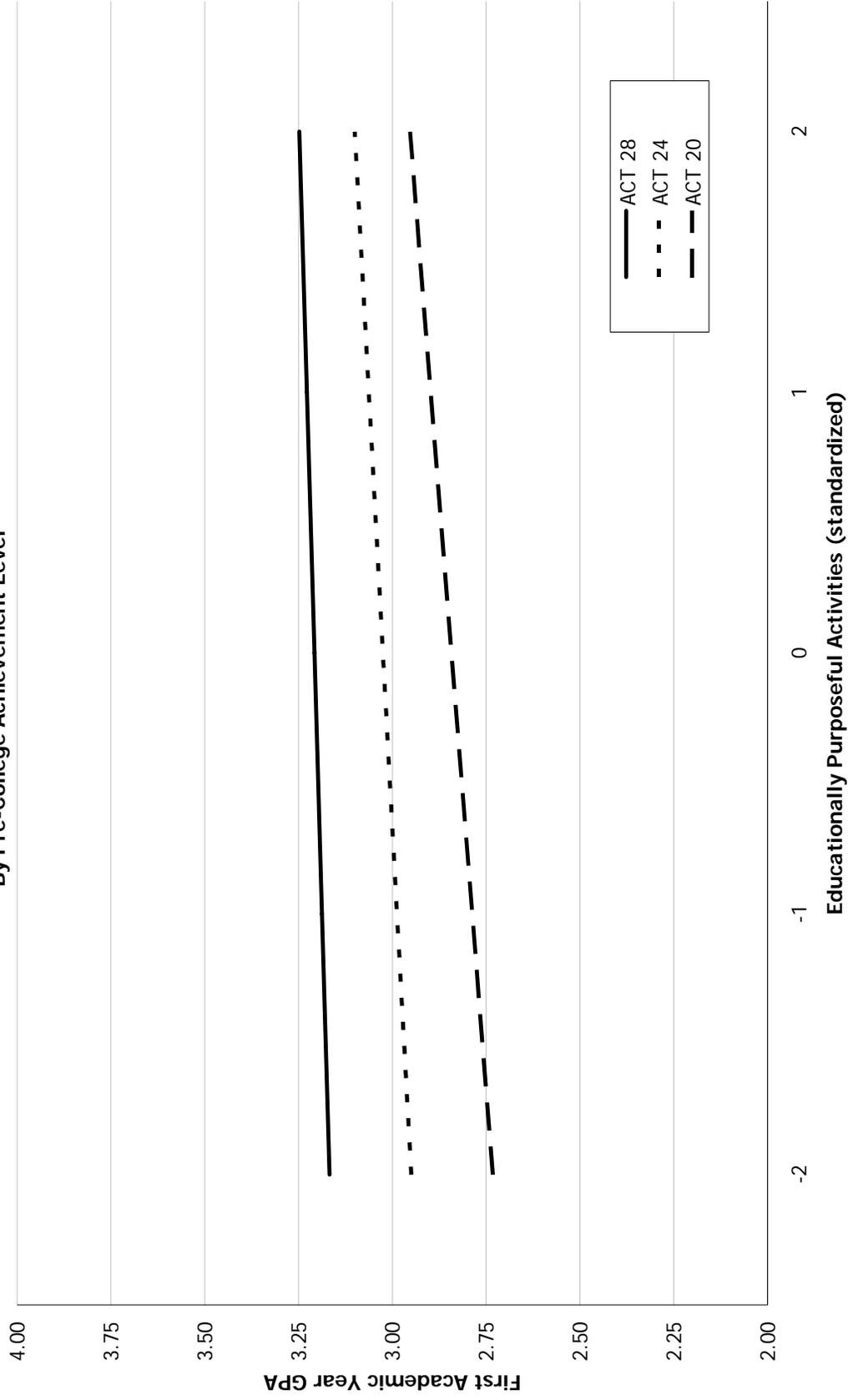


Figure 3.
Impact of Educationally Purposeful Activities on First Academic Year GPA
By Race/Ethnicity

