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First-Generation College Students

Additional Evidence on College Experiences and Outcomes

The growing demographic diversity of the undergraduate student body in American postsecondary education has been well documented over an extended period of time (see, for example, Choy, 2001; Hodgkinson, 1985; Levine & Associates, 1989; *Chronicle of Higher Education: Almanac Issue,* 1996; Pascarella & Terenzini, 1998; Rendon, Hope, & Associates, 1996). One result of this increased diversity is the substantial number of "first-generation" college students from families where neither parent had more than a high-school education. For example, using results from the National Center for Education Statistics Beginning Postsecondary Students Longitudinal Study, Choy (2001) points out that in 1995–96, 34% of students entering the nation's four-year institutions and 53% of students starting at two-year colleges were first-generation students.

First-generation college students have been the focus of a growing body of research. Generally this research falls into three general categories (Terenzini, Springer, Yaeger, Pascarella, & Nora, 1996). The first category consists of studies that typically compare first-generation and other college students in terms of demographic characteristics, secondary school preparation, the college choice process, and college

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expectations (e.g., Berkner & Chavez, 1997; Horn & Nunez, 2000; Hossler, Schmit, & Vesper, 1999; Kojaku & Nunez, 1998; Pratt & Skaggs, 1989; Stage & Hossler, 1989; Warburton, Bugarin, & Nunez, 2001; York-Anderson & Bowman, 1991). The weight of evidence from this research indicates that, compared to their peers, first-generation college students tend to be at a distinct disadvantage with respect to basic knowledge about postsecondary education (e.g., costs and application process), level of family income and support, educational degree expectations and plans, and academic preparation in high school.

A second general category of research on first-generation college students attempts to describe and understand the transition from high school to postsecondary education (e.g., Lara, 1992; Rendon, 1992; Rendon, Hope, & Associates, 1996; Terenzini et al., 1994; Weis, 1992). As summarized by Terenzini et al. (1996), the evidence is reasonably clear that first-generation students as a group have a more difficult transition from secondary school to college than their peers. Not only do first-generation students confront all the anxieties, dislocations, and difficulties of any college student, their experiences often involve substantial cultural as well as social and academic transitions.

The third general category of research on first-generation college students examines their persistence in college, degree attainment, and early career labor market outcomes (e.g., Attinasi, 1989; Berkner, Horn, & Clune, 2000; Billson & Terry, 1982; Choy, 2000; Horn, 1998; Nunez & Cuccaro-Alamin, 1998; Richardson & Skinner, 1992; Warburton, Bugarin, & Nunez, 2001). These investigations consistently indicate that, compared to students whose parents are college graduates, first-generation students are more likely to leave a four-year institution at the end of the first year, less likely to remain enrolled in a four-year institution or be on a persistence track to a bachelor's degree after three years, and are less likely to stay enrolled or attain a bachelor's degree after five years. When degree attainment is taken into account, there appears to be little difference in the early career earnings of first-generation graduates and their peers. However, four to five years after graduation, first-generation college students appear less likely than students whose parents have college degrees to be enrolled in a graduate or first professional program.

Although we appear to know much about first-generation college students with respect to their academic preparation, transition to postsecondary education, and progress toward degree attainment, surprisingly little is known about their college experiences or their cognitive and psychosocial development during college. The only study we uncovered that addresses these issues directly is Terenzini et al. (1996). Analyzing

first-year data from 23 two-and four-year institutions participating in the National Study of Student Learning (NSSL), Terenzini and his colleagues found that, compared to their peers, first-generation students completed fewer first-year credit hours, took fewer humanities and fine arts courses, studied fewer hours and worked more hours per week, were less likely to participate in an honors program, were less likely to perceive that faculty were concerned about students and teaching, and made smaller first-year gains on a standardized measure of reading comprehension. These significant differences persisted even in the presence of statistical controls for a battery of background or precollege characteristics such as tested ability, family economic status, degree aspirations, high-school social involvement, and the like.

