

**Final Report prepared for Lumina Foundation for Education
Grant # 2518**

**Connecting the Dots:
Multi-Faceted Analyses of the Relationships between Student Engagement
Results from the NSSE, and the Institutional Practices and Conditions That
Foster Student Success**

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August 1, 2006

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Executive Summary

Connecting the Dots: Multi-Faceted Analyses of the Relationships between Student Engagement Results from the NSSE, and the Institutional Practices and Conditions That Foster Student Success

Too many students who begin college do not earn a baccalaureate degree. One promising line of inquiry is research showing links between student engagement in educationally purposeful activities, achievement, persistence and graduation. Additional evidence confirming these positive relationships with the current cohort of undergraduate students would give institutional leaders, faculty and staff members, and policy makers more confidence in urging intentional, widespread use of effective educational practices in postsecondary education. However, less is known about the validity and reliability of instruments designed to measure engagement, such as the National Survey of Student Engagement (NSSE), when used with historically underserved students in different institutional contexts. The purpose of the Connecting the Dots (CTD) project is to determine the relationships between student engagement and selected measures of success in college for students from different racial and ethnic backgrounds attending different types of four-year colleges and universities.

First, we examined the relationships between NSSE results, pre-college experiences, college grades, and persistence to the second year of study for about 11,000 first-year and senior students at 18 baccalaureate-granting institutions including four Historically Black Colleges and Universities (HBCUs) and three Hispanic Serving Institutions (HSIs). Student-level data from NSSE responses, academic transcripts and financial aid information, and ACT/SAT score reports were analyzed using ordinary least squares and logistic regression to determine the effects of engagement on grades and persistence, controlling for a variety of pre-college and first-year experience variables. Then we estimated models to test for conditional or interaction effects to determine whether the impact of engagement on college achievement and persistence differed by students' prior academic achievement and racial or ethnic background. The findings were generally consistent with prior research and extant theory. That is, while pre-college characteristics, such as academic achievement, predict first-year grades and persistence, student engagement during college also has modest positive effects. Moreover, while exposure to educationally effective practices is associated with desired outcomes for all students, *historically underserved students benefit more from engaging in these activities than White students in terms of earning higher grades and persisting to the second year of college.*

Second, a combination of statistical analyses and qualitative methods were used to examine the validity and reliability of the NSSE survey for different types of students and institutions. Using NSSE data from thousands of students at scores of Minority Serving Institutions (MSIs) and Predominantly White Institutions (PWIs), the results plainly indicate that *the NSSE survey works equally well for students from different racial and ethnic backgrounds attending different types of institutions.* The similar patterns of findings affirm the construct validity of the NSSE – that it consistently measures what it claims to measure. The stability tests show that the instrument produces comparable results from one administration to another at both MSIs and PWIs. In addition, cognitive interviews and focus groups with 163 students at four MSIs and four PWIs indicate that almost all the NSSE items represented on its five benchmarks

of effective educational practice are generally interpreted in the same way by students from different racial and ethnic backgrounds. Thus, *the NSSE benchmarks can be considered valid, reliable indicators of the quality of the student experience for historically underserved students at MSIs and PWIs.*

These findings point to four conclusions about the relationships between student engagement as measured by NSSE, grades, and persistence.

1. Engagement has positive, modest effects on grades and persistence for students from different racial and ethnic backgrounds, even after controlling for key pre-college variables.
2. Engagement has compensatory effects on first-year grades and persistence to the second year of college at the same institution for historically underserved students.
3. The NSSE instrument works equally well for students of color and White students in different institutional contexts, such as PWIs, HBCUs, and HSIs.
4. Nuanced, context-specific judgments are needed when interpreting the results from a few items for students attending certain MSIs.

There are limits as to what colleges and universities can realistically do to help students overcome years of educational disadvantages. Even so, most institutions can foster greater levels of student engagement and success by more consistently using what this and other research shows are promising policies and effective educational practices. While student engagement is not a silver bullet, finding ways to get students to take part in the right kinds of activities helps to level the playing field, especially for those from low-income family backgrounds and others who have been historically underserved, increasing the odds that they will complete their program of study and enjoy the intellectual and monetary gains associated with the completion of the baccalaureate degree.

Introduction

A college degree is replacing 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. For these reasons, it is imperative that we ensure access to higher education for all college-qualified low income and other historically underserved students, keep college affordable, and demand institutional accountability for student learning and graduation rates.

However, getting students into college is only the first step. To reap the benefits of a college education and acquire the desired learning outcomes demanded by the 21st century (Association of American Colleges & Universities, 2005), students must take full advantage of the learning opportunities and persist to graduation.

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 continue to earn degrees compared with non-minorities. Poor college completion rates and the racial-ethnic gap in graduation rates mean that too many students are not acquiring the desired knowledge, skills and competencies needed for the 21st century.

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 (Astin, Korn, & Green, 1987; Bean, 1990; Cabrera, Nora, Casteneda, &, 1992; Pascarella, 1980; Peltier, Laden, & Matranga, 1999; Tinto, 1987). 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 agents of socialization such as 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. Other relevant variables are the reasons students give for leaving an institution (Astin, 1993; Tinto, 1993) and the impact of national, state, and local policies and campus programs intended to promote persistence and other dimensions of student success (Glass & Garrett, 1995; Reyes, 1997).

To thoroughly probe the causes and consequences of student success in college, the interactions among these factors must also be considered for different groups of students defined by gender, race and ethnicity, and other characteristics that may be linked to their performance (Allen, 1999; Gaither, 2005; Person & Christensen, 1996). The latter is especially important because the nature of the undergraduate experience of historically underserved students can differ markedly from that of the White majority in Predominantly White Institutions (PWIs) (Allen, 1999; Gloria, Robinson Kurpius, Hamilton, & Willson, 1999; Hall, 1999).

For example, some studies show that race is a significant predictor of persistence (Astin, 1997; Murtaugh et al., 1999; Peltier et al., 1999). Allen (1999) found that different variables predicted persistence of students of color compared with White students. Student's 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. 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 (National Center for Education Statistics, 1995; Porter, 1990; Carey, 2004).

More recent studies using multivariate analytical models suggest that the impact of race or ethnicity on persistence is less consistent (Murtaugh et al., 1999; St. John et al., 2001), especially when taking into account socioeconomic status and pre-college experiences (Peltier, Laden, & Matranga, 1999). Even so, Asian American and White students are more likely to persist in college, while other racial groups were less likely to persist (Astin, 1997; Murtaugh et al., 1999; Peltier et al., 1999).

One line of inquiry that promises to increase our understanding and ability to improve student success is the research showing the positive links between student engagement in educationally purposeful activities and such desired outcomes as higher grades and higher first-to-second year persistence and graduation rates (Astin, 1993; Pascarella & Terenzini, 2005). However, most of the research comes from single institution studies that do not always employ rigorous methodological approaches. Few studies are based on large, multi-institutional data sets that permit exploration of organizational and individual factors associated with student persistence. 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. Finally, little is known in general about engagement of students attending Minority Serving Institutions or about the validity and reliability of instruments such as the National Survey of Student Engagement or College Student Experiences Questionnaire when used with historically underserved students in different institutional contexts.

Purpose of the Inquiry

The purpose of the Connecting the Dots (CTD) project is to determine more precisely the relationships between key student behaviors and the institutional practices and conditions that foster student success. Building on two previously-funded Lumina Foundation for Education initiatives – Documenting Effective Educational Practices (DEEP) and Building Engagement and

Attainment of Minority Students (BEAMS) – researchers at the Indiana University Center for Postsecondary Research (IUCPR) pursued two strands of activities drawing on the expansive National Survey of Student Engagement (NSSE) data base. About 1,100 four-year colleges and universities have turned to NSSE for information about the quality of the undergraduate experience. Among the keys to NSSE’s widespread use are its explicit links to prevailing theory and research on student learning and institutional effectiveness. NSSE (Appendix A) was designed by experts to tap student behaviors and institutional conditions that the voluminous research regarding the impact of college on students indicates are related to student learning and personal development.

The CTD analyses were carried out in two strands of work. First, we examined the relationships between student engagement (NSSE) and selected indicators of student success – specifically academic achievement as determined by college grades and persistence to the second year of study. Second, we conducted a series of psychometric analyses to determine how the NSSE survey performs when completed by minority students at PWIs as well as at Minority Serving Institutions, relative to other types of institutional settings. A combination of statistical analyses and qualitative methods were used to examine the validity, reliability, and other psychometric properties of the NSSE survey for different types of students and institutions.

Taken together, these two inquiry strands promise to enrich our understanding of student engagement in different institutional contexts and make an important contribution to our understanding of student success in college, especially for historically underserved students.

Strand One: Relationship Between NSSE and Student Success Indicators

This strand of the Connecting the Dots (CTD) study draws on student-level records from multiple institutions to examine the links between student engagement and two key outcomes of college: academic achievement and persistence. A second important dimension of this analysis is to determine the effects of engagement in educationally purposeful activities on these outcomes for students with different characteristics, such as gender, race and ethnicity and first generation status, who attend different types of colleges and universities.

Student engagement is represented by variables corresponding to 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 items from the NSSE survey (Appendix B, Section 2). These include such behaviors as 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. While we originally intended to incorporate other forms of outcomes data from participating schools, 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. While grades are commonly used as an outcome measure, 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.

The following questions guided the data analysis:

First-Year GPA

- ◆ Do time on task and engagement during the first year of college have a significant impact on first-year grade point average, net of the effects of student background, pre-college experiences, and prior academic achievement?
- ◆ Is the net impact of time on task and engagement on first-year grade point average influenced by pre-college academic achievement? That is, do students who start college with lower levels of academic achievement benefit more or less from their engagement and time on task than students who entered college with higher levels of academic achievement?
- ◆ Do the effects of engagement on first-year grade point average differ for students from different racial or ethnic backgrounds? That is, do students from different racial or ethnic backgrounds benefit more or less from engagement in educationally purposeful activities during college?

Persistence to the Second Year of College

- ◆ Do time on task and engagement during the first year of college have a significant impact on a student's odds of returning for a second year of college, net of the effects of student background, pre-college experiences, first-year academic achievement, and unmet financial need?
- ◆ Do the effects of engagement on persistence to the second year differ for students from different racial or ethnic backgrounds? Said another way, do students from different racial or ethnic backgrounds benefit more or less from engagement in educationally purposeful activities during college in terms of returning for a second year of college?

Senior Year Academic Achievement (GPA)

- ◆ Do time on task and engagement during the senior year of college have a significant impact on senior year grade point average, net of the effects of student background and prior college academic achievement?
- ◆ Is the net impact of time on task and engagement on senior year grade point average associated with prior college academic achievement? That is, do the effects of student engagement differ for students who enter their senior year of college with lower levels of academic achievement compared with those who had higher levels of academic achievement prior to the senior year?
- ◆ Do the effects of engagement on senior year grade point average differ by race or ethnicity?

Selection of Institutions

The data for this analysis are from about 6,000 first-year students and 5,000 seniors at 18 baccalaureate degree-granting colleges and universities that administered the National Survey of Student Engagement (NSSE) at least once between 2000 and 2003. To meet the goals of the CTD project, we intentionally invited a mix of Predominantly White Institutions and Minority Serving Institutions to participate. An additional six liberal arts colleges were added to the original workscope described in the Lumina grant proposal because of the interest in this work of the Center of Inquiry in the Liberal Arts at Wabash College which funded the additional effort.

NSSE staff created a list of institutions (Appendix C) that met two key criteria: an ample number of respondents to insure enough cases for the analytical methods required to answer the research questions and reasonable racial and ethnic diversity among the respondents. We sent invitation letters and other materials to potential CTD project institutions to formalize their participation, including documentation of Human Subjects approval for the project as well as the offer of a \$2,000 stipend to partially offset campus staff time required to collect project data. Institutions that declined the invitation to participate or that later dropped out of the project were replaced by other institutions with similar characteristics. The final set of schools in this convenience sample include eleven Predominantly White Institutions (PWIs), four historically

Black Colleges and Universities (HBCUs), and three 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.

Data Sources

Three primary sources of data were used in the analysis: student responses to the National Survey of Student Engagement (NSSE), campus registrar and institutional research records; and ACT/SAT score reports.

NSSE Data

As noted earlier, NSSE is an annual, research-based survey of college 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; Kuh, 2001a & b, 2003; Pascarella & Terenzini, 2005). It is short, highly focused on activities that matter to student learning, and can be completed on the Web or via a paper version.

Minor 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.

Campus Institutional Research Records

Based on a review of prior studies of student success, consultation with experts, and an examination of data elements collected by external agencies, we developed a comprehensive set of materials to guide institutions in generating and providing the data that we requested. The materials included: (a) advice/instructions on how to collect desired data components, (b) examples of how to format the collected data, (c) a list of identification numbers¹ for students who completed the NSSE survey between 2000 and 2003, and (d) CDs that contained "data grids" that the institutions could populate with their student data. To minimize institutional time and effort to provide the requested data, we focused on student information that is generally available from three sources: offices of the registrar, financial aid, and admissions. Information from the Registrar's office was used to create the two outcome variables for this part of the CTD study: academic year grade point average and college persistence. Data from the financial aid office and from the office of admissions were used 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.

Registrar Records. The registrar's office from each institution provided students' 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.

Financial Aid. To accommodate different financial aid management systems, CTD staff modeled the financial aid data grid on the Common Dataset Initiative, a template that 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.

The financial aid contact was asked to complete the data grid with information from the student's Free Application for Federal Student Aid (FAFSA) and the subsequent Student Aid Report (SAR) provided to the institution. Contacts were also asked 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.

ACT/SAT Score Reports. Initially the institutions were asked to provide ACT/SAT score reports for students in the CTD sample. These reports, provided to colleges and universities at the applicant's expense, contain a wealth of information about student background characteristics, high school experiences, prior academic achievement, educational needs, and college preferences. Surprisingly, only a few of the participating institutions preserved complete ACT/SAT score reports for their students. As a result, it was necessary to obtain written permission from each institution to purchase from ACT and the College Board the pre-college information captured by ACT and SAT score reports for students in the CTD sample.

Student Sample

The standard NSSE sampling scheme draws equal numbers of first-year and senior students, with the size determined by the number of undergraduate students enrolled at the institution. Surveys were administered by the Indiana University Center for Survey Research (CSR) via an online version or a traditional paper and pencil version mailed to students.

To bolster the final data set and maximize the number of survey cases matched to institutional data, all available student survey cases at CTD participating institutions were used. This included randomly selected cases as well as any targeted oversamples of specific student groups that were specified by the institution. Targeted oversamples are typically used by institutions to collect information from underserved student groups that traditionally have lower response rates. We cannot assure, however, that these targeted oversamples are representative of the student population at these institutions.

Table 1 provides the breakdown of randomly sampled and oversampled students used in this analysis for each administration year. Table 2 provides information for the numbers and types of student records used in the study. Only those students who had complete data for the variables of interest are included in the data set for analysis. Thus, the final sample is made up of 6,193 first-year students (53.9% of all originally sampled students) and 5,227 seniors (44.0% of all originally sampled students).²

Outcomes Data

We used the records obtained from the participating institutions to calculate two key outcomes, academic year grade point average and college persistence. These outcomes were determined from aggregating the detailed student course-taking records.³ We elected to calculate these measures ourselves for two primary reasons. First, this enabled us to apply a consistent formula for calculating GPA all student records at all the institutions. Although grade point average is a fairly standard formula, different institutions may enable exceptions (i.e., retaking a failed course) that are not reflected at other institutions. Second, as detailed above, one of the central goals of data collection was to minimize the time demand on the institutional contacts. In most cases, it was easier for institutions to provide a full, disaggregated student course-taking record than to pull specific records for the academic years of interest to the CTD study.

Academic Year Grade Point Average. The 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 the fall and spring semesters as well as for each academic year. Grades for summer courses were not incorporated in GPA calculations.

College Persistence. Academic transcripts were also used to determine student persistence, defined as returning to the same institution for the second year of study. That is, a student was flagged as persisting if they enrolled in one or more courses the following academic year. Using the disaggregated student record, we were able to first identify the academic year the student took the survey. If academic records were found in the following academic year (again excluding summer session enrollments), the student was identified as a persister.

Appendix B contains the operational definitions of the variables used in these analyses.

Analyses

We analyzed the data for this strand of the CTD study in two stages. First, 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 outcomes, 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.

Table 1.

Number of NSSE Participants at Selected Institutions by Administration Year

Year	First-Year Sample				Senior Sample			
	Random		Targeted		Random		Targeted	
	N	%	N	%	N	%	N	%
2000	1,694	65.1	907	34.9	1,726	57.1	1,295	42.9
2001	2,110	100.0	0	0.0	2,028	100.0	0	0.0
2002	2,404	79.9	604	20.1	2,282	66.1	1,170	33.9
2003	3,610	95.8	158	4.2	3,298	97.5	86	2.5
Total	9,818	85.5	1,669	14.5	9,334	78.5	2,551	21.5

Table 2.

Number of NSSE Respondents at Selected Institutions with Usable Data

	First-Year		Senior	
	Count	% of NSSE Records	Count	% of NSSE Records
NSSE survey	11,487	–	11,885	–
ACT or SAT score report	9,373	81.6	7,282	61.3
Transcript	11,456	99.7	11,849	99.7
Financial aid	11,487	100.0	11,885	100.0
Academic year GPA	11,427	99.5	11,776	99.1
Persistence to the second year	11,456	99.7		
N with all records	9,346	81.4	7,247	61.0
N with non-missing data for all study variables	6,193	53.9	5,227	44.0

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 year GPA was added to estimate the impact of time on task and engagement on GPA after taking into account prior year GPA. That is, does engagement add value to academic performance, over and above one's established academic record?

