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Unmasking the Effects of Student Engagement on First-Year 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 degrees. Only half (51%) of students who enrolled at four-year institutions in 1995–96 completed bachelor's degrees within six years at the institutions at which they started. Another 7% obtained baccalaureate degrees 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% (Berkner et al., 2002). Although greater numbers of

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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; Braxton, Hirschy, & McClendon, 2004; Cabrera, Nora, & Casteneda, 1992; Kuh, Kinzie, Buckley, Bridges, & Hayek, 2007; Pascarella, 1980; Peltier, Laden, & Matranga, 1999; Tinto, 1993). More recent theoretical formulations of student persistence (Braxton, 2000; Braxton et al., 2004; Hurtado & Carter, 1997; Titus, 2004) move beyond the interactionist approach to studying retention, underscoring the critical role that institutional characteristics and context play in influencing student persistence. For example, Braxton et al. (2004) recommended that alternative theoretical propositions are needed to better understand student departure at residential and commuter institutions, and to specify differences in the ways students from underrepresented racial ethnic backgrounds experience college.

Although many studies focus on persistence and baccalaureate degree attainment as the primary measures of student success, Braxton (2006) concluded that eight domains warrant attention: academic attainment, acquisition of general education, development of academic competence, development of cognitive skills and intellectual dispositions, occupational attainment, preparation for adulthood and citizenship, personal accomplishments, and personal development. In their review of the literature conducted for the National Postsecondary Education Cooperative, Kuh et al. (2007) proposed that student success be defined broadly to include academic achievement, engagement in educationally purposeful activities, satisfaction, acquisition of desired knowledge, skills and competencies, persistence, attainment of educational objectives, and post-college performance.

Most models that examine aspects of student success 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 (Kuh et al., 2007). To better understand the causes and consequences of student success in col-

lege, 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; Rendon, Jalomo, & Nora, 2000).

Another line of inquiry is the research linking student engagement in educationally purposeful activities to such desired outcomes as grades and persistence (Astin, 1993; Braxton et al., 2004; Kuh, 2001, 2003; Kuh et al., 2007; Pascarella & Terenzini, 2005). Milem and Berger (1997) proposed a persistence model wherein student behaviors and perceptions interact to influence academic and social integration. Similarly, Braxton et al., (2004) expanded the linkage between Astin's (1993) theory of involvement and persistence by proposing that students' "psychosocial engagement," or the energy students invest in social interactions, directly influences the degree to which they are socially integrated into college life. The student engagement construct used in this study is consistent with the theoretical models that feature the interplay between student behaviors and perceptions of the institution and psychosocial engagement.

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). Some studies (e.g., Hughes & Pace, 2003) show that students who leave college prematurely are less engaged than their counterparts who persist. However, most of the research examining the connections between student engagement and college outcomes is based on single institution studies that do not always control for student background characteristics, limiting their generalizability to specific institutions or institutional types. Few studies are based on large, multi-institution data sets using student-level data (Pascarella & Terenzini, 2005). 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. Two 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?
- 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)?

While we recognize that student success has multiple dimensions (Braxton, 2006; Kuh et al., 2007), the institutions participating in this study did not have available common measures in addition to grades and persistence.

Methods

Data Sources

The data for this study are from 18 baccalaureate-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 ensure 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. Four of the institutions have 90% or more of their first-year students living on or near campus, six institutions fall between 75% and 89%, four institutions fall between 50% and 74%, two institutions fall between 25% and 49%, and two institutions fall below 25%. None of the campuses was exclusively commuter.

Multiple sources of information were used in the analysis: information about students' backgrounds and pre-college experiences including

academic achievement, collected at the time the students registered for the ACT or SAT; student responses to the NSSE, collected during the spring academic term; and campus institutional research records including student academic and financial aid, collected at multiple time points during the academic year. Taken together, these sources of information provide a longitudinal look at students from before college entry to the fall of their second academic year. Only the 6,193 students who had complete data for all the variables of interest were included in the analysis.

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 contain a wealth of information, such as 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.

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). It is typically administered in the spring via the web or paper versions to randomly sampled first-year and senior students. Given the specific purposes of this study, only first-year students were included in the analysis.

*Student Academic and Financial Aid Information.*¹ To expedite data collection from the participating institutions, we asked for student information readily available from the registrar, financial aid, and admissions offices, which 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.

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; 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 ensure that both were computed in the same way for all students in the study. 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 provides 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 students of the general effects of time on task and engagement in educationally purposeful activities on academic year grade point average (ranging from 0.0 to 4.0) and persistence to the second year of college (a dummy variable coded as 1 if the student returned). 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.