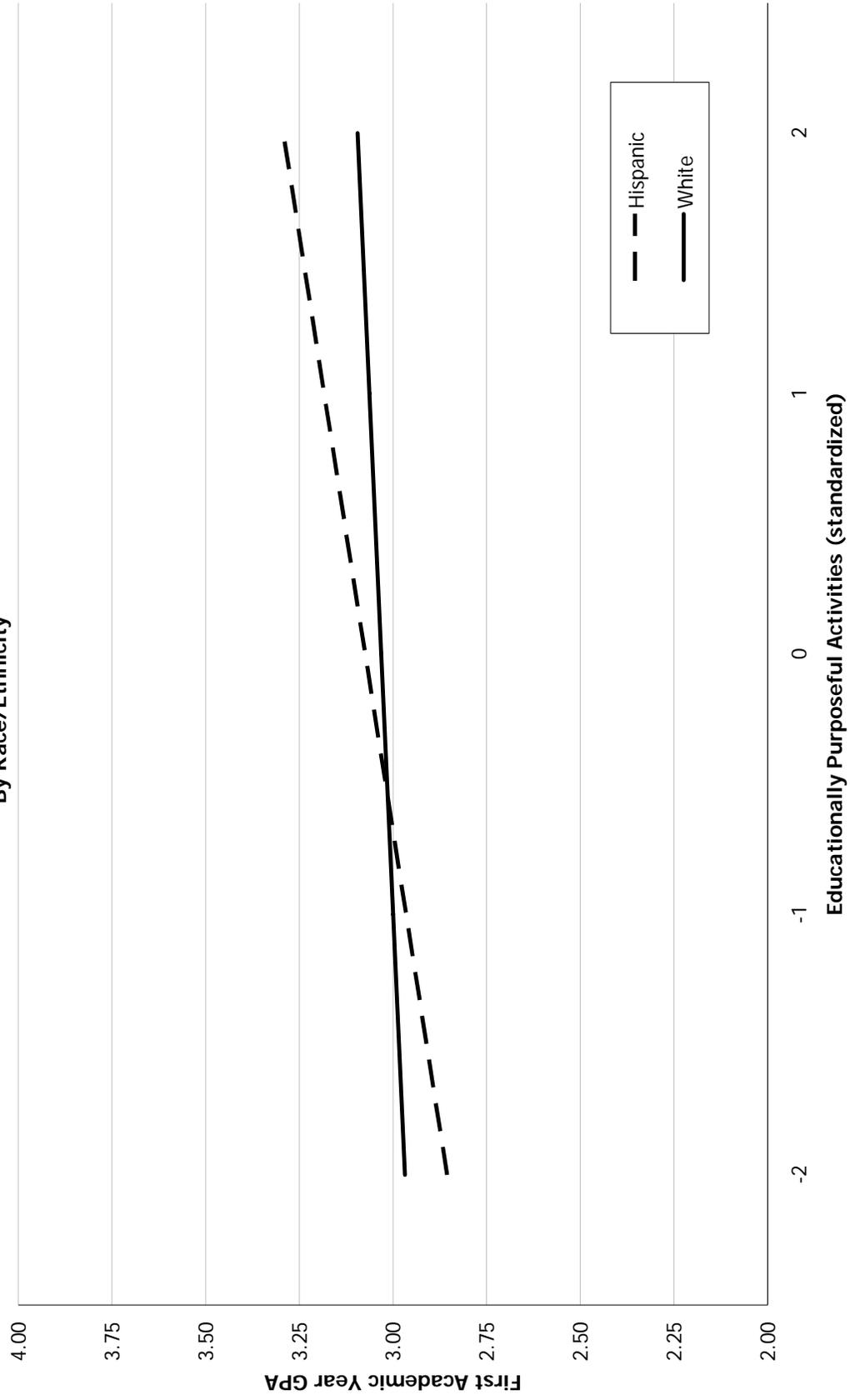


Figure 4.
Impact of Pre-College Achievement Level on Probability of Returning for the Second Year of College