In the second stage of the analyses, we estimated models to test for the presence of conditional or interaction effects. These 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 conditional effects, we entered a series of cross-product variables into the general effects equation. Statistically significant increases in explained variance (R^2 change) and 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 was not statistically significant, we examined the model coefficients for statistically significant effects that may have been masked in the significance test for R^2 change. This approach allows us to determine whether differences in students' prior academic achievement or racial or ethnic background are associated with their engagement, college achievement, and persistence.

Results

First-Year Students Descriptive Statistics

First-year GPA had a mean of 3.03 (Table 3). This variable was approximately normally distributed as were the residuals for the OLS model. Also, the predicted values for the OLS model fell within an appropriate range for GPA (i.e., 1.24 to 3.96). The second outcome of interest – persistence to the second year of college – was attained by 85% of the students in the sample. This percentage almost certainly is higher than actual first-to-second year persistence rates for the participating institutions for two reasons. First, some unknown number of students probably left the institutions prior to the spring term when NSSE was administered. Second, some students who may be considering transferring to another institution or dropping out of college may not be motivated enough to complete and return their surveys. The extent to which the prediction of achievement and persistence is biased by this self selection is not known.

First-Year GPA

General Effects. To determine the net impact of time on task and engagement during the first year of college, we estimated two models regressing first-year grade point average on student background characteristics and first-year experiences. Model 1 in Table 4 includes students' demographic characteristics, pre-college experiences, and prior academic achievement as predictors of GPA, accounting for 29% of the variance in first-year grades.

After controlling for high school academic and extracurricular experiences and prior academic achievement, moderate differences in first-year GPA were associated with gender, race and ethnicity, parents' education and income, and educational aspirations. That is, all else being equal, the first-year GPA of women was .16 points *higher* than that of men. African American first-year student gpa was about .09 points *lower* than that of White students. Students with a college educated parent had a GPA about .02 points higher than their counterparts with parents with less than a baccalaureate degree; students with two college educated parents had a GPA about .04 points higher than students where neither parent received a four-year degree.

Students in the lowest family income bracket – \$30,000 or less – had a first-year GPA about .10 points *lower* than their counterparts whose parents earned \$80,000 or more. First-year grades for students in the middle and highest income level did not differ. Finally, students who expected to earn a post-baccalaureate degree had a first-year GPA .04 points *lower* than that of students who aspired to only the bachelor’s degree. Why this is so is not clear. Perhaps it is due in part to different course taking patterns of these two groups of students, variables that are not represented in our models.

High school academic and extracurricular experiences of students had a small unique effect on their first-year GPA, even after controlling for measures of high school achievement. For example, first-year GPA increased by .01 points for each subject area in which the student took a high school honors or accelerated course. Involvement in high school extracurricular activities, although often viewed positively by college admissions offices, had a slight negative effect on first-year GPA. Holding all else constant, for every additional high school extracurricular activity in which students participated, first-year grade point average *decreased* slightly (.01 points).

Student prior academic achievement had the strongest influence on first-year GPA (Table 4). All else being equal, students whose high school grades were mostly Bs had a first-year GPA almost a third of a grade point *lower* (.31 points) than that of students with mostly A high school grades. Students with mostly C or lower high school grades earned first-year college grades about a half of a grade point (.49 points) *lower* than students who earned mostly As in high school. Also, for every one point increase in ACT score, students realized a .05 point bump in first-year GPA. This means that a one standard deviation increase in ACT score, equal to 4 points in this study, yielded an estimated increase in first-year GPA of about one-fifth of a grade point (.20 points). Finally, being awarded a merit grant from the institution increased the students’ first-year GPA by an estimated .09 points, all else being equal.

Adding student engagement measures to the model accounted for an additional 13% of the variance in grades, increasing the total variance explained to 42% (Table 4, 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. These changes mirror findings from a steady stream of research over the past several decades (Pascarella & Terenzini, 2005) that who students are when they start college – their background characteristics and pre-college behavior – are associated to a non-trivial degree with what they do in the first college year. At the same time, this does not explain everything that matters to student success in college as noted by other researchers (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 points). Several factors may partially explain why part-time students do not perform as well academically as do full-time students. First, a single course grade carries more weight in the GPA of part-time students; thus poor performance in one course can have a dramatic influence on GPA. Second, because part-time students spend less time on

Table 3.
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

Table 4.

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	***

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

campus they may not use campus academic services such as tutoring and the writing center as often as full-time students.

One anomaly in the results is that students who commuted to campus had a first-year GPA about .19 points *higher* than students who live on or very near campus. This differs from the coefficient for the zero-order correlation between commuting to campus and first-year GPA that was negative. In this model, the positive effect of this variable on GPA may be an artifact of additional variables that account for differences between commuters and non-commuters, such as enrollment status and hours per week worked off campus, relaxing or socializing, and studying.

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 earned *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) did not have a significantly different first-year GPA, but students who worked off-campus 21 hours or more had a GPA that was lower by .14 points. Finally, students who relaxed or socialized 6 to 20 hours per week had a first-year GPA that was .05 points lower than students who relaxed or socialized only 5 or fewer hours per week; students 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 depended on a student’s 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 were rewarded with higher first-year GPAs.

Two more subtle patterns in Figure 1 are worth noting. 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 pattern 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. This finding points to the possibility that expending the same or lesser amount of effort that may have been sufficient to attain high grades in high school is not enough to achieve similarly high marks during the first college year.

Second, first-year students with higher ACT scores may not have to study as many hours to earn comparable or even higher grades as do students with lower ACT scores. For example, all else being equal, students with an ACT score of 28 who studied only 5 hours or less per week during their first year of college earned marks about one fifth of a grade higher than did students with an ACT score of 20 who studied for 21 hours or more per week. This finding lends support for why the general effect of study time on first-year GPA is relatively small in magnitude. That is, some high achievers need invest only a few hours per week studying to earn relatively high grades, while some low achievers who study many hours per week earn grades that are lower than their high achieving peers. This finding also indicates that it is not only the amount of the time spent studying that matters to grades, but how efficiently that time is used. That is, perhaps students who were high achievers in high school start college with stronger study skills than their lower achieving counterparts and they more efficiently convert these fewer hours of study into higher levels of achievement (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. A 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 and students with a 28 ACT score realized an advantage of only .02 points.

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 this was the case 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.

Retention 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 5), regressing persistence to the second year of college on student background characteristics and first-year experiences. Model 1 in Table 5 includes only the students' demographic characteristics, pre-college experiences, and prior academic achievement, correctly classifying 58% percent of the students in the sample.

All else being equal, the odds for females returning to the same institution for the second year of college were 65% greater than for males. Hispanic students had 33% lower odds than White students of returning. No other differences in retention by race or ethnicity were statistically significant. With only pre-college information in the model, neither parents' education nor parents' income had a significant impact on the odds of returning. Surprisingly, plans to pursue a post-baccalaureate degree did not have a significant effect on persistence.

The number of subject areas in which honors courses were taken had a positive effect on persistence. The number of high school extracurricular activities in which students were involved had a small *negative* impact (Table 5). This finding is consistent with Tinto's (1993) characterization of the separation stage, whereby students who were highly involved in high school retain strong ties to that environment that make it difficult for them to connect in meaningful ways to people and activities in the college environment.

Net of other pre-college influences in the model, students with high school grades of mostly Bs had 24% greater odds of returning for the second year of college than students who earned mostly A grades, whereas students with mostly C or lower high school grades had the same relative odds of being retained as students who earned mostly A grades. These findings suggest that there is a curvilinear relationship between pre-college academic achievement and persistence at the same institution. That is, all else being equal, students with average high school grades have the greatest odds of returning, while students with the lowest or highest grades are less likely to return. This curvilinear relationship is confirmed 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) has 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 *decreases* exponentially.

Finally, receiving a merit grant has a strong positive effect on persistence (Table 5), in that merit grant holders had odds of returning that are *two and one-half times greater* than their peers who did not have such an award. 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.

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

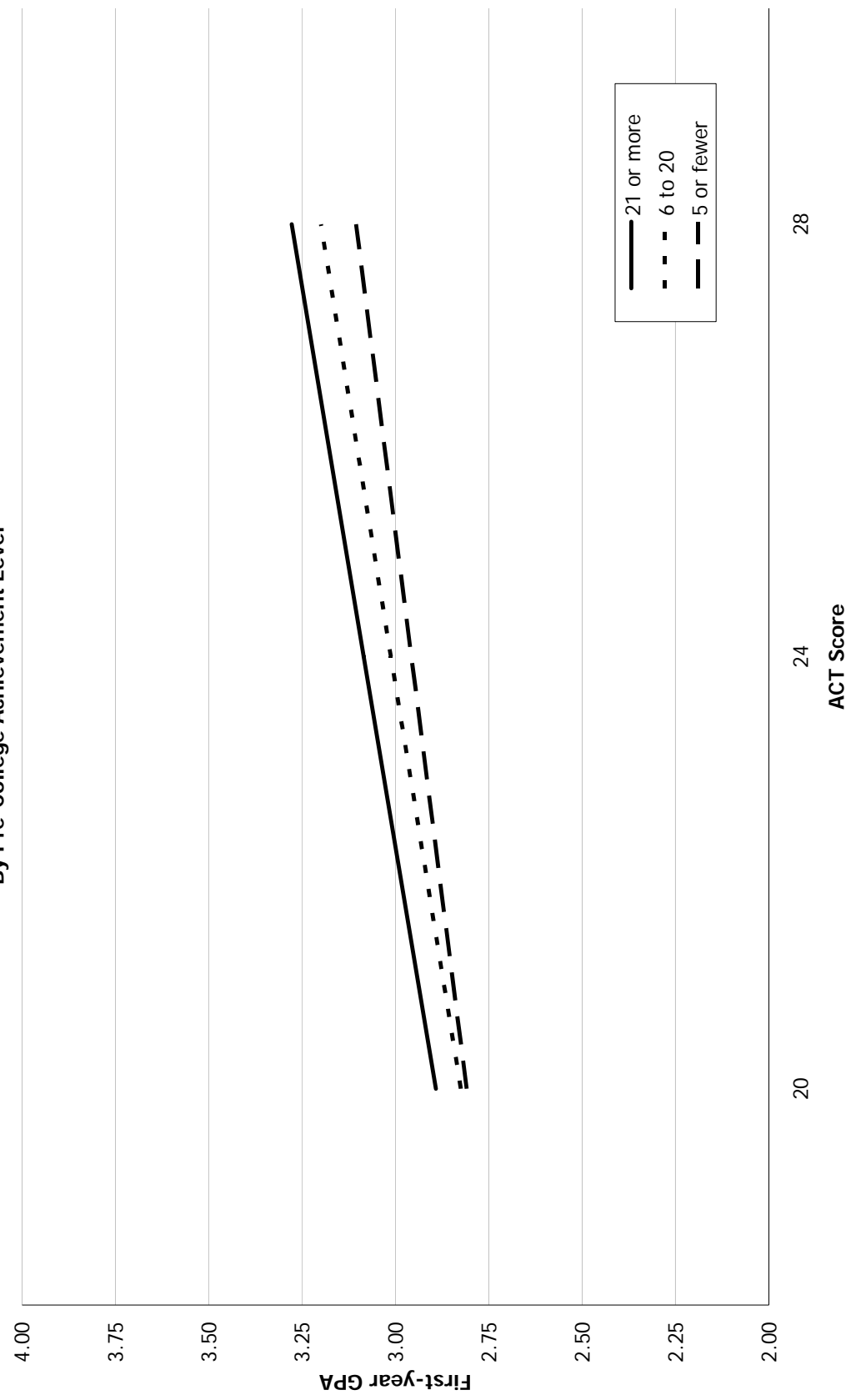


Figure 2.
 Impact of Educationally Purposeful Activities on First Academic Year GPA
 By Pre-College Achievement Level

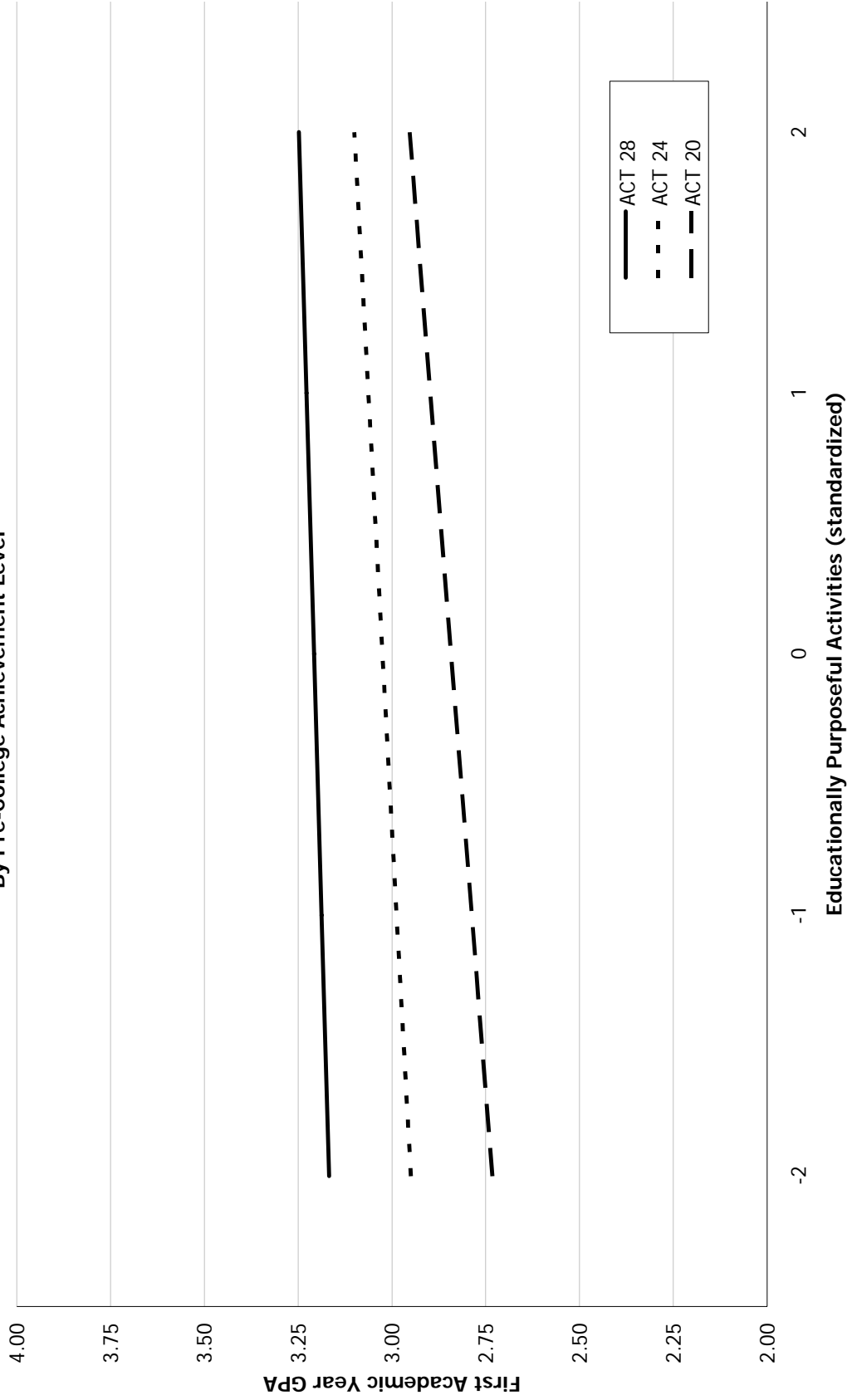
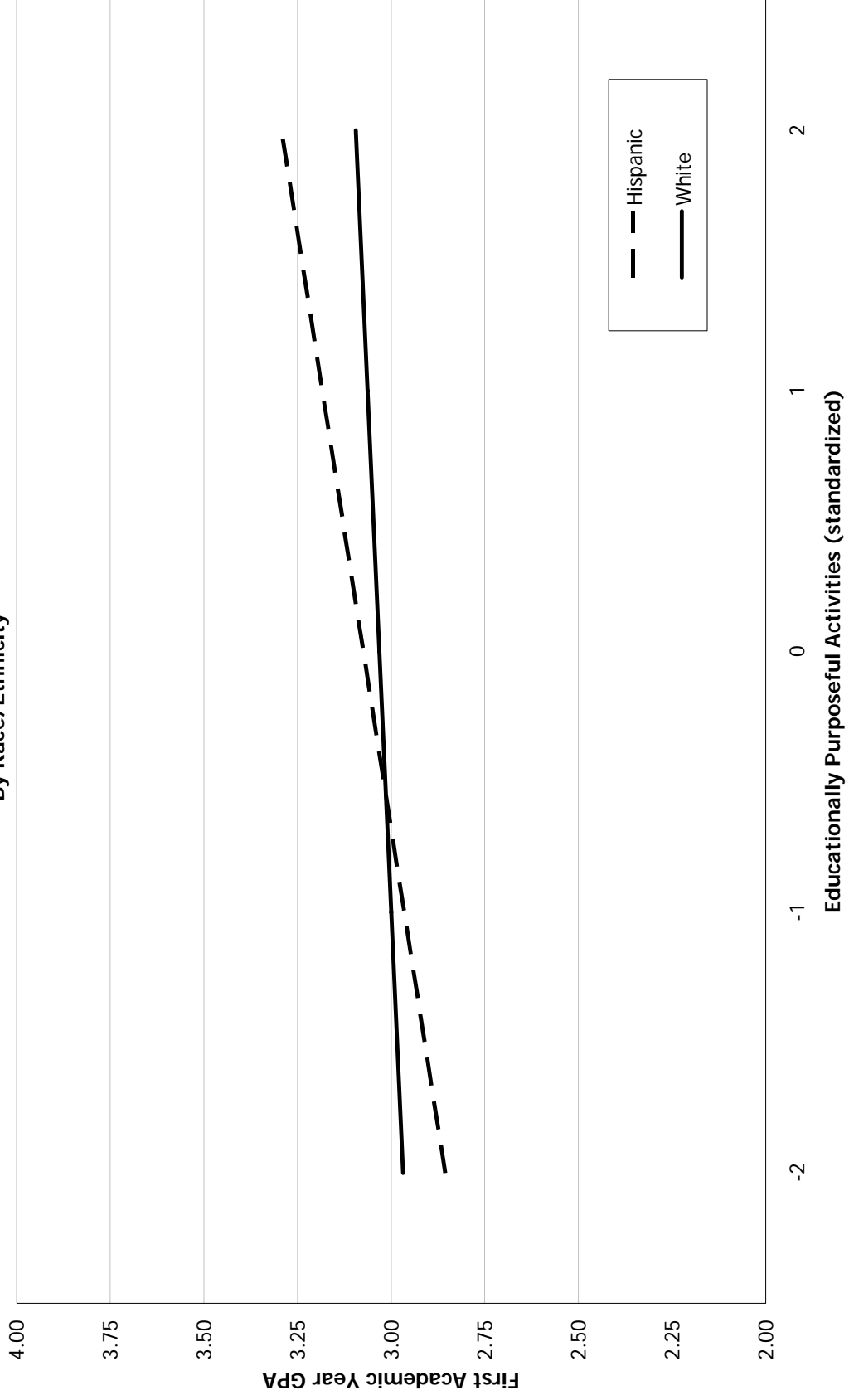


Figure 3.
Impact of Educationally Purposeful Activities on First Academic Year GPA
By Race/Ethnicity



Model 2 in Table 5 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. When these variables were added to the model, no difference existed in the odds of returning for Hispanic and White students, while the odds of returning for African Americans became 51% greater than the odds for White students. This compensatory effect of first-year experiences, grades, and financial aid on the performance of African American students is consistent with the results of the first-year student GPA model. Parent income also became statistically significant. That is, holding constant first-year experiences, grade point average, and unmet student need, those students whose parents made \$50,000 or less had lower odds of returning for a second year than students whose parents earned \$80,000 or more. The merit grant effect, however, decreased in magnitude in the presence of the first-year measures.