While the Terenzini et al. (1996) investigation provides a substantial initial step in understanding the college experiences and relative cognitive growth of first-generation students, it is clearly limited by the fact that it followed students only during the first year of college. The present study sought to expand our understanding of how first-generation students experience college and benefit from it in a more comprehensive analysis of the National Study of Student Learning data that followed individuals through the second and third years of college. Specifically, the study had three purposes. First, it sought to estimate net differences between first-generation and other college students along various dimensions of their academic and nonacademic experience of college. Second, it estimated the net difference between first-generation college students and their peers in select cognitive, psychosocial, and status attainment outcomes. These included standardized measures of science reasoning and writing skills at the end of the second year, standardized measures of reading comprehension and critical thinking at the end of the third year, as well as measures of openness to diversity and challenge, learning for self-understanding, internal locus of control, preference for higher-order cognitive activities, and educational degree plans at the end of the second and third years of college. Third, the study sought to determine if the specific academic and nonacademic experiences influencing cognitive and psychosocial outcomes differed in magnitude for first-generation versus other college students.

Theory-Based Expectations

One useful theoretical perspective for understanding the potential effects of first-generation student status on the experience and outcomes of college is through the related lenses of cultural and social capital (Bills, 2000; Bourdieu, 1986; Coleman, 1988). Although it is frequently

difficult to arrive at a concise definition of these concepts, cultural capital would appear to represent the "degree of ease and familiarity that one has with the 'dominant' culture of a society" (Bills, 2000, p. 90). Social capital is a form of capital that resides in relationships among individuals that facilitate transaction and the transmission of different resources. Such perspectives suggest that individuals with highly educated parents may have a distinct advantage over first-generation students in understanding the culture of higher education and its role in personal development and socioeconomic attainment. Those with college-educated parents have better access to human and cultural capital through family relationships. Consequently, compared to their peers with highly educated parents, first-generation students are more likely to be handicapped in accessing and understanding information and attitudes relevant to making beneficial decisions about such things as the importance of completing a college degree, which college to attend, and what kinds of academic and social choices to make while in attendance. In turn, this may translate into a comparatively less influential collegiate experience for first-generation students, and perhaps even lower levels of growth in the cognitive, psychosocial, and status attainment-oriented outcomes of college.

As explicated by Bourdieu (1986) and Coleman (1988), students not only bring certain levels of cultural and social capital to college, the college experience itself provides a vehicle for acquiring additional cultural/social capital. Since first-generation students are likely to enter college with a lower stock of cultural/social capital than their peers, one might anticipate that their levels of academic, and perhaps even social, engagement during college will function in ways that may help them make up for this deficit. That is, levels of academic and social engagement will act in a compensatory manner, with stronger incremental impacts on cognitive and non-cognitive outcomes for first-generation students than for their classmates whose parents have more experience with postsecondary education.

Method

The study sample comprised students who participated in the National Study of Student Learning (NSSL), a federally funded, longitudinal study of college student experiences and outcomes. The NSSL followed samples of students from 18 four-year colleges for a period of three years. Its major purpose was to assess the factors influencing students' learning and cognitive development during college. The study was initiated in the Fall of 1992 and continued through the spring of 1995.

Institutional Sample

The institutional sample consisted of 18 four-year colleges and universities located in 15 states throughout the country. Institutions were chosen from the National Center on Education Statistics Integrated Postsecondary Education Data System (IPEDS) data to represent differences in colleges and universities nationwide on a variety of characteristics including institutional type and control (e.g., private and public research universities, private liberal arts colleges, public and private comprehensive universities, historically Black colleges), size location, commuter versus residential character, and ethnic distribution of the undergraduate student body. Our sampling technique produced a sample of institutions with a wide range of selectivity. For example, we included some of the most selective institutions in the country as well as some that were essentially open-admission. The result of our sampling technique was a student population from 18 schools that approximated the national population of undergraduates in four-year institutions by ethnicity and gender.

Student Sample

The individuals in the sample were students participating in the second and third follow-ups of the NSSL. The initial sample was selected randomly from the incoming first-year class at each participating institution. The students in the sample were informed that they would be participating in a national longitudinal study of student learning and that they would receive a cash stipend for their participation in each data collection. They were also informed that any information they provided would be kept confidential and never become part of their institutional records.