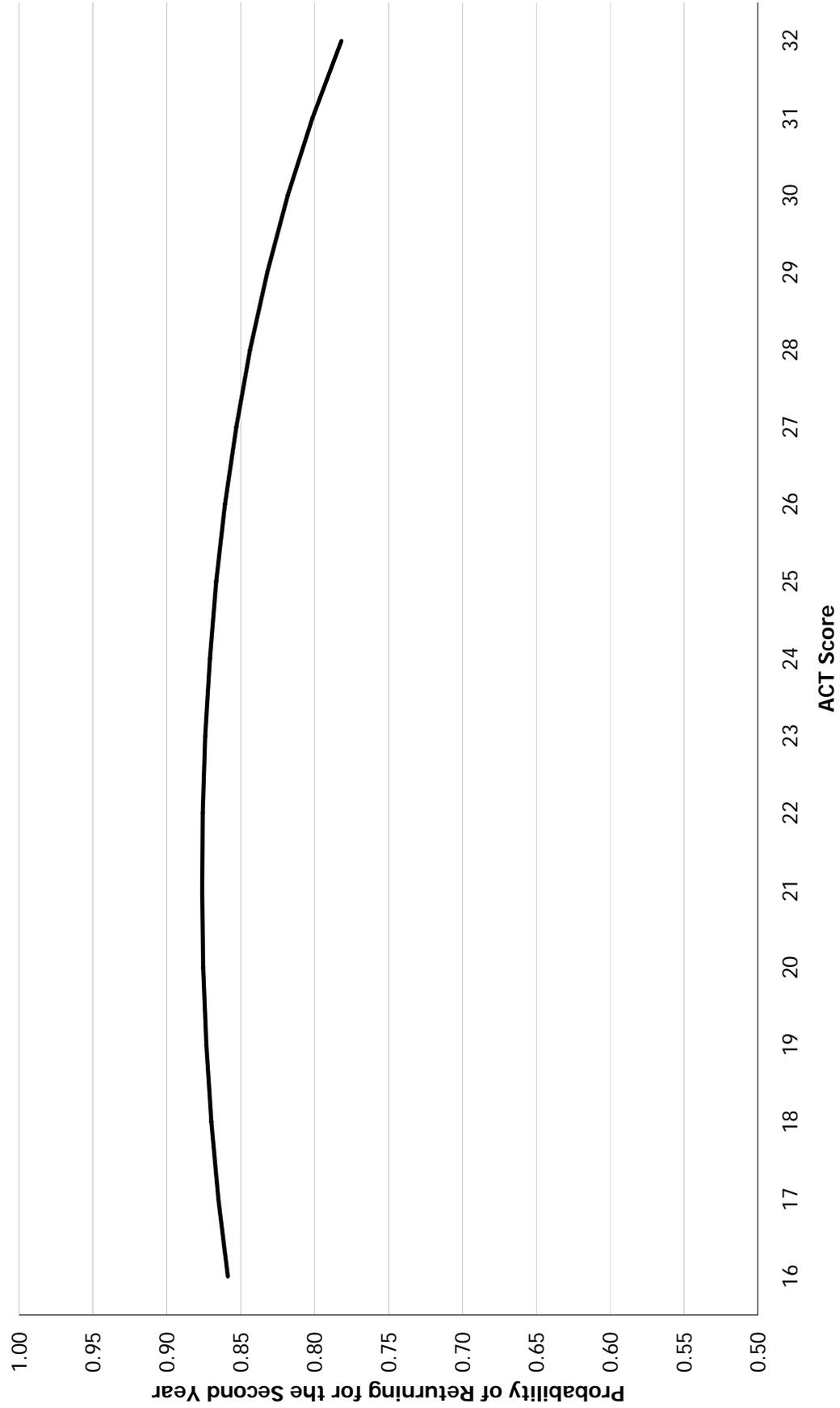


Figure 5.
Impact of First Academic Year GPA on Probability of Returning for the Second Year of College