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 higher grades, above 3.25, the probability of returning *decreases* exponentially.

Several other variables affected persistence (Table 5). For example, part-time students, transfer students, and students with an unmet need greater than or equal to 10% of the cost of attending their institution were less likely to return. These results may reflect some aspects of the increasing multiple institution-transfer-swirl phenomenon, whereby students may be more firmly committed to earning a baccalaureate than doing all their degree work at the same institution. Our data do not allow us to conclude anything about whether, for example, part-time students are less likely to earn a bachelor's degree, although there is plenty of evidence elsewhere (Pascarella & Terenzini, 2005) to suggest that this is the case.

How 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 chances for returning to the same institution for the second year. This finding 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' odds of returning for the second year of college. That is, compared with students who took part in co-curricular activities five or fewer hours per week, the odds for returning were over two times greater for students who were involved six to 20 hours weekly; those involved 21 or more hours per week had odds of returning that were over two and one-half times greater than their peers. The link between extracurricular involvements and persistence is well documented, both empirically (Astin, 1977, 1993; Feldman & Newcomb, 1969; Pascarella & Terenzini, 1983, 2005) and theoretically (Astin, 1984, Tinto, 1993). Research has shown that these benefits appear to extend to contemporary students from different racial and ethnic backgrounds attending different types of four-year colleges and universities.

Especially important for the purposes of this study, student engagement in educationally purposeful activities during the first year of college had a positive, statistically significant effect

Table 5.
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		

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

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

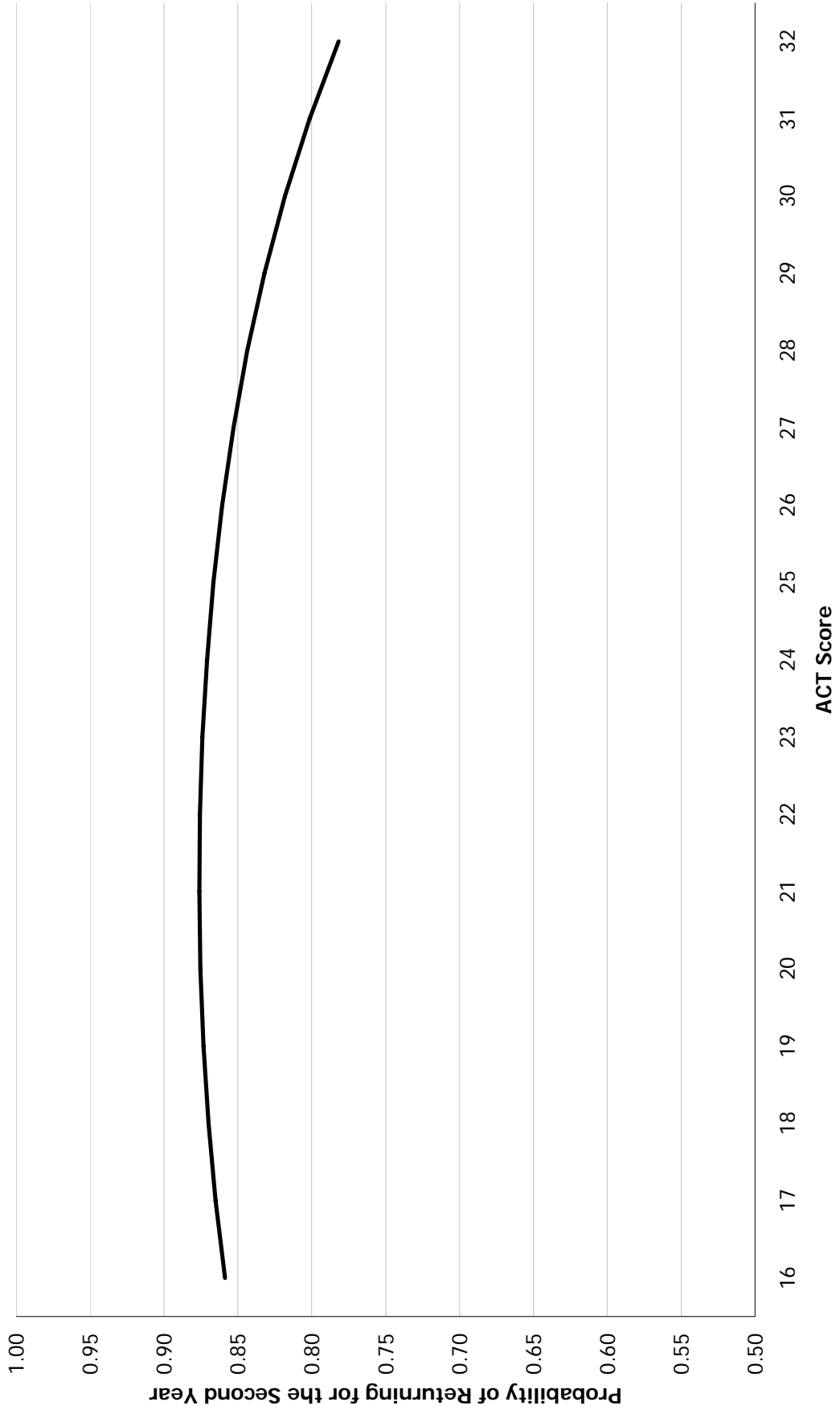
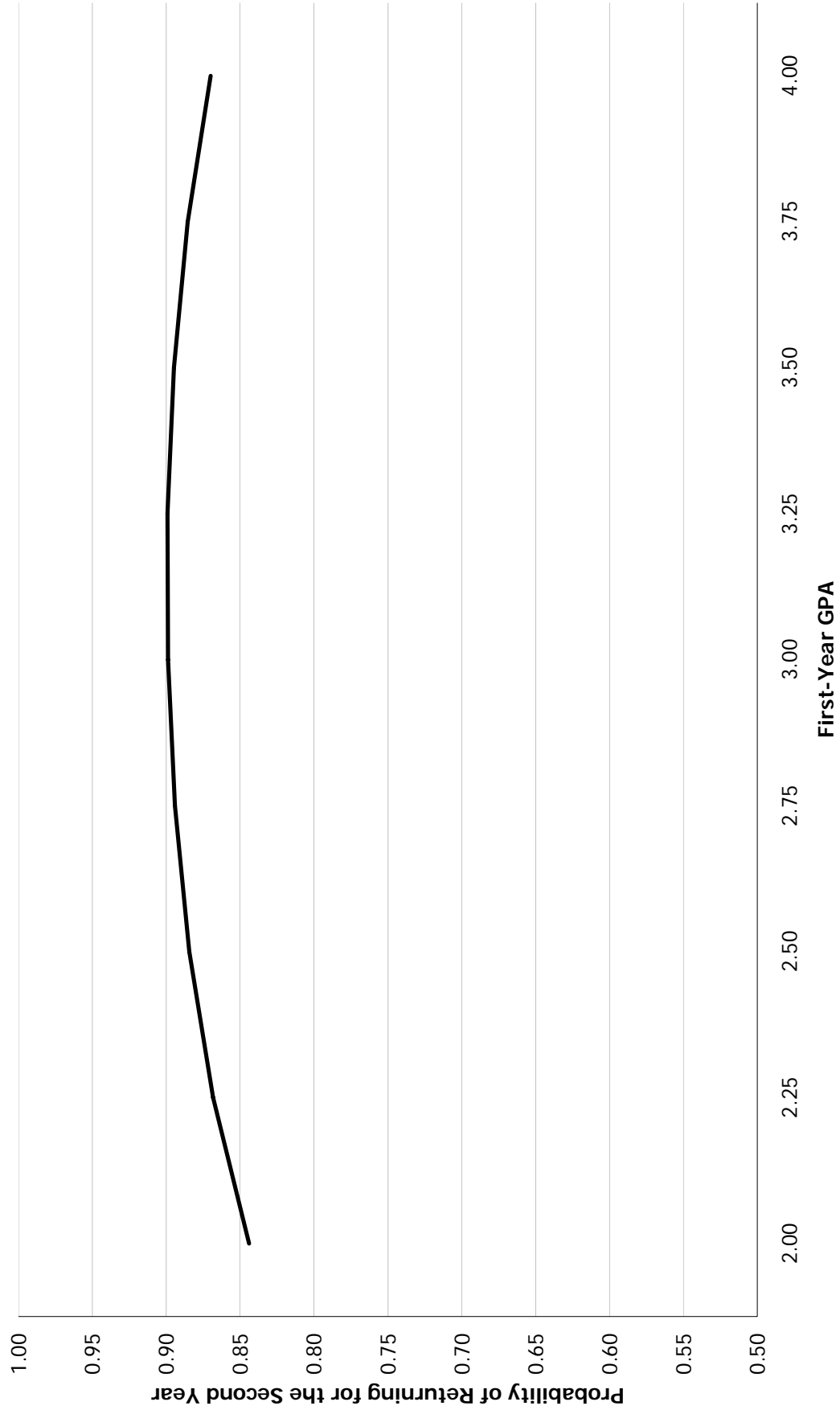


Figure 5.
Impact of First Academic Year GPA on Probability of Returning for the Second Year of College



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, *for every one standard deviation increase in engagement, the odds of returning for the second year of college increased by 17%*. This is another piece of evidence consistent with the large body of evidence 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. Although the likelihood ratio test associated with entering these cross-product terms as a block into the model was statistically nonsignificant, suggesting no differences in the effects of engagement by race, the coefficient representing the differential effect of engagement between African American and White students was statistically significant.

As Figure 6 illustrates, all else being equal, *African American students benefit more than White students from increasing their engagement in educationally effective activities in terms of persistence*. That is, although African American students at the lowest levels of engagement are less likely to persist than their White counterparts, as their engagement increases to about one standard deviation below the mean, African Americans have about the same probability of returning as Whites. As African American students approach the mean level of engagement, they become *more likely* than White students to return for a second year. There are no differences for other racial and ethnic groups in terms of the effects of engagement on persistence.

Senior Student Descriptive Statistics

The average senior year GPA (not including grades in prior years) was 3.36 (Table 6). Unlike the grade distribution for first-year students, the senior grade distribution was negatively skewed. The distribution may be skewed for two reasons. First, the majority of courses seniors take are in their major field(s) where we would expect students to perform relatively well. Second, many of the lowest performing students are no longer enrolled by this point, having dropped out of college or transferred to another institution. The residuals for the OLS model were approximately normally distributed, and predicted values for the outcome based on the OLS model fell only slightly out of the acceptable range for GPA (i.e., 1.06 to 4.08).

Senior Year GPA

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. As Model 1 in Table 7 shows, student background characteristics, pre-college academic achievement, and senior year experiences accounted for about 19% of the variance in senior year GPA.

After controlling for the students' pre-college academic achievement and senior year experiences, small to moderate differences in senior year GPA were evident by gender, race, parents' education and income, and educational aspirations. All else being equal, females had a

senior year GPA .15 points higher than that of males. Students of color had lower senior year grades than White students; that is, African American students' senior year GPA was .16 points lower, Asian American GPA was .15 points lower, and Hispanic student GPA was .09 points lower. For every parent with at least a four-year degree, students' senior year GPA was an estimated .03 points lower than that of students where neither parent received a four-year degree. Students from the lowest income level (i.e., \$30,000 or less) had a senior year GPA about .09 points lower than students whose parents earned \$80,000 or more.

Measures of prior academic achievement continued to be related to grades in the senior year. For every one-point increase in their ACT score, students enjoyed a .03 point benefit in their senior year grades. Thus, one standard deviation increase in ACT score – about 4 points in this study – yielded an estimated bump in senior year GPA of .12 points. And, as with first-year grades and persistence, having a merit grant had a positive effect on senior year GPA.

As with the first-year models, completing 12 or more credit hours during the senior year was a strong predictor of senior grades. Being part-time decreased senior year GPA by an estimated .29 points. Also, transfer students' senior grades were an estimated .04 points lower than students who started college and stayed at the same institution.

In general, the effects of the multiple measures of how students spent their time on senior year GPA were in the expected direction. Studying a greater number of hours per week positively affected senior year GPA. Compared with students who studied five hours or less per week, those who devoted 21 or more hours per week to academics realized a .08 point advantage in senior year grades. While co-curricular involvements were strongly linked to persistence among first-year students, hours spent in such pursuits had a negative effect on senior grades as do the hours spent working off-campus. That is, 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 were disadvantaged by about .07 points in terms of their senior grades; the disadvantage grew to .09 for those who spent 21 or more hours in extracurricular activities.

Working off-campus 6 to 20 hours per week did not have much of an effect on senior grades compared to students who spent five or fewer hours working off-campus. But working 21 hours or more off-campus decreased GPA by .07 points. Hours spent relaxing or socializing had a negative effect on senior grades, though the magnitude did not reach statistical significance.

Entering prior academic year GPA into the model explained an additional 36% of the variance in senior grades, increasing the total variance accounted for to 55% (Table 7, Model 2). As expected, prior academic year GPA had the greatest effect on senior grades, accounting for a .67 point increase in current year GPA for every one point increase in prior academic year GPA. After entering prior academic year GPA into the model, some other variables that previously seemed to make a difference disappeared or became less important to senior year grades. Gender, race and ethnicity, and parental income and education continued to matter, suggesting that these advantages (or disadvantages) were relatively stable.

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

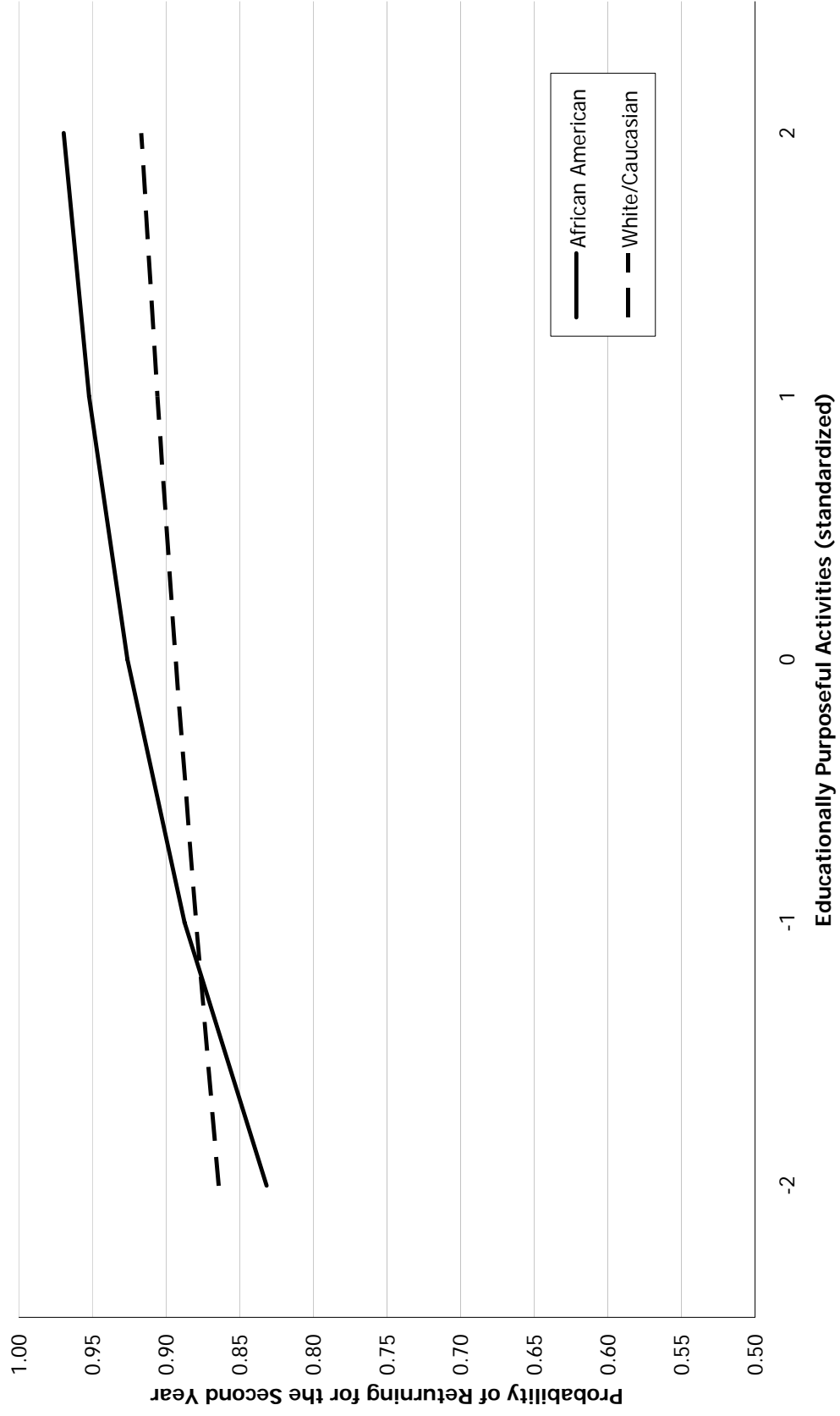


Table 6.