Initial Data Collection

The initial NSSL data collection was conducted in the Fall of 1992 with 3,331 students from the 18 institutions participating. The data collection included an NSSL precollege survey that sought information on student background (e.g., sex, ethnicity, age, family socioeconomic status, secondary school achievement), as well as aspirations, expectations of college, and orientations toward learning (e.g., educational degree plans, intended major, measures of academic motivation, openness to diversity, learning for self-understanding, etc.). Participants also completed Form 88A of the Collegiate Assessment of Academic Proficiency (CAAP), developed by the American College Testing Program (ACT) to assess selected general skills typically acquired by students during the first two years of college (American College Testing Program, 1989).

The total CAAP consists of five 40-minute, multiple choice test modules: reading comprehension, mathematics, critical thinking, writing skills, and science reasoning. The reading comprehension, mathematics, and critical thinking modules of the CAAP were administered during the Fall 1992 data collection.

First Follow-Up Data Collection

The first NSSL follow-up data collection was conducted in the spring of 1993. Of the original sample of 3,331 students who participated in the Fall 1992 testing, 2,416 participated in the spring 1993 data collection, for a first-year follow-up response rate of 72.5%. This data collection included Form 88B of the CAAP reading comprehension, mathematics, and critical thinking modules; the College Student Experiences Questionnaire (CSEQ) (Pace, 1990); and a questionnaire developed for the NSSL. The CSEQ and the NSSL follow-up instruments were used to measure a wide range of students' curricular and out-of-class experiences in the first year of college. The NSSL follow-up instrument also reassessed the students' aspirations and learning orientations.

Information from the initial data collection and the first follow-up constituted the data analyzed in the Terenzini et al. (1996) study of differences among first-generation and other college students in experiences and cognitive outcomes in the first year of college. Information from the initial data collection and the second and third follow-ups form the database for the current study.

Second Follow-Up Data Collection

The second follow-up of the NSSL sample was conducted in the spring of 1994. Similar to the first follow-up, extensive measures of students' second-year experiences, educational aspirations, and learning orientations were taken from their responses on the CSEQ and the NSSL follow-up survey. Students also completed Form 88A of the CAAP writing skills and science reasoning modules.

Of the 2,416 students who participated in the first follow-up (spring 1993), 1,613 participated in the second follow-up (spring 1994), for a response rate of 66.8%. To adjust for potential sample bias by sex, race/ethnicity, and institution, a sample weighting algorithm was developed. Within each of the institutions, participants in the second follow-up data collection were weighted up to that institution's end-of-second-year population by sex (male or female) and race/ethnicity (White, Black, Hispanic, Other). For example, if an institution had 100 African American men in its second-year class and 25 African American men in the sample, each African American man in the sample was given a

weight of 4.00. Applying sample weights in this manner cannot correct for response bias, but it does provide a correction for bias in the samples we analyzed by sex, ethnicity, and institution.

Third Follow-Up Data Collection

The third follow-up of the NSSL sample took place in the spring of 1995. Measures of students' third year experiences, educational aspirations, and learning orientations were taken from their responses on the CSEQ and the NSSL Follow-up Survey. Participants also completed Form 88B of the CAAP reading comprehension and critical thinking modules. Of the 1,613 students who participated in the spring 1994 data collection, 1,054 participated in the spring of 1995, for a third-year response rate of 65.3%. A third weighting algorithm, analogous to the one employed in the second follow-up, was developed to correct for bias by sex, race/ethnicity, and institution in the third-year sample.