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 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 (i.e., $p < 0.05$) 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. In instances where conditional effects were statistically significant, we plotted the effects for ease of interpretation and discussion. Tabled results of the conditional effects models can be requested from the second author.

Results

The findings yield a detailed portrait of the relationships between students' backgrounds and pre-college characteristics, college experiences, and the two outcomes measured. 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 Academic Achievement

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. Taken together, measures of prior academic achievement had the strongest influence on first-year GPA.

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).

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	***

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

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.⁴

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 signif-

ificant 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 also shows that 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 are 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.

Hours per week studying	ACT		
	20	24	28
5 or fewer	2.81	2.96	3.11
6 to 20	2.83	3.01	3.20
21 or more	2.89	3.08	3.28

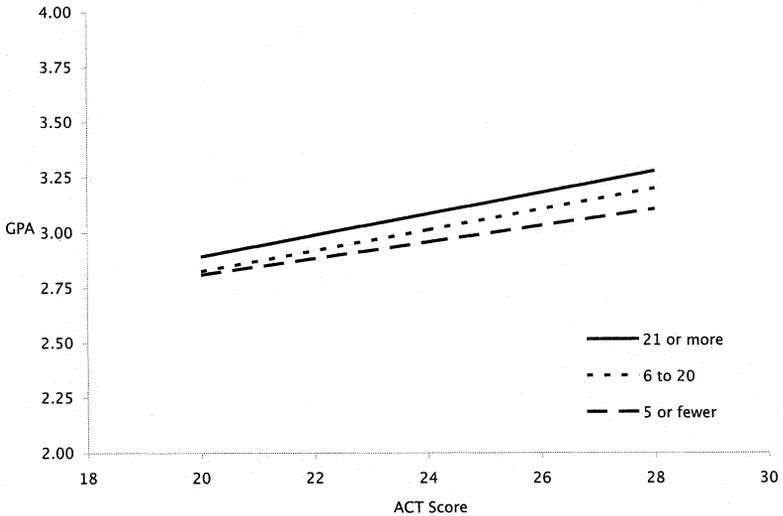


FIG. 1. Impact of hours per week studying on first-year GPA by pre-college achievement level

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.

Ed purposeful activities	ACT		
	ACT 20	ACT 24	ACT 28
-2	2.73	2.95	3.17
-1	2.79	2.99	3.19
0	2.84	3.02	3.21
1	2.90	3.06	3.23
2	2.95	3.10	3.25

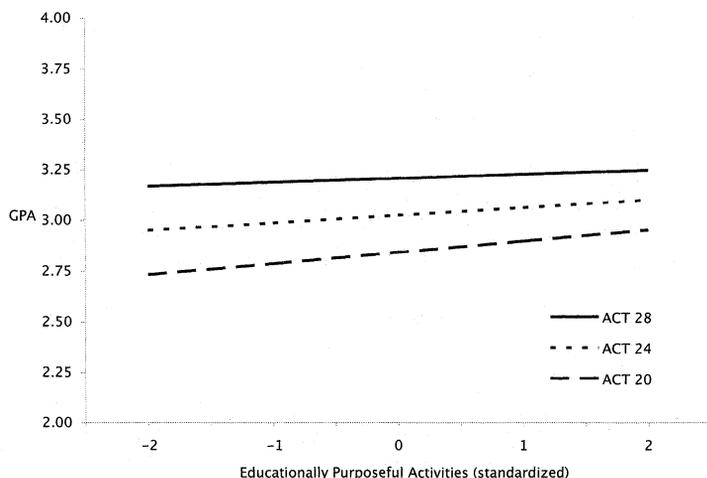


FIG. 2. Impact of educationally purposeful activities on first academic year GPA by pre-college achievement level

Ed purposeful activities	Race	
	White	Hispanic
-2	2.97	2.86
-1	3.00	2.96
0	3.03	3.07
1	3.06	3.18
2	3.09	3.29

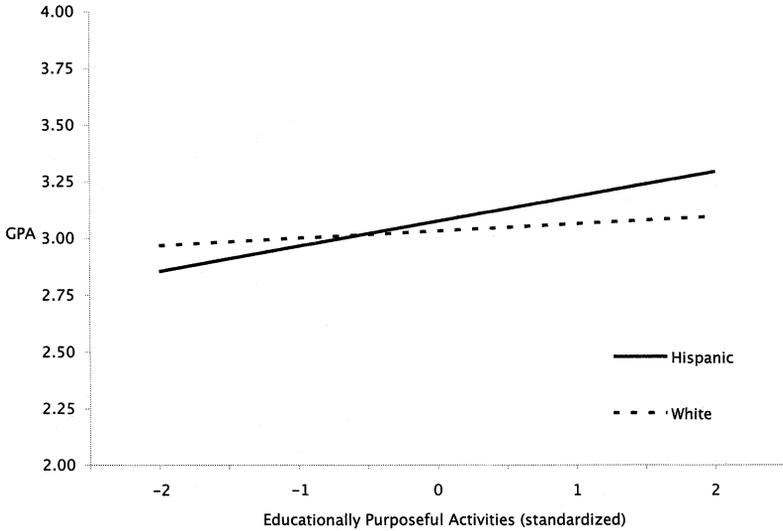


FIG. 3. Impact of educationally purposeful activities on first academic year GPA by race/ethnicity

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.