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

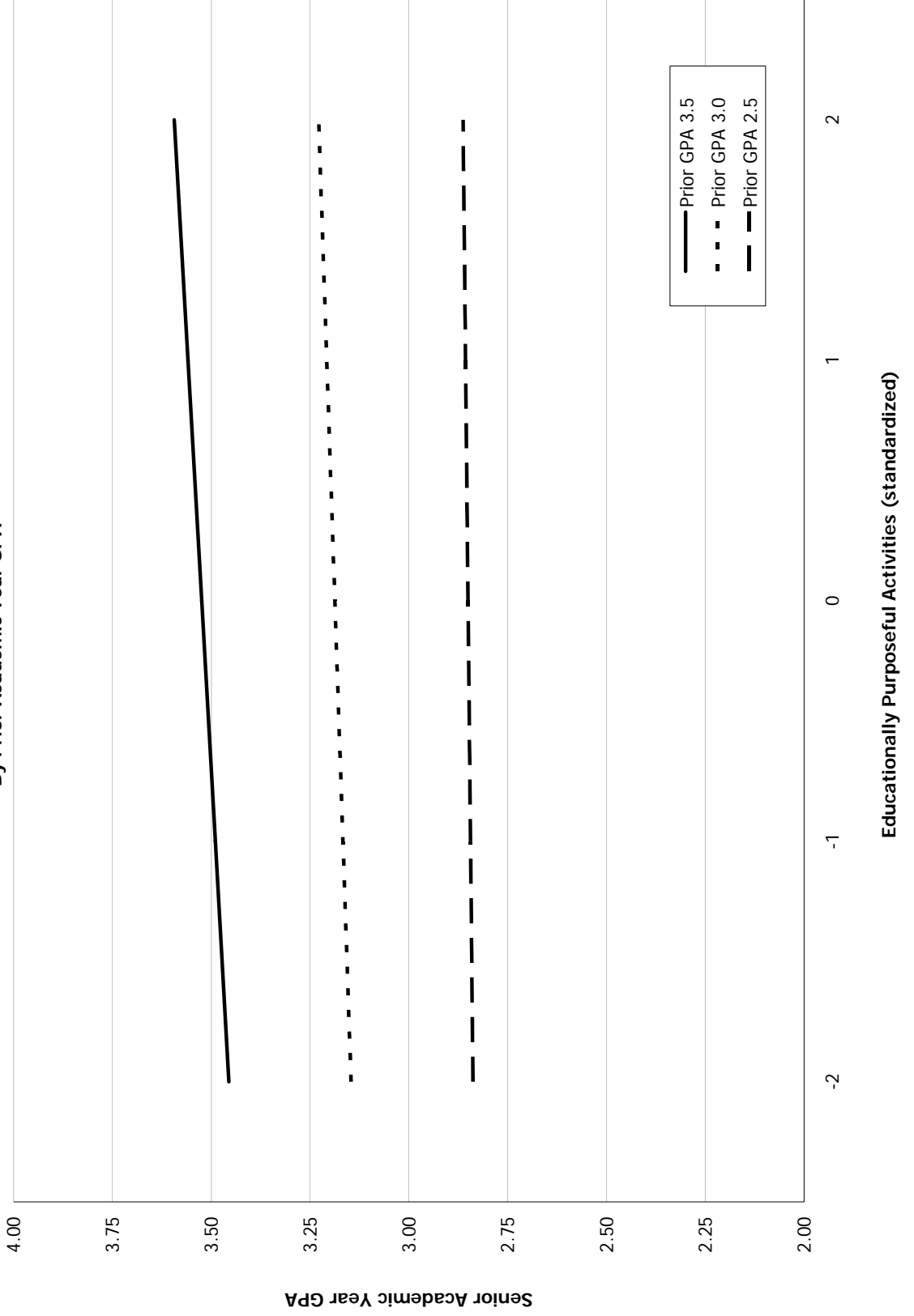
Table 7.

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



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.

Conditional Effects. A series of cross-product terms were entered into the model to examine the differences in the effect of educationally purposeful activities by prior academic year GPA and race/ethnicity. Another set of cross-product terms were entered to examine the differential impact of time spent studying by prior academic year GPA. The set of cross-product terms for educationally purposeful activities by race/ethnicity and the set of terms for studying by prior academic year GPA did not significantly increase the variance explained (R^2 change) in the model. In addition, no differences were found in the effects of educationally purposeful activities or time spent studying by race/ethnicity or for any level of prior academic year GPA. Said another way, these findings indicate that the effect of engagement in educationally purposeful activities on senior year GPA did not vary by the race or ethnicity of the student and that the effect of time spent studying on senior year GPA was consistent for students with different prior academic year GPAs.

A statistically significant increase in explained variance (R^2 change) indicated that the general effect of educationally purposeful activities differed by prior academic year GPA. Unlike the compensatory effect of engagement found for first-year students, Figure 7 illustrates that a greater level of engagement during the senior year actually widens the gap in senior year GPA by prior academic year GPA. For example, students who had a prior 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 prior 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.

Summary

The findings from this strand of the CTD study are generally consistent with prior student engagement research and extant theory. That is, several pre-college characteristics such as academic achievement represented by ACT or SAT score are strongly linked to first-year grades and persistence. However, once college experiences are taken into account, the effects of pre-college characteristics and experiences diminish considerably. Student engagement positively affects grades and persistence to the second year of college even after controlling for host of pre-college characteristics and other variables linked with these outcomes, such as merit aid and parents education. Moreover, while engagement in educationally effective practices benefits students from all racial and ethnic backgrounds, *benefiting most in terms of grades and persistence are those who have been historically underserved by postsecondary education.*

Strand Two: Psychometric Properties of NSSE Data

If survey data are used for institutional decision making, improvement, and public accountability, it is imperative that the data collection tools be valid and reliable. A survey is valid if it accurately measures what it is designed to measure. A survey is reliable if it measures consistently the same phenomena across administrations and settings (Hatcher, 1994). In this strand of the CTD project, we examine whether the patterns of responses of students from various racial and ethnic backgrounds and students attending different types of institutions are similar or different. Said another way, is the NSSE survey equally valid and reliable for different types of students attending different types of institutions?

To answer these questions, we conducted two complementary studies to assess the psychometric properties of the NSSE survey. The first is a series of standard psychometric analyses. The second approach employs cognitive interviews and focus groups. The blend of quantitative and qualitative data provides a systematic examination of NSSE's validity and reliability for different types of students in different institutional settings.

Quantitative Psychometric Analyses

The student groups of interest in this analysis are first-year and senior African American, Asian American, Hispanic, and White students. The institutional types of interest are (a) Historically Black Colleges and Universities (HBCUs), (b) Hispanic Serving Institutions (HSIs), and three types of Predominantly White Institutions (PWIs): (d) baccalaureate-granting schools, (e) master's granting schools, and (f) doctoral-granting schools.⁴

Data Sources and Methods

The data for this analysis are from 305,196 students at 741 four-year colleges and universities who responded to NSSE in 2004 and 2005. Thirty-one of the institutions are HBCUs with 6,175 respondents; 37 institutions are HSIs with 13,396 respondents, and the rest are students attending PWIs. About 68,000 students were enrolled at baccalaureate granting schools, 125,000 were at master's institutions, and 97,000 were at doctoral universities. An additional 15,000 students were enrolled at other types of institutions.

Five different analyses were conducted to estimate the validity and reliability of the NSSE survey instrument across the three groups of students and five institutional types:

1. Cronbach's alpha reliability analysis to compare consistency of NSSE benchmark scale scores of first-year and senior students attending different types of institutions.
2. Pearson product moment correlations to compare the magnitudes and patterns of relationships among the five NSSE benchmarks for different institutions and student groups.
3. Regression analysis to determine if differences exist between students at different types of institutions or from different racial and ethnic backgrounds in the manner in which

student engagement (NSSE benchmark scales) predicted self-reported gains in three areas: personal and social development, practical competence and intellectual skills (Appendix D).

4. Correlations between activities and conceptually compatible outcomes for students at different types of institutions and from different racial and ethnic backgrounds for four types of engagement to measure the internal consistency of scales of similar-content items. The four engagement activity clusters were:
 - academic time on task and reading and writing,
 - diversity experiences and understanding people of different racial and ethnic backgrounds,
 - spirituality-enhancing activities such as worship, meditation, prayer, and so forth, and gains in deepened sense of spirituality, and
 - computing and information technology activities and gains in using computing and information technology.
5. Stability correlations to determine whether NSSE results are stable from one year to the next for MSIs and PWIs.

This combination of analyses will allow us to determine the reliability and construct validity of the NSSE survey. Angoff (1988), Messick (1989) and others consider construct validity to be an essential quality of a valid, reliable measurement tool. According to Loevinger (1957), construct validity has three components:

- substantive -- the extent to which the items are associated with the underlying construct (which in NSSE's case is student engagement);
- structural -- the degree to which the items making up the construct are related to one another; and
- external -- the degree to which scale or item scores are consistent with theories about the construct.

In addition, as Pike (2006, p. 553) emphasized when examining the validity of NSSE scales (clusters of items): "These relationships should transcend institutional characteristics such as size, mission, and control. In addition, the scores should discriminate... That is, scores for some measures should be associated with one set of learning outcomes, whereas the scores for other measures should be associated with different learning outcomes." As we shall see, the results *plainly indicate that the NSSE survey is both valid and reliable across different groups of students and different institutional settings.*

Results

We first report the Cronbach's alpha estimates for the NSSE benchmarks by institutional type (Table 8) and by ethnicity of students attending PWIs (Table 9). Though some coefficients are somewhat below the acceptable limit of .7 (Nunnally, 1978), namely within the active/collaborative learning and enriching educational experiences benchmarks, Table 8 shows no real differences in the reliability of the benchmark scales for students attending different types

of institutions as defined by Carnegie category or minority serving designation. Likewise, Table 9 shows no appreciable differences by ethnicity among students attending PWIs.

Table 8.

Cronbach alpha correlations for NSSE benchmarks
by institutional type

		PWI Doc	PWI Masters	PWI Bacc	HBCU	HSI
Academic Challenge	FY	0.70	0.71	0.71	0.72	0.71
	SEN	0.71	0.72	0.72	0.75	0.72
Active/Collaborative Learning	FY	0.62	0.64	0.61	0.70	0.66
	SEN	0.65	0.65	0.63	0.70	0.67
Student-Faculty Interactions	FY	0.68	0.71	0.72	0.74	0.71
	SEN	0.73	0.74	0.75	0.74	0.74
Enriching Educational Experiences	FY	0.61	0.62	0.59	0.64	0.66
	SEN	0.62	0.63	0.61	0.63	0.67
Supportive Campus Environment	FY	0.75	0.76	0.76	0.75	0.77
	SEN	0.75	0.75	0.74	0.77	0.77

Table 9.

Cronbach alpha correlations for NSSE benchmarks
by student ethnicity at PWIs

		PWI-African American	PWI-Hispanic	PWI-White
Academic Challenge	FY	0.70	0.70	0.71
	SEN	0.73	0.72	0.72
Active/Collaborative Learning	FY	0.67	0.64	0.63
	SEN	0.68	0.65	0.65
Student-Faculty Interactions	FY	0.71	0.74	0.71
	SEN	0.73	0.73	0.75
Enriching Educational Experiences	FY	0.63	0.65	0.60
	SEN	0.65	0.67	0.62
Supportive Campus Environment	FY	0.76	0.76	0.76
	SEN	0.77	0.76	0.75

Next, benchmark intercorrelations are reported across the five institutional types (Table 10) and among the PWI student ethnic groups (Table 11). In both tables, senior correlations are shaded on top, and first-year correlations are unshaded on the bottom. Correlations above .7 are considered strong and between .31 and .70 are thought to be moderate. All the correlations are statistically significant and fall within these parameters. Table 10 shows that the strength of the

correlations do not differ appreciably between groups, indicating that the nature of the relationships among the variables are both strong and similar across the different institutional types for both first-year and senior students. Table 11 shows the same result for the three racial and ethnic groups in the model – African American, Hispanic, and White – with one exception. For senior African American students the associations between Supportive Campus Environment (SCE) and the other benchmark scales are somewhat weaker, perhaps indicating that there are additional factors at work that influence how African American students perceive the campus environment.

Table 10.

Correlations for NSSE benchmark scales
by institutional type

		1	2	3	4	5	
1	Academic Challenge	PWI Doc		0.48**	0.45**	0.37**	0.31**
		PWI Masters		0.49**	0.46**	0.39**	0.32**
		PWI Bacc		0.47**	0.48**	0.42**	0.33**
		HBCU		0.55**	0.52**	0.40**	0.38**
		HSI		0.49**	0.44**	0.37**	0.34**
2	Active/Collaborative Learning	PWI Doc	0.47**		0.56**	0.46**	0.33**
		PWI Masters	0.49**		0.57**	0.46**	0.32**
		PWI Bacc	0.47**		0.57**	0.43**	0.32**
		HBCU	0.54**		0.61**	0.50**	0.35**
		HSI	0.49**		0.57**	0.49**	0.31**
3	Student-Faculty Interactions	PWI Doc	0.44**	0.57**		0.51**	0.40**
		PWI Masters	0.47**	0.59**		0.53**	0.42**
		PWI Bacc	0.47**	0.59**		0.53**	0.39**
		HBCU	0.47**	0.62**		0.55**	0.45**
		HSI	0.44**	0.58**		0.54**	0.42**
4	Enriching Educational Experiences	PWI Doc	0.38**	0.48**	0.43**		0.29**
		PWI Masters	0.40**	0.50**	0.47**		0.31**
		PWI Bacc	0.40**	0.48**	0.46**		0.31**
		HBCU	0.42**	0.53**	0.52**		0.33**
		HSI	0.37**	0.48**	0.46**		0.29**
5	Supportive Campus Environment	PWI Doc	0.35**	0.32**	0.38**	0.31**	
		PWI Masters	0.36**	0.34**	0.39**	0.34**	
		PWI Bacc	0.37**	0.34**	0.39**	0.35**	
		HBCU	0.39**	0.36**	0.40**	0.36**	
		HSI	0.37**	0.34**	0.42**	0.31**	

** p < 0.01

shaded region = seniors

Table 11.

Correlations for NSSE benchmark scales
by student ethnicity at PWIs

		1	2	3	4	5	
1	Academic Challenge	African Amer.		0.50**	0.48**	0.39**	0.32**
		Hispanic		0.49**	0.47**	0.39**	0.34**
		White		0.49**	0.47**	0.41**	0.33**
2	Active/Collaborative Learning	African Amer.	0.48**		0.59**	0.46**	0.31**
		Hispanic	0.48**		0.57**	0.46**	0.33**
		White	0.49**		0.57**	0.45**	0.33**
3	Student-Faculty Interactions	African Amer.	0.46**	0.58**		0.56**	0.37**
		Hispanic	0.47**	0.61**		0.53**	0.42**
		White	0.47**	0.59**		0.53**	0.42**
4	Enriching Educational Experiences	African Amer.	0.40**	0.48**	0.46**		0.27**
		Hispanic	0.38**	0.49**	0.47**		0.32**
		White	0.40**	0.49**	0.46**		0.32**
5	Supportive Campus Environment	African Amer.	0.36**	0.33**	0.39**	0.33**	
		Hispanic	0.35**	0.34**	0.40**	0.34**	
		White	0.37**	0.34**	0.40**	0.33**	

** p < 0.01

shaded region = seniors

The regression analyses reported in Tables 12 and 13 estimate the variance explained in three self-reported gains scales from the NSSE survey: (a) personal and social development, (b) practical competence, and (c) intellectual skills (Appendix D). Each model inputs the same set of independent variables – student background variables (class rank, enrollment status, and sex) and the five benchmarks of effective educational practice. For the purposes of the current study, we seek to compare the overall amount of variance explained (R^2) as well as the relative strength of the independent variable coefficients between the institutional types (Table 12) and student groups (Table 13).

Table 12 shows the majority of regression coefficients are statistically significant in magnitude for all benchmark scales and selected background items. The R^2 values are generally moderate to high, ranging from .37 for the PWI doctoral institutions for the three gains scales to a high of .41 for Historically Black Colleges and Universities for the practical competence model. However, most relevant to the current study is the fact that the relative sizes of the R^2 and coefficients from one institutional type model to the next are generally consistent, indicating that students attending the different institutions respond similarly to the items on the survey.

Table 13 displays the regression results for students from different racial and ethnic backgrounds at PWIs. Again, the findings are quite similar for the three groups of students. Although there are some mixed results related to the predictive power of a few variables, all the models have statistically significant R^2 values comparable in magnitude, differing no more than .04 for each dependent variable. Thus, the effects of student engagement for the three groups of

students attending PWIs do not differ appreciably, showing an almost identical fit with the data across the five NSSE benchmark scales.

Table 12.