Variables

In selecting dependent variables, we cast as wide a net as possible within the limitations of the NSSL data. We attempted to assess the net effects of being a first-generation student, not only on status attainment-oriented outcomes (which have dominated the college outcomes research in this area), but also on learning, cognitive development, and psychosocial dimensions, where little is known about the relative progress of first-generation students. Overall, the study had nine dependent variables. Four of the dependent variables were standardized measures of students' learning or cognitive development, four were of a more psychosocial nature and assessed students' orientations to learning and diversity, and one assessed students' educational degree plans or aspirations. The measures of learning or cognitive development were: end-of-second-year scores on the CAAP writing skills and science reasoning modules and end-of-third-year scores on the CAAP reading comprehension and critical thinking modules. Students' end-of-second-year and end-of-third-year orientations to learning and diversity were measured by four factorially derived scales entitled: openness to diversity and challenge, learning for self-understanding, internal locus of attribution for academic success, and preference for higher-order cognitive activities. End-of-second-year and end-of-third-year educational plans or aspirations were assessed with a single item that asked students to indicate the highest academic degree they intended to obtain in their lifetime.

The body of existing research has tended to compare first-generation with all other college students. We were concerned, however, that this might be too global a grouping of "other college students" to detect

many of the general or conditional impacts of different levels of parental postsecondary education. For example, a student whose mother had completed a year of college and whose father had a high-school diploma would be grouped in the "other college student" category with a student whose parents both had graduate degrees. Consequently, in an attempt to obtain a somewhat more fine-grained analysis, we used the criterion of both parents obtaining a college degree to divide the "other college student" category into two groups: "high" and "moderate" levels of postsecondary education. Accordingly, the major independent variable in the study, first-generation versus other college students (as indicated by level of parental education), was defined by two dummy variables representing three comparison groups. The first dummy variable represented NSSL students whose parents had both completed a bachelor's degree or above. This group was termed "high parental postsecondary education." The second dummy variable represented students having one or more parents who had completed at least some college, but no more than one parent who had obtained a bachelor's degree or above. This group was termed "moderate parental postsecondary education." The comparison (or third) group was, therefore, students having both parents with no more than a high-school education, or first-generation college students.

The conceptual work of Astin (1993), Chickering (1969), Pascarella (1985), and Pascarella and Terenzini (1991) has suggested that four types of influences need to be taken into account to accurately estimate and understand the impact of college on students: (1) student demographic or precollege characteristics; (2) organizational or structural characteristics of the institution attended; (3) students' academic experiences; and (4) students' nonacademic experiences. Consistent with this framework, the other independent variables employed in the study were composed of the following categories:

1. Demographic and precollege characteristics (i.e., sex, ethnicity, age, family income level, secondary school grades, volunteer work in high school, a measure of Fall 1992 academic motivation, appropriate Fall 1992 CAAP module score, appropriate Fall 1992 orientation to learning score, and Fall 1992 educational degree plans).
2. Institutional characteristics (i.e., average precollege, Fall 1992, composite cognitive development of incoming students at the institution attended).
3. College academic experiences (i.e., cumulative credit hours completed, time spent studying, patterns of coursework taken in five different areas, college grades, scales measuring course-related in-

teractions with peers, academic effort/involvement, use of computers, and reading and writing involvement).
4. College nonacademic experiences (i.e., work responsibilities, on- or off-campus residence, participation in intercollegiate athletics, Greek affiliation, scales measuring non-course-related interactions with peers, extracurricular involvement, and participation in volunteer work).

Table 1 provides detailed operational definitions and, where appropriate, reliabilities for all NSSL variables used in our analyses. It also provides information as to which independent variables were used in specific analyses (e.g., as an appropriate pretest for a particular dependent variable). Unless otherwise indicated in Table 1, an independent variable was employed in the prediction of all dependent variables.

Analyses

Reflecting the three major purposes of the study, the analyses were conducted in three stages. The first stage of the analyses sought to determine the net differences between first-generation and other college students in their academic and nonacademic experience of college. Accordingly, each individual end-of-second-year and end-of-third-year academic and nonacademic experience of college was regressed on the dummy variables representing first-generation versus other college students plus all demographic and precollege characteristics, as well as the average cognitive development of incoming students at the institution attended. Since a student's academic and nonacademic experience of college is likely to be influenced by the characteristics of the institution attended, we also sought to estimate differences among first-generation and other students in the academic selectivity of the institution attended. In this analysis, we used the average entering student cognitive development at the institution attended as the dependent variable. This dependent variable was estimated with the average composite of the Fall 1992 CAAP reading comprehension, mathematics, and critical thinking score of the NSSL sample at each institution. Each student was assigned the score at his or her NSSL institution. The average student cognitive development measure correlated 0.95 with the average ACT/SAT score at the NSSL institution. Thus, it appeared to be a more than adequate proxy for the most typically employed indicator of the academic selectivity of an institution (Pascarella & Terenzini, 1991). Using the precollege sample of 3,331 four-year students, an ordinary least-squares regression was conducted which regressed the average entering student cognitive development estimate at each NSSL institution on the dummy variables