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.

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. 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 4 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.

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. Second,

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 Likelihood	5085.50			4520.24		
Likelihood Ratio	7	***		9	***	
Cox & Snell R ²	0.034			0.118		
Nagelkerke R ²	0.060			0.206		
Percent correct	0.577			0.719		

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

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

^aPredicted probabilities are calculated with all other variables in the model held at their mean values^bReference group^cIncludes 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. 3.5)	0.890
Mostly Bs	0.921	1 SD below mean (approx. 2.5)	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		

^aPredicted probabilities are calculated with all other variables in the model held at their mean values^bReference group^cIncludes polynomial term

Ed purposeful activities	Race	
	White	African American
-2	0.86	0.83
-1	0.88	0.89
0	0.89	0.93
1	0.91	0.95
2	0.92	0.97

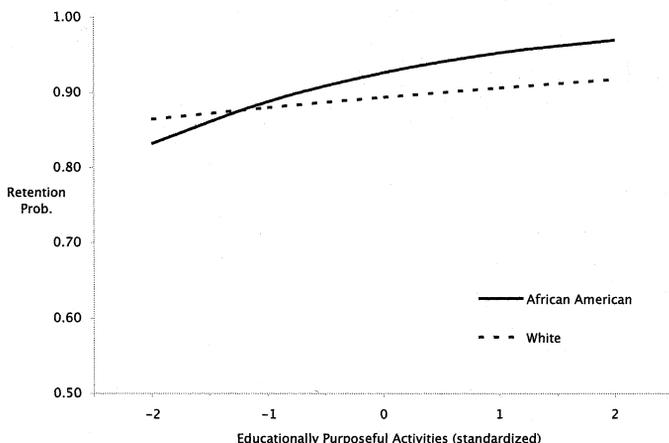


FIG. 4. Impact of educationally purposeful activities on the probability of returning for the second year college by race

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 or if other engagement behaviors were included, the findings might change. Third, while different types of colleges and universities were included in the study, thus broadening the generalizability of the findings, 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 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 a 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.

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. Moreover, this finding lends further support to Outcalt and Skewes-Cox’s (2002) theory regarding the importance of “reciprocal engagement,” or the notion that student involvement and campus environmental conditions coexist in a mutually shaping relationship, to support student success at HBCUs.

Because students generally benefit most 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.

Faculty and staff must use effective educational practices throughout the institution to help compensate for shortcomings in students' academic preparation and to create a culture that fosters student success (Allen, 1999; Fleming, 1984). 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; Dayton, Gonzalez-Vasquez, Martinez, & Plum, 2004; Education Commission of the States, 1995; Fleming, 1984; Kuh, Douglas, Lund, & Ramin-Gyurnek, 1994; Kuh, Kinzie, Schuh, Whitt, & Associates, 2005; Kuh, Schuh, Whitt, & Associates, 1991; Outcalt & Skewes-Cox, 2002; Pascarella & Terenzini, 2005; Watson, Terrell, Wright, Bonner, Cuyjet, Gold, Rudy, & Person, 2002). 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 (Boylund, 2002; Grubb, 2001), and student affairs work (Blimling & Whitt, 1999). We will learn more about these matters from such initiatives as *Achieving the Dream*, which is focused on two-year colleges enrolling large numbers students from low income and minority racial and ethnic backgrounds.

In the meantime, it seems that *all 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 (Kuh et al., 2005; Kuh et al., 2007). 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; Kuh et al., 2007; 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 ensure 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 collaboratively 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).

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; Kuh et al., 2007).

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 colleges at which they started. As with other studies (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 degrees elsewhere.

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 (listserv, 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: .818

† NSSE Response Set: 2000 = 'Very often,' 'Often,' 'Occasionally,' 'Never,' 2001–2003 = 'Very often,' 'Often,' 'Sometimes,' 'Never'

^aDefined using a set of dichotomous variables

^bReference group for the set of dichotomous variables

APPENDIX B

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

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 to 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 term, the sum of the GPA points (credit hours 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 grades are the only measures of academic achievement and learning available for the analysis.

⁴The same pattern for effects of engagement of GPA was found for senior students.

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