Comparison of regression coefficients of three gains scales by institutional type

		Gains in Personal-Social Development					Gains in Practical Competence					Gains in Intellectual Skills				
		PWI - Doc	PWI - Master's	PWI - Bacc.	HBCU	HSI	PWI - Doc	PWI - Master's	PWI - Bacc.	HBCU	HSI	PWI - Doc	PWI - Master's	PWI - Bacc.	HBCU	HSI
<i>constant</i>		-6.902** (0.530)	-7.474** (0.442)	-4.270** (0.803)	-2.796 (2.097)	-1.754 (1.169)	5.034** (0.528)	2.764** (0.438)	6.060** (0.859)	5.834** (1.956)	3.632** (1.095)	6.447** (0.510)	7.977** (0.427)	8.406** (0.773)	9.608** (2.006)	9.063** (1.097)
<i>student background variables</i>	CLASS	-0.007* (0.045)	-0.002 (0.039)	0.014** (0.058)	-0.006 (0.194)	-0.02** (0.119)	0.147** (0.045)	0.165** (0.038)	0.133** (0.062)	0.077** (0.181)	0.118** (0.112)	0.100** (0.043)	0.092** (0.037)	0.115** (0.056)	0.029* (0.185)	0.070** (0.112)
	ENRLMNT	-0.001 (0.218)	-0.008** (0.174)	-0.017** (0.347)	0.024* (0.782)	-0.025** (0.427)	0.002 (0.217)	-0.017** (0.172)	-0.021** (0.371)	-0.022* (0.729)	-0.009 (0.400)	-0.029** (0.210)	-0.042** (0.168)	-0.019** (0.334)	-0.022* (0.747)	-0.027** (0.401)
	SEX	0.042** (0.119)	0.031** (0.108)	0.000 (0.147)	0.057** (0.571)	0.034** (0.335)	-0.048** (0.119)	-0.003 (0.106)	-0.024 (0.157)	0.050** (0.534)	-0.003 (0.314)	0.012** (0.115)	0.018** (0.104)	-0.014** (0.141)	0.037** (0.547)	0.012 (0.314)
<i>benchmarks</i>	ACA	0.183** (0.005)	0.177** (0.004)	0.186** (0.006)	0.150** (0.022)	0.175** (0.013)	0.228** (0.005)	0.227** (0.004)	0.167** (0.007)	0.249** (0.020)	0.233** (0.012)	0.304** (0.005)	0.308** (0.004)	0.309** (0.006)	0.317** (0.021)	0.298** (0.013)
	ACL	0.066** (0.005)	0.079** (0.004)	0.076** (0.006)	0.099** (0.020)	0.098** (0.012)	0.124** (0.005)	0.124** (0.004)	0.146** (0.006)	0.071** (0.019)	0.158** (0.012)	0.053** (0.005)	0.060** (0.004)	0.060** (0.006)	0.033* (0.019)	0.088** (0.012)
	SFI	0.037** (0.004)	0.054** (0.004)	0.055** (0.005)	0.046** (0.017)	0.036** (0.011)	0.009* (0.004)	0.026** (0.004)	0.057** (0.005)	0.033* (0.016)	-0.015* (0.010)	0.025** (0.004)	0.031** (0.003)	0.056** (0.005)	0.015 (0.017)	-0.001 (0.010)
	EEE	0.098** (0.005)	0.079** (0.004)	0.109** (0.006)	0.073** (0.020)	0.059** (0.012)	0.011** (0.005)	-0.010** (0.004)	-0.035** (0.006)	0.034* (0.018)	0.011 (0.011)	0.000 (0.004)	-0.004 (0.004)	0.013** (0.005)	0.009 (0.019)	-0.022** (0.011)
	SCE	0.432** (0.004)	0.440** (0.003)	0.429** (0.004)	0.434** (0.014)	0.441** (0.009)	0.387** (0.004)	0.386** (0.003)	0.380** (0.005)	0.409** (0.014)	0.406** (0.009)	0.382** (0.003)	0.373** (0.003)	0.349** (0.004)	0.389** (0.014)	0.398** (0.009)
R^2 (** p < 0.01).		0.38	0.40	0.41	0.39	0.38	0.37	0.38	0.34	0.41	0.40	0.37	0.38	0.39	0.39	0.38

Table 13.

Comparison of regression coefficients of three gains scales by ethnicity

		Gains in Personal-Social Development			Gains in Practical Competence			Gains in Intellectual Skills		
		PWI – Afr. Am.	PWI -Hispanic	PWI - White	PWI – Afr. Am.	PWI -Hispanic	PWI - White	PWI – Afr. Am.	PWI -Hispanic	PWI - White
<i>constant</i>		-2.865* (1.068)	-2.284 (1.438)	-6.459** (0.335)	6.215** (1.165)	7.840** (1.405)	7.345** (0.342)	10.859** (1.149)	9.861** (1.337)	8.044** (0.324)
<i>student background variables</i>	CLASS	0.005 (0.113)	-0.016* (0.128)	-0.006** (0.028)	0.134** (0.106)	0.149** (0.125)	0.151** (0.029)	0.097** (0.104)	0.104** (0.119)	0.097** (0.027)
	ENRLMNT	-0.003 (0.446)	-0.007 (0.561)	-0.003* (0.137)	-0.013* (0.416)	-0.008 (0.548)	-0.014** (0.140)	-0.034** (0.411)	-0.031** (0.521)	-0.034** (0.133)
	SEX	0.026** (0.337)	0.012 (0.346)	0.021** (0.075)	0.004 (0.315)	-0.036** (0.338)	-0.036** (0.077)	0.020** (0.311)	0.001 (0.322)	0.004** (0.073)
<i>benchmarks</i>	ACA	0.168** (0.013)	0.173** (0.014)	0.180** (0.003)	0.230** (0.097)	0.205** (0.014)	0.210** (0.003)	0.303** (0.012)	0.309** (0.013)	0.308** (0.003)
	ACL	0.072** (0.012)	0.072** (0.013)	0.074** (0.003)	0.097** (0.011)	0.127** (0.013)	0.141** (0.003)	0.061** (0.011)	0.070** (0.012)	0.056** (0.003)
	SFI	0.069** (0.010)	0.058** (0.011)	0.051** (0.003)	0.026** (0.010)	0.026** (0.011)	0.120** (0.003)	0.024** (0.010)	0.013 (0.011)	0.039** (0.002)
	EEE	0.036** (0.012)	0.070** (0.013)	0.100** (0.003)	0.008 (0.011)	0.004 (0.012)	-0.015** (0.003)	-0.013 (0.011)	0.002 (0.012)	0.003 (0.003)
	SCE	0.432** (0.009)	0.436** (0.010)	0.430** (0.002)	0.399** (0.008)	0.387** (0.010)	0.373** (0.002)	0.371** (0.008)	0.378** (0.009)	0.371** (0.002)
R^2		0.36	0.38	0.40	0.37	0.36	0.35	0.36	0.38	0.38

(** p < 0.01).

Next, we examined the links between clusters of similar-content items, institutional type, racial and ethnic background. These item clusters were: academic time on task, spirituality-enhancing activities, diversity experiences, and computing and information technology activities. As shown in Table 14, the results were again very similar across institutional types for first-year students and seniors, with the items representing academic preparation being smaller in magnitude and those related to diversity experiences being larger in magnitude.

Table 14.
Inter-Item Correlation of selected variables by institutional type and year in school

Correlations between:	Institution Type	First Years	Seniors
Preparing for Class ¹ and Reading /Writing index ²	PWI Doc	0.22**	0.20**
	PWI Masters	0.27**	0.25**
	PWI Bacc.	0.28**	0.26**
	HBCU	0.29**	0.23**
	HSI	0.24**	0.25**
Developing a deep sense of spirituality and Participated in activities to enhance spirituality	PWI Doc	0.37**	0.34**
	PWI Masters	0.39**	0.35**
	PWI Bacc.	0.46**	0.45**
	HBCU	0.32**	0.28**
	HSI	0.27**	0.22**
Understanding people of other races and Diversity index ³	Doc	0.50**	0.53**
	Masters	0.51**	0.53**
	Bacc	0.54**	0.56**
	HBCU	0.48**	0.52**
	HSI	0.48**	0.48**
Using computing/information technology and Computing index ⁴	PWI Doc	0.40**	0.39**
	PWI Masters	0.39**	0.39**
	PWI Bacc.	0.39**	0.38**
	HBCU	0.42**	0.44**
	HSI	0.42**	0.41**

** = p < 0.01

Variables:

1. acadpr01

2. writemid, writesml, readasgn

3. divclass, divrstud, envdivrs

4. itacadem, envcompt

Table 15 shows correlations for students from different racial and ethnic groups for the selected clusters of content-similar items. Larger differences exist among student groups in the strength of correlations between spirituality-enhancing activities and diversity experiences and their conceptually compatible outcomes or gains. Especially for African American students and to a lesser degree for Hispanics, engaging in spirituality-enhancing activities is not as strongly related to deepening one's sense of spirituality compared with Whites. Diversity shows a similar pattern, though not as pronounced. That is, the self-reported gains of African American and Hispanic students

in understanding people of other races are not as strongly linked with diversity experiences and perceptions of the environment compared with White students.

Table 15.

Inter-Item correlations of selected variables by race and ethnicity and year in school

Correlations between:	Student Type	First Years	Seniors
Preparing for Class ¹ and Reading /Writing index ²	African Amer.	0.26**	0.26**
	Hispanic	0.26**	0.24**
	White	0.27**	0.24**
Developing a deep sense of spirituality and Participated in activities to enhance spirituality	African Amer.	0.31**	0.25**
	Hispanic	0.33**	0.31**
	White	0.42**	0.38**
Understanding people of other races and Diversity index ³	African Amer.	0.45**	0.46**
	Hispanic	0.48**	0.48**
	White	0.53**	0.55**
Using computing/information technology and Computing index ⁴	African Amer.	0.36**	0.38**
	Hispanic	0.41**	0.37**
	White	0.40**	0.39**

** p < .01

Variables:

1. acadpr01
2. writemid, writesml, readasgn
3. divclass, divrstud, envdivrs
4. itacadem, envcompt

Stability Testing. Stability analysis checks whether the same instrument produces similar results when administered multiple times. At the individual student level, the test-retest format is commonly used to estimate this type of reliability by administering the same survey to the same people at different times. NSSE test-retest results for individual students show the results to be quite stable, as one would expect of a reliable survey (Kuh, 2002). Previous stability tests at the institutional level also indicated that benchmark scores were highly stable across years (Kuh, 2002), even though some changes can be expected when schools attempt to introduce educationally effective practices to enhance the student experience. However, as with the other CTD psychometric tests, previous analyses did not specifically examine stability indicators for minority serving institutions because relatively few such institutions used NSSE in the early years. With a large number of HBCUs and HSIs participating in BEAMS, there are now enough MSIs to conduct stability tests.

Sample. Forty one HBCUs and HSIs participated in NSSE two or more times between 2002 and 2005 and were eligible for the analysis. Eight participated four times, 8 three times, and 25 twice. Three institutions were excluded because the gap between participating was three years, which could affect the results in unknown ways because of

the time lapse. Also, four cases were removed because of unacceptably high sampling errors (>15) or small numbers of respondents (<30). Thus, 34 MSIs are represented in the analyses.

Results. Four of the five NSSE benchmarks are used for the analysis. Most of the items in the enriching educational experiences cluster were rescaled in 2004 making comparisons with prior years unreliable. Pearson correlation coefficients for first-year and senior student benchmark scores were calculated for the most recent pair of NSSE administrations. As Table 16 shows, the year-to-year correlations for benchmark scores are well above the minimum levels to be considered moderately (.31 to .6) or highly stable (.6+). First-year benchmark scores are slightly less stable, perhaps because schools were taking action to modify policies and practices to increase student engagement in subsequent years, which could affect the stability analysis.

Table 16.

Stability Correlations for NSSE Benchmark Scores for MSIs

	First Year	Senior
Academic Challenge (adjusted)	0.55 (0.001)	0.62 (0.000)
Active & Collaborative Learning	0.80 (0.000)	0.83 (0.000)
Student-Faculty Interaction	0.73 (0.000)	0.89 (0.000)
Supportive Campus Environment	0.72 (0.000)	0.83 (0.000)

*First rows are correlation scores and second rows are p values.

Table 17 shows the results for the stability analysis for 210 PWIs that participated in 2004 and 2005 and met the criteria for inclusion in the analysis. For the two upper-division schools, only senior data are available so the senior analysis is based on 208 institutions. The findings unequivocally indicate that the NSSE benchmark scores are highly stable from one year to the next for PWIs.

Table 17.

Stability Correlations for NSSE Benchmark Scores for PWIs

	Fist Year	Senior
Academic Challenge (adjusted) – weighted	0.890 (0.000)	0.866 (0.000)
Active & Collaborative – weighted	0.816 (0.000)	0.803 (0.000)
Student-faculty interaction (for yr-to-yr comp) – weighted	0.776 (0.000)	0.874 (0.000)
Supportive campus environment – weighted	0.851 (0.000)	0.880 (0.000)

Summary

Taken together, this series of quantitative psychometric analyses indicate that the NSSE survey works equally well for students from different racial and ethnic backgrounds attending different types of institutions. The pattern of findings affirms the construct validity of the NSSE – that it consistently measures what it claims to measure. The stability tests show that the instrument produces similar results from one administration to another at both MSIs and PWIs.

Cognitive Research Interviews and Focus Groups

The final step in the examination of NSSE psychometric properties was conducting cognitive interviews and focus groups with students. These data collection approaches obtain information about the meaning respondents make of survey items and how they answer survey questions, providing a more contextualized understanding of survey responses (Conrad & Blair, 1996; DeMaio & Rothgeb, 1996; Drennan, 2003; Krueger, 1994, 1998; Ouimet et al., 2004; Tourangeau, 1984; Willis, 1999). They also help to reveal potential issues or problems that could lead to survey response error (Drennan, 2003).

The CTD interviews and focus groups expanded on previous work (Kuh, 2000; Ouimet et al., 2004) that did not explicitly take into account differences in responses associated with racial or ethnic background. As mentioned earlier, knowing more about how the instrument works with students from different racial and ethnic groups is essential as campuses become more diverse. In addition, assessing NSSE's performance with different racial and ethnic groups in different institutional contexts is critical to encouraging minority serving institutions (MSIs) to participate in NSSE and assuring that the results are valid and reliable for these students as well as for students at Predominantly White Institutions (PWIs). Finally, sharing contextualized information with NSSE users can help enliven discussions about results by providing concrete examples of student behaviors and institutional practices.

Cognitive interviews and focus groups address the broadest definition of validity, whether the measure produces results consistent with conceptual intent. To this end, we conducted cognitive research interviews and focus groups with more than 160 students at eight colleges and universities. Our purposes were threefold:

- To obtain information about the cognitive processes respondents use to answer survey questions
- To better understand the meaning respondents made of particular survey items.
- To identify potential problems associated with survey items that might lead to survey response error

Methods

Cognitive interviewing is employed to understand how respondents are interpreting particular items. The two main strategies used in this process are “think-aloud” interviewing and probing. Think-aloud interviewing asks respondents to literally verbalize their thinking as they answer questions. The interviewer asks respondents follow-up questions to clarify meaning and explore the reasoning whereby respondents derived their answers (Collins, 2003). The goal is to gain insight into the ways respondents handle the cognitive tasks posed by a question, such as how they comprehend the question or the information they use to respond. Cognitive interviews can also be helpful in determining whether respondents understand the question as intended and to identify question-response patterns that may differentiate groups of

respondents, such as those attending different types of institutions or who are from different racial and ethnic backgrounds or gender (Drennan, 2003).

Focus groups are semi-structured, small group discussions (typically three to ten participants) designed to solicit individual and group reaction and feedback. The purposes of focus groups are similar in many ways to cognitive interviews when used to examine the validity and reliability of survey items and have the added advantage of including more people in the study. In addition, focus groups help determine the degree to which group consensus and differences exist and may reveal patterns of understanding and interpretation that vary by cultural, institutional, and social differences that may not be directly addressed during individual interviews (Jobe, 2003). Finally, focus group responses can be used to triangulate survey results by contextualizing and validating the meaning of aggregate findings (Krueger, 1994; Caudle, 1994).

Data Collection

Focus group sessions and individual cognitive research interviews were conducted in the spring of 2005 with 163 undergraduate students (50 males, 113 females) on the campuses of four minority-serving institutions (MSIs) and with underrepresented and some majority students at four predominately-White institutions (PWIs) (Table 1). The interviews were timed to correspond to the NSSE survey administration schedule so as to capture students' perceptions at about the same point in the academic year they would typically respond to the NSSE survey. Individual interviews took about 45 minutes and focus groups lasted about 60 minutes.

Participants were recruited by interviewers located in highly-trafficked campus buildings. Two NSSE staff members conducted and tape recorded all interview and focus group sessions. Summaries were either typed by the second staff member as students responded to questions, or subsequently transcribed from the tapes. Using multiple interviewers and a third staff member who later reviewed the tapes and transcriptions increased the accuracy and comprehensiveness in interpretation of student responses (Caudle, 1994; Silverman, Ricci, & Gunter, 1990).

Table 18
Gender, Race-Ethnicity, and Class Level of Participants in CTD Cognitive Interviews and Focus Groups

Institution	Participants	Gender		Race/Ethnicity					Class Level		
		M	F	AS	AA	H	W	O	FY	SR	O
DePaul University	14	3	11	3	6	3		2	9	4	1
Georgia State University	26	7	19	5	16	2	3		6	20	
Grinnell College	20	6	14	1	1	1	16	1	10	10	
Livingstone College	24	13	11		21			3	12	12	
New Jersey City University	14	5	9		11		1	2	1	13	
Morgan State University	21	8	13		20			1	17	4	

Texas A&M International	19	4	15			18	1		8	11	
Winthrop University	25	4	21		14		7	4	10	14	1
Total	163	50	113	9	89	24	28	13	73	88	2

AS = Asian, AA = African American, H = Hispanic, W = White, O = Other or unknown, FY = first-year student, SR = senior student

Because time constraints would not allow us to explore every item on the survey (Appendix A), we used two different scripted interview protocols (Script A and Script B, see Appendices E and F) that included both common and unique questions. That is, all cognitive interview participants answered some questions, while about half answered others. This approach allowed us to maximize the number of questions covered. We did not query demographic items or survey questions that were studied thoroughly by Quimet et al. (2004).