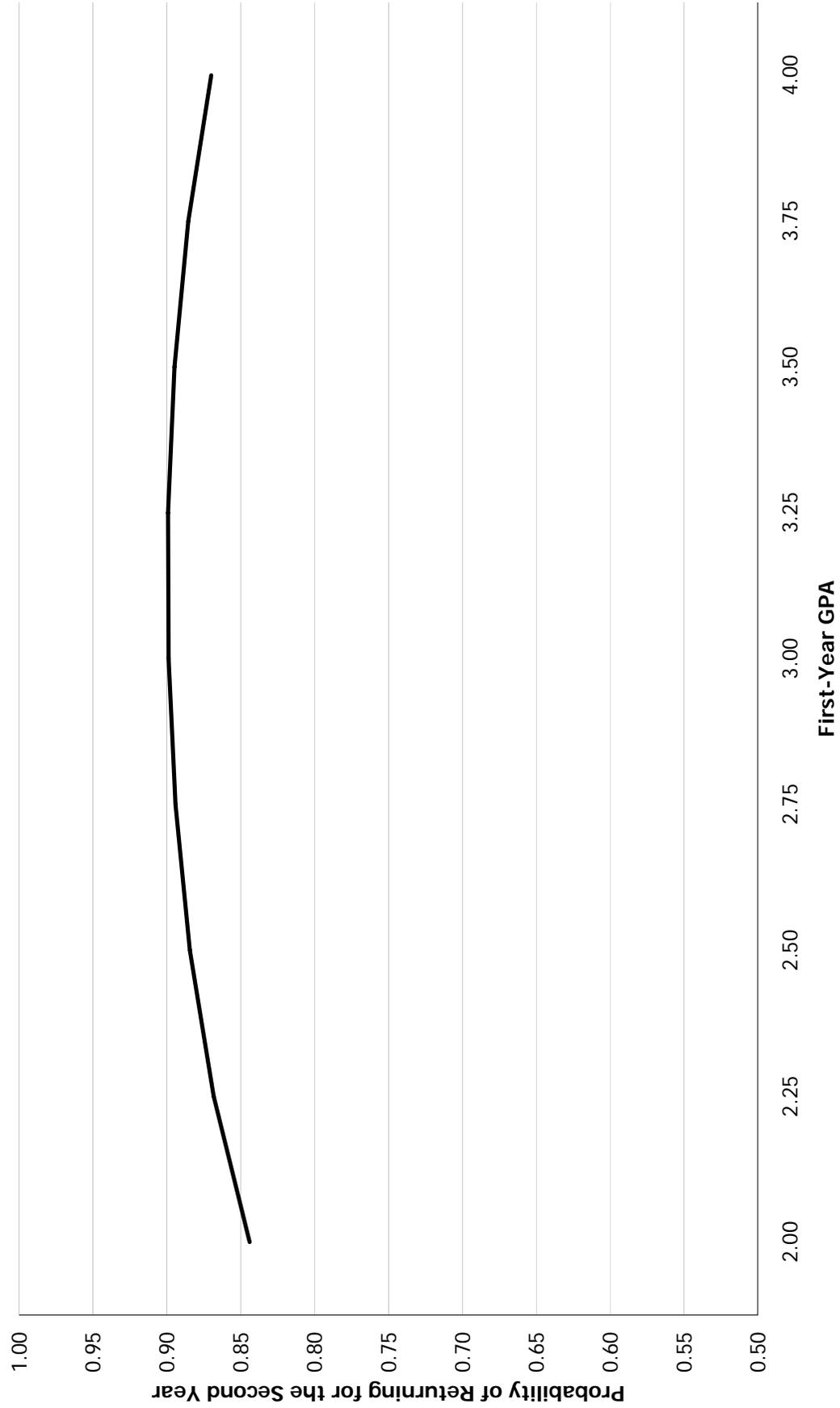


Figure 6.
Impact of Educationally Purposeful Activities on the Probability of Returning for the Second Year of College
By Race