TABLE 1

Operational Definitions of All Variables

Category/Variable

Dependent Variables

End-of-second-year (Spring 1994) science reasoning: An individual's end-of-second-year-score on the Collegiate Assessment of Academic Proficiency (CAAP) science reasoning module. The CAAP science reasoning module is a 40-minute, multiple-choice test composed of 45 items. The contents of the test are drawn from biology, chemistry, physics, and the physical sciences (e.g., geology, astronomy, and meteorology). The test emphasizes scientific reasoning skills rather than recall of scientific content or a high level of skill in mathematics or reading. It consists of eight passages, each of which contains scientific information and a set of multiple-choice test questions. Response stimuli for the passages included data representation (graphic and tabular material similar to those found in science journals and texts), research summaries (descriptions of one or several experiments), and conflicting viewpoints (students are presented with several hypotheses or views that are mutually inconsistent because of different premises, incomplete or disputed data, or different interpretations of data). Alpha (internal consistency) reliabilities range from 0.76 to 0.87.

End-of-second-year writing skills: An individual's end-of-second-year score on the CAAP writing skills module. The CAAP writing skills module is a 40-minute, multiple-choice test composed of 72 items. The test measures a student's understanding of the conventions of standard written English in usage and mechanics (punctuation, grammar, and sentence structure) and rhetorical skills (strategy, organization, and style). Spelling, vocabulary, and rote recall of grammatical rules are not tested. The test consists of six prose passages, each of which is accompanied by a set of 12 multiple-choice test items. A range of passage types is used to provide a variety of rhetorical situations. Items that measure usage and mechanics offer alternative responses, including *no change*, to underlined portions of the test. The student must decide which alternative employs the conventional practice in usage and mechanics that best fits the context. Items that measure rhetorical skills may refer to an underlined portion of the test or may ask a question about a section of the passage or about the passage as a whole. The student must decide which alternative response is most appropriate in a given rhetorical situation. Alpha reliabilities range from 0.93 to 0.95.

End-of-third-year (Spring 1995) reading comprehension: An individual's end-of-third-year score on the CAAP reading comprehension module. The CAAP reading comprehension module is a 40-minute multiple-choice test composed of 36 items that assesses reading comprehension as a product of skill in inferring, reasoning, and generalizing. The test consists of four 900-word prose passages designed to represent the level and kinds of reading students commonly encounter in college curricula, including topics in fiction, humanities, social sciences, and natural sciences. Alpha reliabilities range from 0.76 to 0.87.

End-of-third-year critical thinking: An individual's end-of-third-year score on the CAAP critical thinking module. The CAAP critical thinking module is a 40-minute, multiple-choice test composed of 32 items. It is designed to measure a student's ability to clarify, analyze, evaluate, and extend arguments. The test consists of four passages in a variety of formats (e.g., case studies, debates, dialogues, experimental results, statistical arguments, editorials). Each passage contains a series of arguments that support a general conclusion. Alpha reliabilities range from 0.81 to 0.82. In a pilot testing of various instruments for use in the NSSL on a sample of 30 college students, the critical thinking module of CAAP correlated 0.75 with the total score on the Watson-Glaser Critical Thinking Appraisal (Pascarella, Bohr, Nora, & Terenzini, 1995).