Cognitive interview sessions usually employed traditional prompts such as, “tell me how you determined your answer” and “what does [question term] mean to you?” and “Can you give me an example of what you mean?” These probes or follow-up questions were used when it appeared more in-depth exploration of participants’ interpretation of key concepts might yield instructive information (Patton, 2002).

The focus group protocol (Appendix G) followed a standard format and contained several common questions across all sites. The group-specific questions were determined from on a review of the data gathered during the individual interviews. Additional probes during focus groups included questions such as: “Is your experience different than others at this school?” “Can you provide an example of what you mean?”

Data Analysis

As noted, tapes and transcripts for each institution were reviewed and edited by CTD research team members. Data were entered into spreadsheets tables and coded using the scheme described below (Conrad & Blair, 1996). NSSE staff conducted several work sessions to resolve any issues on coding definitions or strategies which resulted in a refined coding structure (Miles & Huberman, 1984).

A three-stage approach was used to analyze the cognitive interview data (Tourangeau, 1984; Willis, 1999; Conrad & Blair, 1996). The first stage, understanding the survey question and response options, provides a foundation for the second stage, performing the primary survey tasks (retrieving information, drawing conclusions, and occasionally mental arithmetic). These two stages then become the basis for completing the third and final stage, determining how to respond. Here are the three stages and their related sub-tasks:

- 1) Understanding the survey question and response option
 - a) Comprehending the survey question
 - b) Comprehending the response options

- 2) Performing the primary survey task
 - a) Retrieving information
 - b) Deducing, making conclusions about information
 - c) Mental arithmetic computation
- 3) Formatting responses
 - a) Mapping data yielded through the primary task processes to an explicit response option
 - b) Responding to a situation in which an appropriate response option is not available

We reviewed the cognitive interview data with an eye toward misunderstanding the survey terms, having difficulty retrieving information, making computational errors, and asking the interviewer for clarification on the content of the question. If problems were evident, we coded students' comments according to the following categories provided by Conrad and Blair (1996). The examples below help illustrate how these categories applied to findings on NSSE items.

Language – Did students understand the meaning of words and phrases?

Example: Lack of familiarity with the term “culminating” or “capstone” senior experience in item 7h.

Inclusion/exclusion – Were certain concepts or experiences considered within the scope of an item?

Example: Explored whether students included activities taking place inside versus outside of class on item 6d.

Temporal – What was the appropriate time period applied to a particular question? Was this consistent among students?

Example: Students noticed the transition between questions that required them to consider the “current school year” versus “typical 7-day week”

Logical – How do students interpret phrases like ‘and’/‘or’ in survey questions?

Example: Response option calculation challenge associated with item 9e, “relaxing and socializing”

Computational – How do students respond to difficult mental arithmetic or complicated syntax in question?

Example: Students found the process for calculating time spent on the writing and reading activities in item 3 “tricky” and “confusing.”

The data were first coded and analyzed by institution. Interview transcripts were read to identify patterns in categories, themes, and processes that appeared to be linked to respondents from different racial and ethnic backgrounds. We also reviewed for institutionally distinct patterns in interview results. We compiled interpretative notes for each question that described any problems specifically linked to features in the questions. Although consistency in themes (i.e., misunderstanding the question, difficulty

computing a response) across interviews provides a strong basis for drawing conclusions, we were sensitive to comments from small numbers of students because they can point to relevant, context-specific differences in interpretations that can be instructive for faculty and staff charged with institutional improvement.

Summary reports for individual institutions were compiled to assist administrative staff and faculty in interpreting and making good use of NSSE survey data. In these reports, we highlighted those items that appear to be reliable, while identifying those where interpretations may differ so that individual institutions can determine how to best use and interpret results from NSSE items in their context.

This report presents the findings from the cross-case analysis. When reviewing the report, it may be helpful to refer to the interview scripts (Appendices E, F, and G) and the NSSE survey instrument (Appendix A). The findings presented here are loosely organized to follow the order in which the items appear on NSSE. Although a full report from cognitive testing would include information on every survey item tested, and offer a more balanced review of reliable and problematic items, this report focuses primarily on questions that may be potentially problematic relevant to a particular group or institutional context (Merriam, 1998). The items from NSSE that we do not mention – the majority of those tested -- appear to be interpreted in similar ways by different groups of students across different institutional settings. We use direct quotes and paraphrased summaries of comments from student transcripts to illustrate the meaning students make of particular survey items. In some cases, these are examples of how the survey items are working as intended, in other instances they illustrate a potential problem, and in still other instances they point to items that students find challenging to think about in terms of their college experience.

What Did We Learn from Students?

Results from this segment of the CTD study indicate that the NSSE survey generally performs well for students from different racial and ethnic backgrounds across all eight institutions. Overall, students who participated in the cognitive research interviews and focus groups found survey questions to be *clearly worded* and *easy to complete*. Students' first impressions of the survey were favorable. They found the format readable, and because the survey "looked short," they assumed it would be easy to complete. However, students at MSIs in particular tended to interpret questions somewhat differently than their counterparts in PWIs.

Because the purpose of this strand of the CTD project is to determine how the survey performs at MSIs and for minority students at PWIs, we focus on differences in the meaning students make of questions. These alternative interpretations may be important to take into account when examining NSSE results in the context of a given MSI or when reviewing the response of minority students. We highlight insights into students' understanding of survey items along with items where language and questions or response options may not adequately or accurately represent students' experiences. We then discuss the implications for NSSE, for institutional use of NSSE, and future

research. Although the findings suggest responses to a handful of items may have different meanings in certain contexts, *overall the NSSE instrument appears to be valid for students from different racial and ethnic backgrounds and students at MSIs*. That is, the cognitive interview and focus group results suggest that the vast majority of students at different types of institutions *understand what is being asked, find the directions to be clear, interpret the questions in the same way, and tend to formulate answers to questions in a similar manner*.

Challenging, Problematic and Informative Results

It is not surprising that some respondents interpret certain items differently, or find some questions more difficult to answer than others. In many instances where some respondents found the item challenging to answer, it did not mean they interpreted it differently, or that they misread the intention of the question, or that they responded inaccurately; rather, these “challenging” items required more thought to answer compared with the majority of questions on the survey. In other instances, the item was interpreted somewhat differently by students and could potentially be “problematic” in terms of drawing accurate conclusions from the results. In still other instances, students’ elaborations on the meanings of items were “informative” because they yielded additional insights into their thought processes when responding to the item. In this section we report all three of these types of items.

Findings are labeled challenging, problematic or informative within the categories derived from Conrad and Blair (1996) specified earlier. These categories are: clarity and comprehension, inclusion/exclusion issues, temporal issues, logical problems, and computational problems. Examples from interview transcripts illustrate variations in the ways students talked about the meaning they made of the questions.

Clarity and Comprehension. Cognitive interviews and focus groups are especially effective in identifying language issues, specifically problems respondents may have in comprehending the intent or meaning of the question. Such items are important to survey validity. However, *many of these issues were not specific to students’ cultural, racial or ethnic background or institutional context per se*. That is, additional clarity may generate more accurate, consistent interpretations for all respondents, institutional setting and racial and ethnic background notwithstanding.

Sample student quotes to illustrate clarity and comprehension issues:

1k *“Participated in a community-based project (e.g. service learning) as part of a regular course”*

Challenging

“I was not really sure about this, but I took it to mean the class as a whole would do a service project and reflect on it afterwards.” Female, African American, Senior, PWI

“At first I thought, oh yeah I do that, I help out with my church, tutor middle school kids, but then I saw as part of a regular course. So then I said, no I've never done that as part of a course.” Male, African American, Senior, MSI

Problematic

“I didn't read the question right...and just saw participate in community service. So this was confusing to me” Male, African American, First-year student, MSI

“My parents made sure I was very active and stressed the importance of giving back to people less fortunate. So I do a lot of community service.” [student responded “done” but in a response to a follow-up question indicated that she had actually not done this for a course] Female, African American, First-Year Student, MSI

2c *“Coursework emphasizes: Synthesizing and organizing ideas, information, or experiences.”*

Challenging

“Synthesizing is sort of confusing; I had to re-read it; I think it means taking what you have and organizing it; get more in depth with the idea; more than memorizing.” Male, African American, First-year student, MSI

Problematic

“I don't know. Does this mean preparing notes for class in your own words?” Male, African American, Senior, MSI

“I guess I don't know what this [synthesizing] means. Maybe it's understanding something for what it is?” Female, African American, First-year student, MSI

7c. *“Participate in a learning community or some other formal program where groups of students take two or more classes together”*

Problematic

“I marked done. Me and my friends, we try and take classes together, we formed our own learning community I guess.” Female, African American, Senior, MSI

“This confused me. I did not know if that was at a university or like a community college or did that mean taking a dance class in the community?” Female, Latino, First-year student, MSI

“I don't plan to do this. I am not sure what a learning community is. Is this a college?” Male, African American, Senior, MSI

“Does that mean friends taking the same course? Aren't we in one? We learn together and we are a community ... I said “Do not plan to do” because I don't know what it meant.” Female, African American, Senior, PWI

The language of “service learning” and “community-based project” included in item 1k “Participated in a community-based project (e.g. service learning) as part of a regular course” was unclear for some students, especially at HBCUs. The phrase “part of a regular course” caught some students by surprise; some understood it as intended -- to clarify the question, but a few were confused, or simply did not notice that the question included this specification. More important, students at HBCUs in which community service is a required but not necessarily course-based learning experience were not sure how to answer. Thus, the emphasis on service distinctive to many HBCUs may not be reflected in responses to this question by students at HBCUs.

Interviews with students across all eight institutions revealed that many students found the “synthesizing” in item 2c to be challenging. The item reads, “Coursework emphasizes: Synthesizing and organizing ideas, information, or experiences.” As the quotes above illustrate, some students were unsure about the meaning of the word “synthesize.” Many students found “Synthesizing” in 2c and “Analyzing” in 2b difficult to differentiate. The only exceptions were students attending a highly selective liberal arts college who were able to clearly differentiate among these items. We cannot determine from these data whether these problems are related to comprehension or whether students simply had not been exposed to these terms and the activities they represent in their college coursework.

Some students who admitted difficulty in understanding these terms became frustrated by their inability to articulate the meaning of the concept. In a few cases, this produced emotionally deflated reactions, in that the student simply presumed that they must not have had this learning experience since they had difficulty comprehending the meaning of the term and providing an example.

Many students across all eight institutions indicated that “learning community” in item 7c -- “Participate in a learning community or some other formal program where groups of students take two or more classes together” -- was an ambiguous, unfamiliar term. The confusion around the term resulted in inaccurate responses. For example, many students at the HBCUs told us that they were participating in a learning community, explaining that the whole college was a learning community. Other students selected the “do not plan to do” response option because they did not know what the term meant.

The word “culminating” in item 7h -- “Culminating senior experience (capstone course, thesis, project, comprehensive exam, etc.)” -- was unfamiliar to many students, particularly first-year students, across all eight institutions. Fortunately, students took the next appropriate step and reviewed the terms in parenthesis to formulate a response to the question. However, the term “capstone course” was also unfamiliar to students. Most referenced “thesis” or “project” to respond to the question. Students typically asked the interviewer for clarity on this question, and several asked if this meant “senior project” and a few asked if it included portfolios. The inability of some students to correctly interpret some terms in the question caused them to report that they “have not decided” simply because they were unsure about the terms and whether their institution even had

this experience. Of course, if the institution requires a culminating experience, responses such as “have not decided” or do not plan to do so” can point to an issue the institution needs to address.

In summary, while most of the NSSE items were clear to students, some were not. In a few instances, additional clarity may produce more accurate responses by all students. In a few other instances, responses need to be interpreted in context-specific ways.

Inclusion/exclusion issues. The extent to which students consider certain concepts or experiences within the scope of what a survey item is asking is important to understand. Such insights illustrate more precisely what information is captured in students’ responses to questions and also exposes the importance of contextualizing results. In this section we discuss several NSSE items in which interview data yielded greater insight into the meaning students make of these items.

Item 1g “Worked with other students on projects during class” prompted some students to wonder what sort of group work was intended. These students explained that the phrase, “on projects,” suggested that the question meant lab reports and other formal group projects. Students at both MSIs and PWIs thought this item applied more to students taking science, math, engineering, and technology classes. In fact, the most frequently cited examples of this activity were lab projects in science classes.

The terms “faculty member” and “administrative personnel” are somewhat ambiguous for most college students. That is, does “faculty member” mean to imply graduate teaching assistants or a staff affairs member who occasionally teaches a class or one’s advisor? Generally, when responding to the NSSE survey student tend to consider anyone who teaches to be a faculty member. They correctly think about personnel in administrative offices such as financial aid, bursar, and registrar when they think of administrators. Just to illustrate differences in who students consider to be faculty and administrators, at one Hispanic Serving Institution (HSI), a few students were confused by what “faculty member” meant in questions 1o, 1p, and 8b, explaining that they thought faculty were administrators. This issue was raised at several points in the survey when faculty were referenced, but was especially evident when students responded to item 8c “Quality of relationships with administrative personnel and offices.” They also tended to think of administrators when they answered question 8b.: “Quality of relationships with faculty members.” This example demonstrates the importance of contextualizing results.

For the most part students correctly considered experiences with tutoring, in item 1j “Tutored or taught other students (paid or voluntary)”. However, about dozen students at HBCUs, who participated in off-campus tutoring programs with high school and junior high school students, included these tutoring experiences in their response. Some students at other institutions only considered formal tutoring positions or situations where students felt expertise and/or were compensated. This seemed to be emphasized by students because “tutor or taught” has a formal connotation. However, the item was intended to measure peer support or peer learning experiences at a particular institution,

Sample student quotes to illustrate inclusion/exclusion issues:

1j. *"Tutored or taught other students (paid or voluntary)"*

Informative

"I do this very often. I tutor high school students in Maryland [not on campus]" Female, African American, Senior, MSI

Challenging

"Does this only include paid tutoring?...If I meet with someone in my class to go over the material and sort of tutor them does that count?" Female, African American, Senior, MSI

1u. *"Had serious conversations with students of a different race or ethnicity than your own,"*

Informative

"Well, we're an all-Black school so I don't really see a lot of this happening here." Female, African American, Senior, MSI

"With myself being Black, that would mean me talking to Caucasians, it can be any other race outside of my race, I've talked with some students. I went to summer school to take a Spanish class at another school and we got along. But I don't do that here, because it is an HBCU. So I put 'sometimes' because we don't do that much. Female, African American, Senior, MSI

6f., *"Learned something that changed the way you understand an issue or concept"*

Informative

"I'd say 'Very Often,' because I learn something everyday that I didn't understand about something, something that makes me think of something from a different angle. Both in and out (of the classroom) ... it is hard for me to separate" Female, African American, First-year student, PWI

"I think that goes along with 'e,' it is kind of similar. I always come out of discussions having learned something, so I am going to say 'Often.' I think this is in class, but mostly outside. I talk with my friends so that would be outside of class" Female, Latino, Senior, MSI

8b. *"Quality of relationships with faculty members."*

Problematic

"You can have teachers in administrative roles also, so its confusing.... Grad students are in administrative positions, and they teach, where do you put them?" Female, African American, Senior, PWI

9f *"Providing care for dependents living with you (parents, children, spouse, etc.)."*

"I think about 1-5 hrs. But you said living with you and I care for a sister, but she does not live with me, should I include this? Female, African American, Senior, MSI

not necessarily tutoring students in K-12 education, or only formal tutoring relationships of expertise and compensation.

Items related to diversity experiences (1e, 1u, 1v, 10c, 11l) posed challenges for students at MSIs and minority students at PWIs. Three questions in particular caused students to pause and think about their experiences:

- “Had serious conversations with students of a different race or ethnicity than your own”;
- “Understanding people of other racial and ethnic backgrounds.”

Some students at HSIs and HBCUs explained that because they were at an MSI, which tend not be racially diverse, there were simply few opportunities to engage with students from racial backgrounds other than their own. In contrast, even though there may be relatively little structural diversity at a PWI White students at PWIs were less likely to see this institutional feature as diminishing their experiences in this realm. White students mentioned the classroom as a place for fostering such discussions, while minority students at PWIs tended to mention experiences outside of the classroom. Some students at one HSI interpreted the question to include one’s nationality in this item; as a result, they considered Mexican students from Mexico as being of the same ethnicity, but nonetheless significantly different. Finally, some students at both PWIs and MSIs did not know the difference between race and ethnicity, though it is not clear whether this affected how they would respond to the item.

Many NSSE questions do not specify how or where the respective activity occurs. We queried students on several of these items to get a better sense of what they included when formulating their response. Our primary interest was whether the activity occurred “inside or outside of class,” and we asked students about this for items 6e, “Tried to better understand someone else’s views by imagining how an issue looks from his or her perspective” and 6f “Learned something that changed the way you understand an issue or concept.” Generally, students appeared to be thinking broadly about their college experience when they responded, including both in-and out-of-class experiences. This suggests that students are appropriately including a range of experiences as the survey item intends.

Item 9d, asks students about their participation in co-curricular activities and contains a term among the parenthetical examples that troubled some students in Black Greek organizations. Some students at HBCUs felt that the use of the word “social” before fraternity or sorority did not fairly represent the role and culture of Black Greek organizations. Although they indicated that they included their Greek experience in their response, they suggested that the question could better represent the Black Greek experience if it did not specify social.

Another potentially problematic exclusion item for some students at MSIs was 9f “Providing care for dependents living with you (parents, children, spouse, etc.).” Some students told us they provided care for dependents, but these individuals did not always live with them. In this case they were not sure how to respond. More importantly, some students felt that the question did not represent their reality.