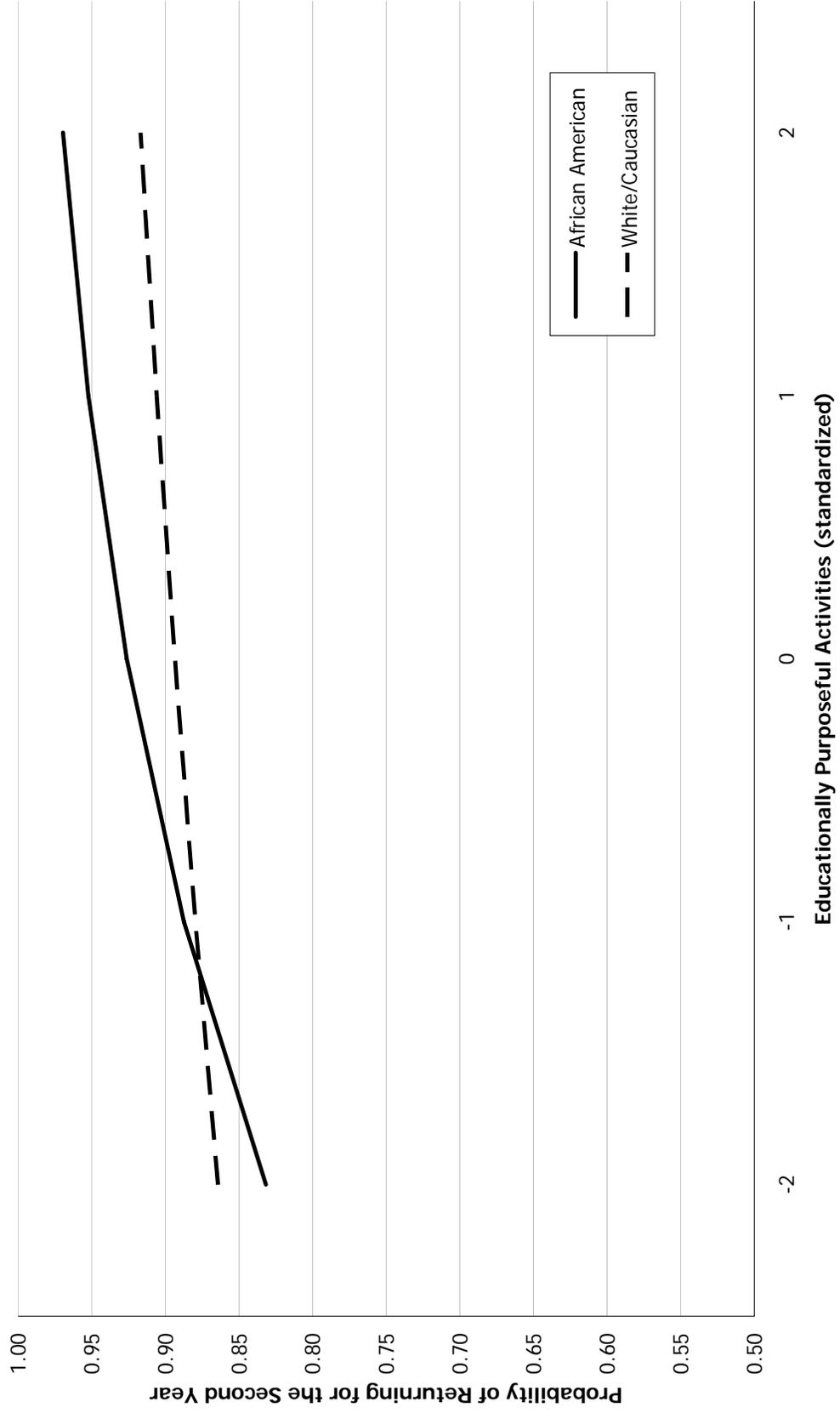