Temporal issues. Temporal considerations include the extent to which students apply the appropriate time period to a particular question, and whether these interpretations are consistent across students and institutions. The temporal aspects of

NSSE appears to be one of its strongest features, in that students consistently made appropriate references to the time period specified in the questions. For example, students responded appropriately to shifts between “in the current school year” and “in a typical 7-day week.”

Sample student quotes related to temporal issues:

7b. “*Community service or volunteer work*”

Informative

“I’ve been tutoring kids in an after school program for about two years. So I said ‘done’ because I did it, but I plan to keep doing it too.” Female, African American, First-year student, MSI

Problematic

“I marked done because I’ve already done community service in high school. I didn’t know you had to do that in college too.” Male, African American, First-year student, MSI

One temporal issue distinctive to HBCUs and to minority students at PWIs is that they often referred to pre-college and summer experiences when responding to the community service question.

Logic problems. Logic problems refer to structural or logical flaws in questionnaires that simply do not fit the basic cognitive model. Redundant and double-barreled, or questions based on a flawed premise, are considered logical problems. Although NSSE has been pretty thoroughly tested and corrected for these problems, our study revealed questions that suggest a few possible logical problems, particularly as they relate to students experiences at MSIs and minority students at PWIs.

Sample student quotes related to logical problems:

9e *hours spent “relaxing and socializing (watching TV, partying, etc.),”*

Problematic

“I think relaxing is different than socializing. I spent a few hours relaxing every day.... I socialize some each day, but mostly this is on the weekend, so I guess about 10 hours a week, then about 10 more on the weekend when I hang out with my friends.” Female, African American, Senior, PWI

“I think that the more than 30 hours I spend relaxing includes time with my fraternity. It is a choice to be involved so I think of it as socializing too. So I am not really sure where to put this time, here [9e] or here [9d].” Male, African American, Senior, MSI

Item 9e, hours spent “relaxing and socializing (watching TV, partying, etc.),” was associated with computation errors, since students considered “relaxing” and “socializing” as different kinds of experiences. Students often calculated “relaxing” in daily allotments of hours (e.g. hours a day that they watch TV, surf the internet), while hours spent socializing were weekly allotment (hanging out with friends on Friday and

Saturday nights as a total of 8 hours). Combining these two experiences into one question may create response errors. In addition, 9e was problematic for many students attending HBCUs who belonged to Greek organizations who indicated that they were unsure whether time spent with their fraternity or sorority was “socializing” or taking part in “co-curricular activities.” This issue likely exists for other Greek-affiliated respondents. Neither of these items contribute to the NSSE benchmarks of effective educational practice. They are included on the instrument to make certain that students are relatively accurate in their accounting for how they spend their time on a weekly basis.

Computation problems. Questions that require difficult mental calculations to recall or determine a response can be problematic on surveys. Although students found the process for calculating time spent on writing and reading activities in NSSE item 3 “tricky,” they were generally able to make the mental calculations on all survey items. Item 9, which asks students to calculate hours spent in a typical 7-day week, tended to slow students down as they completed the survey, but they determined their response in line with what the question asked of them.

Response Set Issues

The cognitive interviews and focus groups addressed the meaning and completeness of some of the item response sets. The results generally were consistent with those reported from earlier studies of the NSSE survey (see Kuh, 2001b; Ouimet, et al., 2004). Overall, meanings associated with the response sets varied somewhat from item to item, reinforcing that categories for each are item specific. At the same time, student interpreted the meaning of the items in a fairly consistent manner. For example, when students marked “very often” to the item “asked questions in class or contributed to class discussions,” they agreed that this meant about “three or four times per week,” or “most days in some classes.” When answering the “attended an art exhibit, play, dance or other theater performance” item, students told us that “often” meant that they attended between six and ten events during the academic year, and confirmed this number by identifying multiple arts venues and occasions they attended.

There also was considerable consistency in what students reported in terms of frequency, how they quantified their participation, and what they referenced in determining their response for the majority of items on the survey. The finding that response categories are item specific is important, in that it serves as a reminder that response categories are not uniform across items. It also suggests the value of contextualizing the meaning of the results to better understand institution-specific student experiences.

Additional Insights

To learn more about the venues where students had meaningful, engaging experiences we asked them whether the activity occurred “inside or outside of class.” For example, for item 6e, “Tried to better understand someone else’s views by imagining how an issue looks from his or her perspective.” As indicated, responses to these items

generally indicated that students appropriately include both in-and out-of-class experiences. However, some differences between students at PWIs versus HBCUs were observed in terms of the venue where the experiences more typically took place. Minority students at PWIs perceived the classroom as a safer environment to engage in these activities, while African American students at HBCUs were more likely to report that these experiences in the company of peers outside of class. Students who attended one highly selective PWI had very sophisticated reflections about these items and described engaging very intensely in such experiences in classes and the peer culture. Interestingly, students' responses to items 6d, 6e and 6f, also demonstrated more maturity and reflexivity than their responses to other questions. For example:

“I think of that in both academic and non academic settings. Academically, in terms of the class, it means looking through materials and doing the reading, and considering the arguments that might be made and then thinking where I stand on that issue. More frequently it has taken place on campus, yes that has prompted a great deal of self-analysis in terms of reaction, so I'd mark 'Very Often' ” Male, White, Senior, PWI.

“Very often. Coming to college really changed my thinking. Because there are some things that I thought were that aren't. I had an idea about something, and then I see things from another person's point of view, and that has shaped or changed what I think...I do this everyday...Usually in class, because I hear someone like a teacher say something new, but I talk about this with friends and family outside of class” Female, African American, Senior, HBCU

“I definitely do this [understand someone else's view] more often because there have been times when I'm in class where I hear something and it helps me to see something from someone else's views. This might start in the classroom, but I talk about it with friends outside, and then I can figure out what this means to me.” Male, African American, First Year, HBCU.

“I would say 'Often.' I have done that through the format of being in class. Because, the way in which [institution] assigns reading and for you to participate in it. It is your own personal relationship with whatever topic is being discussed ... In defending it, you will need to examine this is why I feel this way, yet this might be a flaw, or this might not work. But also just even in discussions with friends and family ... if somebody brings up another point that makes more sense, you will have to say let me think about that a little” Female, African international, Senior, PWI.

Talking about item 9 “About how many hours do you spend in a typical 7-day week doing each of the following?” had salutary effects on some students. Students who reported relatively few hours preparing for class relative to other activities expressed some concern about how they were spending their time and prioritizing their academics. For example,

“Those questions made me think. Made me do a lot of thinking about being here. I’ve had a good experience, but the question really helped me evaluate myself when I had to think about how I spend my time, and what I am getting out of my experience here... Yeah, I need to spend more time with school work.” Male, African American, First-year student, MSI

One positive outcome of the interview process was that it gives students an opportunity to reflect on their academic performance. The questions on the survey prompted students to reflect on the extent to which they were making the most of their education. For example, many students commented that they probably should be dedicating more time to studying, while others talked about making greater use of study groups and the academic support services at their school. We return to this point later in the implications section.

Summary

On balance, the results from cognitive interviews and focus groups indicate that the majority of NSSE items are interpreted as intended and illicit the responses consistent across students from different racial and ethnic backgrounds attending MSIs and PWIs. A few items are problematic across all settings and students, such as understanding the meaning of a learning community and problems parsing between socializing and relaxing. In a few other instances, items are problematic primarily in the context of MSIs and require context-specific interpretations to be sure erroneous conclusions are not made. Certain items are challenging but most students after reflection were able to interpret the item as intended, such as the senior culminating experience item. Except for two items contributing to the enriching educational experiences benchmark (learning community, senior culminating experience) which may potentially be misinterpreted by any student in any institutional context, none of the other items identified as problematic in this analysis contribute to the five NSSE benchmarks of effective educational practice. Thus, the benchmarks can be considered valid, reliable indicators of the quality of the student experience for historically underserved students at MSIs and PWIs.

Implications

The CTD cognitive interviews and focus groups explored the extent to which the survey is valid with minority students and at MSIs. Although these cognitive research interviews are typically used to identify problems with questionnaires, what to do about any issues or problems that are found is another matter. In this section we discuss the implications of what we learned from students for revising the survey, interpreting NSSE results, and conducting research using NSSE data, particularly as it relates to minority students and MSIs.

Implications for NSSE

The data presented reveal valuable insights into minority students’ understanding and interpretations of NSSE survey questions and response sets. Initial findings were

immediately used to inform revisions to the NSSE 2006 instrument and will be incorporated into subsequent revisions to the survey. For example, many students were unfamiliar with the term “culminating experience,” but found that at least one of the examples provided in parenthesis offered some clarity. Students suggested that “senior project” was a term they understood, so this was added to the examples in parenthesis in NSSE 2006. Another example of revisions to the survey based on the cognitive interviews is a change to item 9d, participating in co-curricular experiences, that makes the list of organizations more reflective of student’s experiences at MSIs. Students at HBCUs felt that the use of the word “social” before fraternity or sorority was not inclusive of Black Greek organizations. To make the item more inclusive, we removed “social” from the survey question. These changes clarify survey questions, but more importantly have been improved to be more reflective of minority students.

Future revisions to survey question based on these findings will be considered according to NSSE’s survey redesign schedule. While it is important to ensure that survey items are improved, it is simply not feasible to change items from year to year. At the same time, ensuring item consistency across survey administrations must be balanced against the value of improving survey items. The results of this study suggest several items that might be considered for revision. Two such questions are:

- 1g “Worked with other students on projects during class”: consider removing “on projects” to improve clarity of question;
- 9f “Providing care for dependents living with you (parents, children, spouse, etc.)”: revise item to remove phrase ‘living with you,’ so it represented more students’ experiences.

Given what some students include and exclude when thinking about their responses, NSSE could report those questions where such variation is common. One example is the community service item where some students at MSIs included pre-college and summer experiences when answering.

Findings from this study will be shared with NSSE schools and higher education scholars and administrators during conference sessions. More importantly, we have conducted sessions on “Using Quantitative Methods to Contextualize Your NSSE Results” at Regional NSSE User Workshops, the Association for Institutional Research (AIR) Annual Forum, and the American College Personnel Association (ACPA) annual meeting to instruct interested participants in approaches to using cognitive interviews and focus groups on their own campus to contextualize their NSSE results.

Finally, one of the most important findings from this study is confirmation that NSSE generally performs well for students from different racial and ethnic backgrounds across all eight institutions. With very few exceptions, NSSE items are appropriate, adequately capture the range of students’ experiences, enable students to provide an account of their educational experiences, and ensure that comparisons are based on similar understandings insofar as possible. As a result, we are confident that the survey is

valid and reliable in terms of measuring student engagement at with minority students attending MSIs as well as PWIs.

Implications for Institutions

Data from cognitive interviews and focus groups provide institutions with increased confidence that NSSE measures what it was intended and that students understand survey questions and response options. Beyond this, institutions should contextualize their NSSE results and enrich their ability to interpret NSSE data by conducting cognitive interviews or focus groups with students on their own campus. Institutions are encouraged to convene student focus groups to explore the meaning students make of items of interest to the institution. For example, an institution interested in expanding its service-learning opportunities might convene focus groups to dig deeper into students understanding of all NSSE items related to service. Another approach might be to conduct interview and focus groups around items with lower than expected NSSE scores. For instance, if the institution was surprised by low scores around active learning among first-year students, a focus group could expose more information about the quality of students experience around this topic. We will make an adapted version of our protocols for this study available to institutions interested in conducting interviews and focus groups on their own campus.

One of the salutary outcomes of student participation in the cognitive interviews and focus groups is the opportunity for reflection invited by responding to questions that ask them to think about their behaviors in college. Many students commented that the survey questions prompted them to think about ways they could take greater advantage of opportunities at their institution. Although this finding suggests that students may engage in helpful reflection simply by participating in the survey, institutions might be more intentional about using their data to help inform and shape student behaviors and be more explicit about opportunities and academic services that students might take advantage of to increase their engagement in educationally productive activities.

Implications for Research

The quality and effectiveness of survey items is a crucial component for survey research. Although no questionnaire can be regarded as perfect, the psychometric qualities of the NSSE instrument demonstrate that it is a valid tool for research on student engagement in educational practices associated with high levels of learning and development. With a database of almost 900,000 students at about 1,100 four-year institutions, including more than 100 MSIs, NSSE represents a major source of information about the college experiences of students at PWIs and MSIs. The findings from this qualitative examination strengthens our confidence in the survey as a suitable tool for examining dimensions of quality in undergraduate education at different institutional types and the college experiences of Hispanic/Latino and African American students at PWIs and MSIs.

Finally, although cognitive interviews and focus groups plainly indicate that the NSSE instrument measures what was intended across all institutional contexts, the educational perspectives revealed in these interviews with students suggests that there is more to learn about distinctive features of the undergraduate experience by gender and race-ethnicity and among students in different institutional types. Researchers interested in expanding our understanding about the quality of the undergraduate experience at MSIs can look to NSSE as a valid source of information.

Conclusions and Implications

The findings from the Connecting the Dots Project point to four conclusions.

1. *Student engagement in educationally purposeful activities is positively related to academic outcomes as represented by first-year and senior student grades and to persistence between the first and second year of college.* Consistent with the findings of many other studies over several decades, the positive effects of engagement persist even after controlling for a host of variables that also influence achievement and persistence, such as pre-college achievement, financial aid, family income, enrollment status, living on campus, working off campus, and so forth. Equally important, the effects of engagement are generally in the same positive direction for students from different racial and ethnic backgrounds.
2. *Engagement has a compensatory effect on first-year grades and persistence to the second year of college at the same institution.* That is, although exposure to effective educational practices generally benefits all students, the salutary effects are even greater for lower ability students and students of color compared with White students.
3. *The NSSE instrument works equally well for students of color and White students in different institutional contexts,* such as Predominantly White Institutions (PWIs), Historically Black Colleges and Universities (HBCUs), and Hispanic Serving Institutions (HSIs). The psychometric analyses indicate that the direction and strength of the relationships among variables are very consistent across different groups and different institutional types. The stability analysis indicated that the results are highly stable for PWIs and moderately to highly stable for MSIs. Thus, NSSE can be confidently used across all institutional settings with different types of students.
4. *Nuanced, informed, context-specific judgments are recommended when interpreting the results from a few items for students attending certain MSIs.* This discovery does not undermine the value of the instrument as a lens into the quality of the undergraduate experience inasmuch as none of these items contribute to the five NSSE benchmarks of effective educational practice. In addition, the meaning and use of survey results will understandably differ from one institutional context to another. Nonetheless, campus policy and decision makers should be aware of such potential issues identified through the cognitive interviews and focus groups.

Final Word

Colleges and universities are limited in terms of what they can do to help students overcome years of educational disadvantages. An institution of higher education cannot change the lineage of its students. Campus cultures do not change easily or willingly. Too many long-held beliefs and standard operating practices are tightly woven into an institution's ethos and embedded in the psyche of faculty leaders and senior administrators, some of which may be counterproductive. That said, most institutions

can do far more to influence student engagement by more consistently using what this and other research shows are promising policies and effective educational practices.

While student engagement is not a silver bullet, finding ways to get students to take part in the right kinds of activities helps to level the playing field, especially for those from low-income family backgrounds and others who have been historically underserved, increasing the odds that they will complete their program of study and benefit in the desired ways. The real question is whether we have the *will* to more consistently use what we know works in order to increase the odds that more students complete their program of study and benefit in the desired ways.

Research Notes

¹To protect student confidentiality, social security numbers were not used to link NSSE responses to institutional records. Instead, institutions provided a “population” file to NSSE that listed all first-year and senior students who are eligible to participate in the survey with a proxy student identification number. The crosswalk between this proxy identification number and student social security number is stored at each institution, not with NSSE or CSR. Accordingly, the key to linking student academic records and survey data relied on each institution’s ability to link the NSSE survey ID to the student’s social security number. To assist this process CTD staff provided with each “data grid” a list of survey IDs, the proxy student ID provided by the institution, the year the student took the survey, and the student’s academic class. The primary campus contact was asked to link these IDs to student social security number before passing on the grids to the relevant campus offices.

²Given that missing data for this study is presumed missing systematically instead of randomly, we cannot confirm the representativeness of the final sample of students to the original populations from which they were drawn.

³Within the disaggregated academic record file each case provided the following information:

- Student Identification Number
- Term Code (Fall, Spring, Summer, etc.)
- Year Code
- Course Code (specific to the institution)
- Credit Hours Sought
- Letter Grade

⁴Historically black colleges and universities are schools established before 1964 with the intention of serving the African American community. Hispanic serving institutions are those where Hispanic students make up at least 25 percent of undergraduate enrollment. These institutions make up about 6 percent of colleges and universities in the United States and enroll almost half of Latino college students. Predominantly White Institutions are divided into three for this analysis, those that are focused on undergraduate, masters and doctoral education.

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Appendix A: NSSE Instrument

(see http://nsse.iub.edu/html/survey_instruments_2005.cfm)

Appendix B: Operational Definitions for Study Variables

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 B 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

Appendix B continued

Section II. 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 C: CTD Strand One Participating Institutions

Participating Strand One CTD Institutions

Adams State College
Brigham Young University
California State University-Dominguez Hills
Centre College
Depauw University
Longwood University
Ohio State University-Main Campus
Prairie View A & M University
Seton Hall University
Spelman College
Southern Illinois University-Edwardsville
Susquehanna University
University of Maryland-Eastern Shore
University of Puget Sound
University of Texas at El Paso
University of Wisconsin-La Crosse
Wabash College
Xavier University of Louisiana

Appendix D: NSSE Self-Reported Gains Scales, Reliability Coefficients, and Component Items

NSSE Self-Reported Gains Scales, Reliability Coefficients, and Component Items

Gains in Personal and Social Development

(Cronbach's Alpha FY=.84 ; Senior=.84)

gnethics	Developing a personal code of values and ethics
gndivers	Understanding people of other racial and ethnic backgrounds
gnself	Understanding yourself
gninq	Learning effectively on your own
gnothers	Working effectively with others
gncitizn	Voting in local, state, or national elections

Gains in Practical Competence

(Cronbach's Alpha FY=.78; Senior=.76)

gnwork	Acquiring job or work-related knowledge and skills
gnothers	Working effectively with others
gncmpts	Using computing and information technology
gnquant	Analyzing quantitative problems

Gains in Intellectual Skills

(Cronbach's Alpha FY=.80 ; Senior=.79)

gnwrite	Writing clearly and effectively
gnspeak	Speaking clearly and effectively
ngnenled	Acquiring a broad general education
gnquant	Analyzing quantitative problems

Appendix E: Cognitive Interview Protocol A

Script A for cognitive interviews
Evaluating the 2005 paper NSSE questionnaire

Give the Consent Form to student.