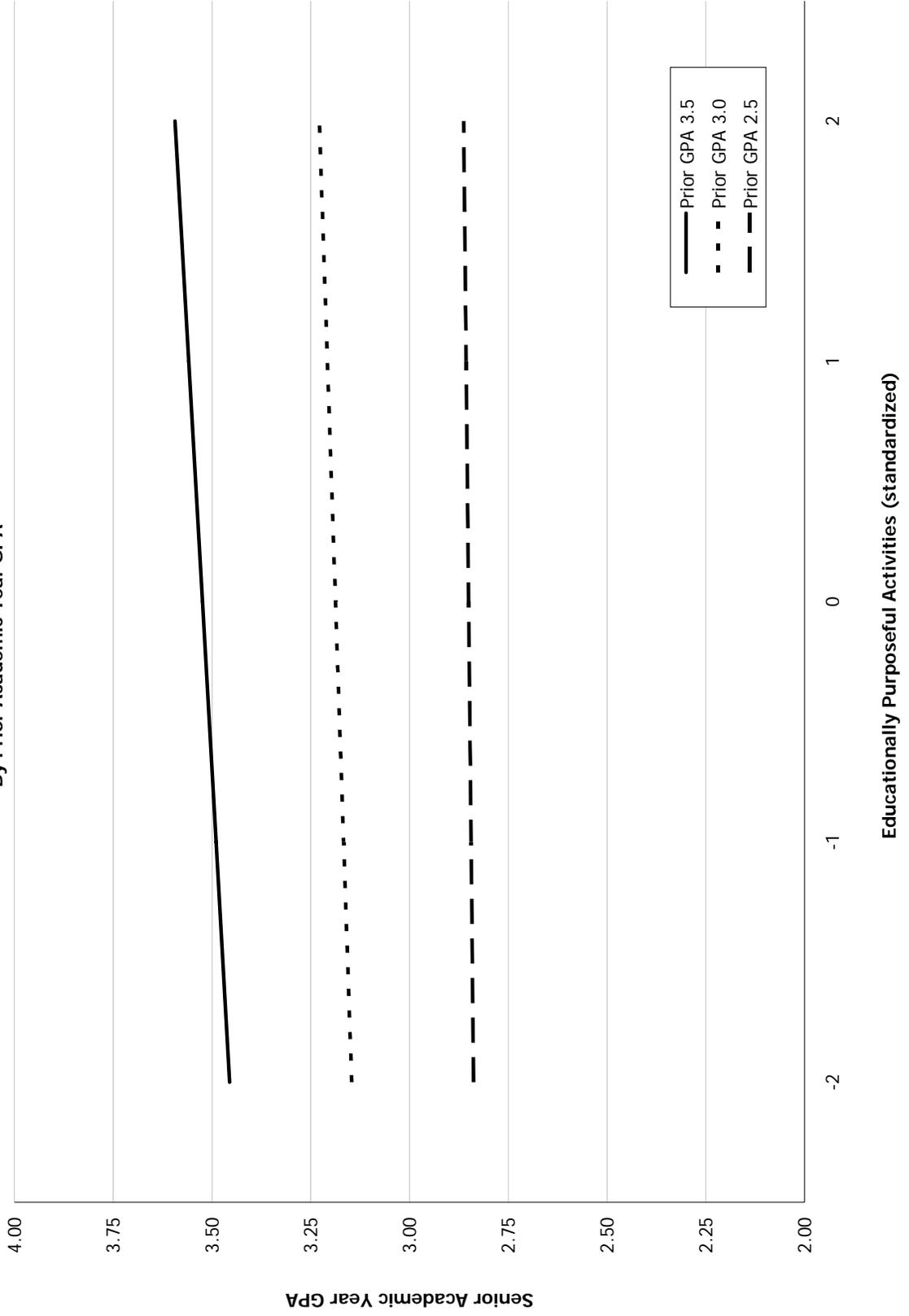


Figure 7.
Impact of Educationally Purposeful Activities on Senior Academic Year GPA
By Prior Academic Year GPA



Appendix A

Scale of Educationally Purposeful Activities

A summative scale of 19 NSSE items measuring student interaction with faculty, their experiences with diverse others, and their involvement in opportunities for active and collaborative learning.

- Asked questions in class or contributed to class discussions
- Made a class presentation
- Prepared two or more drafts of a paper or assignment before turning it in
- Come to class without completing readings or assignments
- Worked with other students on projects during class
- Worked with classmates outside of class to prepare class assignments
- Tutored or taught other students (paid or voluntary)
- Participated in a community-based project as part of a regular course
- Used an electronic medium (list-serv, chat group, Internet, etc.) to discuss or complete an assignment
- Used e-mail to communicate with an instructor
- Discussed grades or assignments with an instructor
- Talked about career plans with a faculty member or advisor
- Discussed ideas from your readings or classes with faculty members outside of class
- Received prompt feedback from faculty on your academic performance (written or oral)
- Worked harder than you thought you could to meet an instructor's standards or expectations
- Worked with faculty members on activities other than coursework (committees, orientation, student life activities, etc.)
- Discussed ideas from your readings or classes with others outside of class (students, family members, coworkers, etc.)
- Had serious conversations with students of a different race or ethnicity than your own
- Had serious conversations with students who differ from you in terms of their religious beliefs, political opinions, or personal values

Cronbach's Alpha Coefficient for Internal Consistency: First-year students = .818;
Seniors = .836

[†] NSSE Response Set: 2000 = 'Very often,' 'Often,' 'Occasionally,' 'Never;' 2001-2003 = 'Very often,' 'Often,' 'Sometimes,' 'Never'

^a Defined using a set of dichotomous variables

^b Reference group for the set of dichotomous variables

^c Variables not used in senior-level analysis

Appendix A continued

Merit grant recipient^a

- Received merit grant
- Did not receive merit grant^b

Unmet need

Represents 10% or more of cost to attend. A dichotomous variable that equals 1 when the difference between the student's financial need and his or her total aid received is equal to or greater than 10% of the cost to attend the institution.

Credit hours earned^a

- Earned less than full-time credit hours
- Earned full-time credit hours^b

Residence^a

- Commuted to campus
- Lived on or near campus^b

Transfer status^a

- Transferred to current institution
- Started at current institution^b

Time spent working off-campus^a

- 5 or fewer hours per week^b
- 6 to 20 hours per week
- 21 or more hours per week

Time spent relaxing/socializing^a

- 5 or fewer hours per week^b
- 6 to 20 hours per week
- 21 or more hours per week

Time spent studying^a

- 5 or fewer hours per week^b
- 6 to 20 hours per week
- 21 or more hours per week

Time spent in co-curricular activities^a

- 5 or fewer hours per week^b
- 6 to 20 hours per week
- 21 or more hours per week

Operational Definitions for Study Variables

Section 1. Student background variables

Gender^a

- Female
- Male^b

Race^a

- African American/Black
- Asian/Pacific Islander
- Hispanic/Latino
- White/Caucasian^b
- Other race

Number of parents with 4-year degree

A discrete measure, ranging from 0 to 2, that indicates the number of parents (or legal guardians) with a four-year degree or more.

Parent income^a

- \$30,000 or less
- \$30,000 to \$50,000
- \$50,000 to \$80,000
- \$80,000 or more^b

Pre-college graduate degree expectations^a

- Graduate degree
- Bachelor's degree or less^b

Number of honors courses taken in high school^c

Number of subject areas, ranging from 0 to 5, in which a student took one or more honors, Advanced Placement, or accelerated courses.

Number of high school extracurricular activities^c

Number of extra-curricular activities, ranging from 0 to 11, in which a student participated during high school.

High school GPA^{a, c}

- A^b
- B
- C or lower

Pre-college achievement score

Most recent college entrance exam score, with a possible range of 1 to 36. SAT scores were converted into ACT scores using standard conversion tables.