You need:

Tape recorder and tape. Turn on.

Note taker (with script, pad, and pen OR LAPTOP).

NSSE questionnaire in envelope for first look through.

NSSE questionnaire for respondent to use.

Script.

Introduce yourself, and the note taker, mention the recording, etc.

Introduction

First, thank you for taking time to help us develop our survey questionnaire. Just to provide you with a little background, this survey is given to first-year and senior students to better understand their undergraduate experience.

We want to assure you that we have plenty of time. We are looking for honest, thoughtful responses, and comments.

Interviewer: Do you have any questions before we begin?

Occasionally, during the interview, we will ask you to speak aloud about what you are thinking about as you respond to questions. To be sure you understand what I mean, we'd like to demonstrate.

Interviewer: How many soft drinks, if any, did you drink last week?

Respondent: Well ...

Hand the envelope with questionnaire to the respondent.

Institution _____

A. Tape Number _____

B. Gender _____

C. Ethnicity _____

D. Date _____

E. Please open this envelope and briefly look at each page of the questionnaire. Later I am going to ask you about individual questions. But now, I'd like you to describe *your initial impression of the survey* as you removed it from the envelope, and looked at each page.

F. I am going to ask that you to pay special attention to certain questions or elements of the questionnaire. However, we are interested in any comments you have regarding the layout, the instructions for answering questions, the response options, and the overall 'flow' of the questionnaire. Our goal is to provide a survey that is as easy to use as possible, while conveying the meaning of the questions intended by the researchers.

1. We will begin by asking you to complete certain survey items in question #1. Are you ready to begin? Please stop when you complete question #1.
 - a. For item a, what does *asked questions in or contributed to class discussions* mean to you?
 - i. PROBE: For item a, what does your response (read response) mean?
 - b. What does *made a class presentation* mean to you?
 - i. PROBE: For item b, what does your response (read response) mean?
 - e. What does *included diverse perspectives in class discussions or writing assignments* mean to you?
 - i. PROBE: For item e, what does your response (read response) mean?
 - f. What does *come to class without completing readings or assignments* mean to you?
 - g. What does *worked with other students on projects during class* mean to you?
 - i. PROBE: For item g, what does your response (read response) mean?
 - h. What does *worked with classmates outside of class to prepare class assignments* mean to you?
 - i. For item h, what does your response (read response) mean?
 - j. What does *tutored or taught other students* mean to you?
 - k. What does *participated in community-based projects* as part of a course mean to you?

2. Now, let's move on to question #2. After you answer **all** of the items, please stop.
 - b. What does *analyzing* mean to you?
 - i. PROBE: Would you mind providing some concrete examples?
 - c. What does *synthesizing* mean to you?
 - i. PROBE: Would you mind providing some concrete examples?

5. Please complete questions #3 – 5 and then stop. For question #5, please look over the *response categories of 1, “very little” and 7 “very much.”* Now that you completed this question, what did the unmarked categories or numbers mean to you?

6. For question 6, please tell me what you are thinking about as you determine your responses. This is a “Think Aloud” question like the exercise we practiced earlier.
 - a. For item a, *Attend an art exhibit, gallery, play, dance, or other theater performance.* Think aloud.
 - c. For item c, *participated in activities to enhance your spirituality (workshop, meditation, prayer, etc.).* Think aloud.
 - d. For item d, *examined the strengths and weaknesses of your own views on a topic or issue.* Think aloud.
 - i. PROBE: what does your response (read response) mean?
 - e. For item e, *tried to better understand someone else's views by imagining how an issue looks from his or her perspective.* Think aloud.
 - i. PROBE: Was this inside or outside of class?
 - f. For item f, *learned something that changed the way you understand an issue or concept.* Think aloud.
 - i. PROBE: Was this inside or outside of class?

7. Let's proceed to question #7. After you answer all of the questions, please stop.
 - a. How did you determine your response for item a?
 - b. How did you determine your response for item b?
 - c. How did you determine your response for item c?

- d. How did you determine your response for item d?
 - e. In question #7, are there any unfamiliar terms?
8. Complete question #8.
- a. For item a, when you think about *relationships with other students*, which students come to mind?
 - i. For item a, what does your response (read response) mean to you?
How did you come to determine that answer?
 - b. For item b, when you think about *relationships with other faculty*, which faculty come to mind?
 - i. PROBE: Faculty in your major? Outside of your major?
 - ii. For item b, what does your response (read response) mean to you?
How did you come to determine that answer?
 - c. When you think about *relationships with administrative personnel and offices*, which offices come to mind?
 - i. For item c, what does your response (read response) mean to you?
How did you come to determine that answer?
9. For question 9, please tell me what you are thinking about as you determine your responses. This is a “Think Aloud” question.
- a. For item a, what does *preparing for class* mean to you?
 - d. For item d, what does *participating in co-curricular activities* mean to you?
 - i. For item “d,” take a look at the examples provided for co-curricular activities. Does this list reflect your interests?
 - e. For item e, what does *relaxing and socializing* mean to you?
 - i. How much time each day do you spend time *relaxing*?
 - ii. How much time each day do you spend time *socializing*?
 - f. Let’s take a look at question “f.” Does the list of examples reflect your situation?
 - i. PROBE: How hard was it to answer question #9?
11. Answer questions #10 and #11 and then stop.
- a. In question #11, item a, what does *acquiring a broad general education* mean to you?
 - b. For item b, what does *acquiring job or work-related knowledge and skills* mean to you?
 - c. For item c, what does *writing clearly and effectively* mean to you?
 - d. For item d, what does *speaking clearly and effectively* mean to you?
 - e. For item e, what does *thinking critically and analytically* mean to you?
 - g. For item g, what does *using computing and information technology* mean to you?
 - h. For item h, what does *working effectively with others* mean to you?
12. For question 12, please tell me what you are thinking about as you determine your response. This is a “Think Aloud” question.
13. For question 13, please tell me what you are thinking about as you determine your response. This is a “Think Aloud” question.
14. Please answer question #14 and tell us how you determined your answer.

- G.** You may now complete questions 15 through 29 and stop. This concludes the formal process of completing the survey, but we'd like to conclude by asking a few general questions. Please tell me any thoughts about the look of the questionnaire.
- i. PROBE: Why do you feel that way?
- H.** Please tell me any thoughts about the organization of the questionnaire.
- i. PROBE: Why do you feel that way?
- I.** Are there additional questions you believe should be asked?
- J.** Are there questions you believe should be deleted?
- K.** Are there questions you believe should be modified?
- L.** Are there words used in the questions that you think could be changed to make it more understandable to students?
- M.** Do you have any questions for (me/us)?

Appendix F: Cognitive Interview Protocol B

Script B for cognitive interviews Evaluating the 2005 paper NSSE questionnaire

Give the Consent Form to student.

You need:

Tape recorder and tape. Turn on.

Note taker (with script, pad, and pen OR Laptop).

NSSE questionnaire in white envelope for first look through.

NSSE questionnaire for respondent to use.

Script.

Introduce yourself, and the note taker, mention the recording, etc.

Introduction

First, thank you for taking time to help us develop our survey questionnaire. Just to provide you with a little background, this survey is given to first-year and senior students to better understand their undergraduate experience.

We want to assure you that we have plenty of time. We are looking for honest, thoughtful responses, and comments. *Do you have any questions before we begin?*

Occasionally, during the interview, we will ask you to speak aloud about what you are thinking about as you respond to questions. To be sure you understand what I mean, we'd like to demonstrate.

Interviewer: How many soft drinks, if any, did you drink last week?

Respondent: Well ...

Hand the envelope with questionnaire to the respondent.

Institution _____

A. Tape Number _____

B. Gender _____

C. Ethnicity _____

D. Date _____

E. Please open this envelope and briefly look at each page of the questionnaire. Later I am going to ask you about individual questions. But now, I'd like you to describe *your initial impression of the survey* as you removed it from the envelope, and looked at each page.

F. I am going to ask that you to pay special attention to certain questions or elements of the questionnaire. However, we are interested in any comments you have regarding the layout, the instructions for answering questions, the response options, and the overall 'flow' of the questionnaire. Our goal is to provide a survey that is as easy to use as possible, while conveying the meaning of the questions intended by the researchers.

1. We will begin by asking you to complete certain survey items in question #1. Are you ready to begin? Please stop when you complete question #1.
 - d. For item m, what does *used email to communicate with an instructor* mean to you?
 - i. PROBE: For item m, what does your response (read response) mean?
 - e. For item n, what does *discussed grades or assignments with an instructor* mean to you?
 - f. For item o, what does *talked about career plans with a faculty member or advisor* mean to you?
 - g. For item p, what does *discussed ideas from your readings or classes with faculty members outside of class* mean to you?
 - h. What does *received prompt feedback from faculty* mean to you?
 - i. What does *what does worked harder than you thought you could to meet an instructor's standards or expectations* mean to you?
 - j. What does *worked with faculty members on activities other than coursework* mean to you?
 - i. PROBE: For item s, what does your response (read response) mean?
 - k. What does *what does discussed ideas from your readings or classes with others outside of class* mean to you?
 - l. For item u, what does *had serious conversations with students of a different race or ethnicity than your own* mean to you?
 - i. PROBE: What does *serious conversation* mean to you?
 - m. Can you share the meaning of item v; *had a serious conversation with students who are very different from you in terms of their religious beliefs, political opinions, or personal values?*
 - i. PROBE: What does *serious conversation* mean here?

8. Please complete questions #2 – 5 and then stop. For question 6, please tell me what you are thinking about as you determine your responses. This is a “Think Aloud” question like the exercise we practiced earlier.
 - a. For item a, *Attend an art exhibit, gallery, play, dance, or other theater performance*. Think aloud.
 - j. For item c, *participated in activities to enhance your spirituality (workshop, meditation, prayer, etc.)*. Think aloud.
 - k. For item d, *examined the strengths and weaknesses of your own views on a topic or issue*. Think aloud.
 - i. PROBE: what does your response (read response) mean?
 - l. For item e, *tried to better understand someone else's views by imagining how an issue looks from his or her perspective*. Think aloud.
 - i. PROBE: Was this inside or outside of class?
 - m. For item f, *learned something that changed the way you understand an issue or concept*. Think aloud.
 - i. PROBE: Was this inside or outside of class?

9. Let's proceed to question #7. After you answer all of the questions, please stop.
 - e. How did you determine your answer for item e?
 - f. How did you determine your answer for item f?
 - g. How did you determine your answer for item g?
 - h. How did you determine your answer for item h?
 - i. In question #7, are there any unfamiliar term

10. Complete question #8.
- a. For item a, when you think about *relationships with other students*, which students come to mind?
 - ii. For item a, what does your response (read response) mean to you? How did you come to determine that answer?
 - d. For item b, when you think about *relationships with faculty members*, which faculty come to mind?
 - i. PROBE: Faculty in your major? Outside of your major?
 - ii. For item b, what does your response (read response) mean to you? How did you come to determine that answer?
 - e. When you think about *relationships with administrative personnel and offices*, which offices come to mind?
 - i. For item c, what does your response (read response) mean to you? How did you come to determine that answer?
10. After completing #9, please stop. Now we ask that you answer question #10 and “think aloud” as you complete each item.
- c. In question #10, item c, what does *different economic, social, and racial or ethnic backgrounds* mean to you?
 - d. In item d, what does *helping you cope with non-academic responsibilities* mean to you?
 - e. In item e, what does *providing the support you need to thrive socially* mean to you?
 - i. PROBE: What does *thrive socially* mean to you?
 - g. For item g, what does *using computers in academic work* mean?
 - i. PROBE: what *computer resources are available on- or off-campus to complete academic work*?
 - h. Are there other things that your institution emphasizes?
15. Answer question #11 and then stop.
- a. In question #11, item i, what does *voting in local, state, or national elections* mean to you?
 - j. For item j, what does *learning effectively on your own* mean to you?
 - k. For item k, what does *understanding yourself* mean to you?
 - l. For item l, what does *understanding people of other racial and ethnic backgrounds* mean to you?
 - m. For item m, what does *solving complex real-world problems* mean to you?
 - n. For item n, what does *developing a personal code of ethics* mean to you?
 - o. For item o, what does *contributing to the welfare of your community* mean to you?
 - p. For item p, what does *developing a deepened sense of spirituality* mean to you?
16. For question 12, please tell me what you are thinking about as you determine your response. This is a “Think Aloud” question.
17. For question 13, please tell me what you are thinking about as you determine your response. This is a “Think Aloud” question.
18. Please answer question #14 and tell us how you determined your answer.

G. You may now complete questions 15 through 29 and stop. This concludes the formal process of completing the survey, but we'd like to conclude by asking a few general questions. Please tell me any thoughts about the look of the questionnaire.

a. PROBE: Why do you feel that way?

H. Please tell me any thoughts about the organization of the questionnaire.

i. PROBE: Why do you feel that way?

J) Are there additional questions you believe should be asked?

K) Are there questions you believe should be deleted?

L) Are there questions you believe should be modified?

M) Are there words used in the questions that you think could be changed to make it more understandable to students?

N) Do you have any questions for (me/us)?

Appendix G: Focus Group Protocol

Focus Group Script Evaluating the 2005 paper NSSE questionnaire

You need:

Tape recorder and tape. Turn on.

Note taker (with script, pad, and pen OR laptop).

NSSE questionnaire in white envelop for first look through.

Yellow questionnaire for respondent to use.

Script.

Introduce yourself, and the note taker, mention the recording, etc.

Introduction

First, thank you for taking time to help us develop our survey questionnaire. Good Morning/Afternoon/Evening. Thank you for taking time out of your busy schedules to join our discussion. My name is _____, and I represent the CPR. Assisting me is _____, who is also from CPR. Before we get the discussion going, let's introduce ourselves . . . [Name, major]

Just to provide you with a little background, this survey is given to first-year and senior students to better understand their undergraduate experience. Do you remember taking this?

We're here to get your thoughts and interpretations of the College Student Report. Some of you had the opportunity to complete the survey this spring. Now, I would like you to take about 10 minutes to complete the survey – you can stop at question 29. I've asked you to complete the survey now to re-acquaint you with the questions and the item response categories. [Note if anyone recalls completing the survey.]

We want to assure you that we have plenty of time. We are looking for honest, thoughtful responses, and comments.

Interviewer: Do you have any questions before we begin?

Now that you have taken the survey, I'd like your assistance in helping us understand how you interpreted the questions and response categories. The survey has multiple sections focusing on college activities, educational and personal growth, opinions about your school, educational goals and demographic information. What I'd like to do is go through each section and pick a few questions and discuss your interpretation of these items. Then, at the end, if you have a particular item that we didn't discuss, please bring it up. It is important that you understand that there are NO RIGHT ANSWERS. We're trying to learn whether WE are getting things right, not whether you are!

I would like everyone to feel comfortable offering his or her viewpoint. I'd prefer if only one person speaks at a time, since it's difficult when listening to the tape to hear all the comments when two people are talking at the same time.

Questions for Focus Groups

[As a guide to what questions to ask, review items that seem to be problematic or generate different responses from the cognitive interviews.]

1. First, what is your impression of the survey?

2. Let's look at 1h. What does it mean to you to have "worked with classmates outside of class to prepare class assignments"?
 - a) PROBE: Was this required?
3. Let's look at 1q. What does it mean to you to "receive prompt feedback from faculty on your academic performance"?
4. Let's look at 1u. What does it mean to you to have "had serious conversations with students of a different race or ethnicity than your own"?
5. Let's look at 2b. How did you respond to this item? What does your response mean – can you provide an example of coursework that emphasizes analyzing?
6. Let's look at 5. How did you respond to this item? How did you determine your response? What do the unlabeled boxes mean?
7. Let's look at 6d. What does it mean to you to have "Examined the strengths and weaknesses of you own views on a topic or issue"?
8. Let's look at 7. Are there other experiences not on this list that you plan to do before you graduate?
9. Let's look at 8.
10. Let's look at 9. Tell me about completing this item. What do you do that is not represented in the list?
11. Let's look at 10. What does it mean to you to for you institution to emphasize "helping you cope with your non-academic responsibilities (work, family, etc.)"?
12. Let's look at 11. What else should be on this list?
13. Let's look at items 12-14. How did you find these questions?
14. Do you have any comments about questions 15- 29?

General Concluding Questions

1. Are there any questions that you found difficult to answer?
2. Did you find any response sets hard to use or confusing?
3. Was there anything that you expected us to ask you about that's not on the survey?
4. What should we add? Or change on the survey?
5. Is there anything that we failed to ask you about on this survey – anything that you see as very important to your learning and your ability to stay in school?

Thank you for participating in this discussion. Your responses are very helpful to us. Give students gift cards. Sign acknowledgement forms

General Comments for Conducting Meeting:

Remind students of the value of differing points of views;

Does anyone see it differently?

Are there any other points of view?

Probes:

Would you explain further? Can you give me an example of what you mean?

Would you say more? Is there anything else? Please describe what you mean

Tell me more about that. Does anyone have a different response?