Appendix C
Descriptive Statistics for Variables in First-Year Models

Variable	Mean	Std. Dev.
First academic year GPA	3.026	0.644
Persistence to the second year	0.847	0.360
Female	0.693	0.461
African American/Black	0.128	0.334
Asian/Pacific Islander	0.035	0.183
Hispanic/Latino	0.055	0.227
White/Caucasian	0.768	0.422
Other race	0.015	0.120
Number of parents with 4-year degree	0.961	0.849
Parent income 30,000 or less	0.148	0.356
Parent income 30,000 to 50,000	0.228	0.419
Parent income 50,000 to 80,000	0.324	0.468
Parent income 80,000 or more	0.300	0.458
Pre-college graduate degree expectations	0.685	0.465
Number of honors courses taken in high school	2.301	1.696
Number of high school extracurricular activities	5.280	2.158
Pre-college GPA of A	0.660	0.474
Pre-college GPA of B	0.311	0.463
Pre-college GPA of C or lower	0.029	0.167
Pre-college achievement score	24.091	4.164
Received merit grant	0.362	0.481
Earned less than full-time credit hours	0.105	0.307
Commuting residence	0.137	0.344
Transfer status	0.029	0.169
5 or fewer hours per week worked off-campus	0.827	0.379
6 to 20 hours per week worked off-campus	0.112	0.316
21 or more hours per week worked off-campus	0.061	0.239
5 or fewer hours per week relaxing/socializing	0.183	0.386
6 to 20 hours per week relaxing/socializing	0.608	0.488
21 or more hours per week relaxing/socializing	0.209	0.407
5 or fewer hours per week studying	0.143	0.350
6 to 20 hours per week studying	0.595	0.491
21 or more hours per week studying	0.262	0.440
5 or fewer hours per week co-curricular activities	0.701	0.458
6 to 20 hours per week co-curricular activities	0.254	0.435
21 or more hours per week co-curricular activities	0.045	0.206
Educationally purposeful activities (standardized)	0.000	1.000
Unmet need represents 10% or more of cost to attend	0.333	0.471

N = 6,193

Appendix D
Descriptive Statistics for Variables in Senior Model

Variable	Mean	Std. Dev.
Senior academic year GPA	3.357	0.539
Female	0.648	0.478
African American/Black	0.101	0.301
Asian/Pacific Islander	0.024	0.152
Hispanic/Latino	0.048	0.213
White/Caucasian	0.817	0.387
Other race	0.011	0.105
Number of parents with 4-year degree	0.996	0.841
Parent income 30,000 or less	0.160	0.367
Parent income 30,000 to 50,000	0.267	0.443
Parent income 50,000 to 80,000	0.336	0.472
Parent income 80,000 or more	0.236	0.425
Pre-college graduate degree expectations	0.708	0.455
Pre-college achievement score	24.150	4.320
Received merit grant	0.348	0.476
Earned less than full-time credit hours	0.165	0.371
Commuting residence	0.355	0.479
Transfer status	0.177	0.382
5 or fewer hours per week worked off-campus	0.549	0.498
6 to 20 hours per week worked off-campus	0.258	0.438
21 or more hours per week worked off-campus	0.192	0.394
5 or fewer hours per week relaxing/socializing	0.200	0.400
6 to 20 hours per week relaxing/socializing	0.629	0.483
21 or more hours per week relaxing/socializing	0.171	0.376
5 or fewer hours per week studying	0.169	0.375
6 to 20 hours per week studying	0.581	0.493
21 or more hours per week studying	0.250	0.433
5 or fewer hours per week co-curricular activities	0.672	0.470
6 to 20 hours per week co-curricular activities	0.270	0.444
21 or more hours per week co-curricular activities	0.059	0.235
Educationally purposeful activities (standardized)	0.000	1.000
Prior academic year GPA	3.264	0.540

N = 5,227