End-of-second- or third-year openness to diversity and challenge: An individual's score on an 8-item, Likert-type scale (5 = strongly agree, to 1 = strongly disagree) that assessed openness to cultural, racial, and value diversity, as well the extent to which one enjoys being challenged by different perspectives, values, and ideas. Constituent items were: "I enjoy having discussions with people whose ideas and values are different from my own"; "The real value of a college education lies in being introduced to different values"; "I enjoy talking with people who have values different from mine because it helps me understand myself and my values better"; "Learning about people from different cultures is a very important part of my college education"; "I enjoy taking courses that challenge my beliefs and values"; "The courses I enjoy the most are those that make me think about things from a different perspective"; "Contact with individuals whose background (e.g., race, national origin, sexual orientation) is different from my own is an essential part of my college education"; and "I enjoy courses that are intellectually challenging." Alpha reliabilities ranged from 0.83 to 0.84. (Scored separately for second or third years.)

End-of-second- or third-year learning for self-understanding: An individual's score on a 3-item, Likert-type scale (5 = strongly agree, to 1 = strongly disagree) that assessed the importance of learning about oneself during college. Constituent items were: "One of the most important benefits of a college education is a better understanding of myself and my values"; "Developing a clear

TABLE 1 (*Continued*)

Category/Variable

sense of who I am is very important to me"; and "I prefer courses in which the material helps me understand something about myself." Alpha reliabilities ranged from 0.73 to 0.76. (Scored separately for second or third years.)

End-of-second- or third-year internal locus of attribution for academic success: An individual's score on a 4-item, Likert-type scale (5 = strongly agree, to 1 = strongly disagree) that assessed the extent to which one felt that academic success in college was based on individual hard work or effort rather than on luck or external circumstances. Constituent items were: "The grade I get in a course depends on how hard the instructor grades, not on how carefully I study"; "Good luck is more important for college academic success than hard work"; "Getting a good grade in a college course depends more on being 'naturally smart' than on how hard I work"; and "When I have trouble learning the material in a course it is because the professor isn't doing a very good job." (All items coded in reverse.) Alpha reliabilities ranged from 0.62 to 0.69. (Scored separately for second or third years.)

End-of-second- or third-year preference for higher-order cognitive tasks: An individual's score on a 2-item, Likert-type scale (5 = strongly agree, to 1 = strongly disagree) that assessed one's enjoyment of higher-order cognitive tasks. Constituent items were: "I prefer exams requiring me to organize and interpret information or ideas over exams that ask me only to remember facts or information"; and "I prefer to do assignments in which I have to analyze and interpret what I've just read rather than just summarize and report." Alpha reliabilities ranged from 0.65 to 0.68. (Scored separately for second or third years.)

End-of-second- or third-year educational plans: An individual's response to the question: "What is the highest academic degree that you intend to obtain in your lifetime?" Possible responses were: 1 = none, 2 = vocational certificate, 3 = associate degree, 4 = bachelor's degree, 5 = master's degree, 6 = doctoral degree or professional equivalent (e.g., MD, LLB/JD, DDS).

Primary Independent Variable

First-generation versus other college students: Defined by two dummy variables (1 or 0) for: (1) having both parents holding a bachelor's degree or above (High Parental Postsecondary Education) or (2) having at least one parent with some higher education, but no more than one parent holding a bachelor's degree or higher (Moderate Parental Postsecondary Education). The comparison group was always first-generation college students (i.e., both parents had no more than a high-school education).

Student Demographic/Precollege Characteristics

Female: 1 = female, 0 = male.

White: 1 = white, 0 = person of color.

Age: A continuous variable calculated by subtracting year of birth from 1992.

Parental income: Total family income, coded: 1 = less than $6,000/year, to 14 = $150,000/year or more.

Self-reported secondary school grades: An individual's responses to the question: "What is your best estimate of your grade point average in high school?" (Coded: 1 = D+ or lower; 2 = C, C-; 3 = B-, C+; 4 = B; 5 = A-, B+; 6 = A).

Volunteer work in secondary school: An individual's response to the question: "During your last year in high school, how often did you engage in volunteer work?" (Coded: 1 = never, 2 = occasionally, 3 = often, 4 = very often).

Precollege (Fall 1992) academic motivation: An individual's Fall 1992 score on an 8-item, Likert-type scale (5 = strongly agree, to 1 = strongly disagree) assessing motivation for academic work and learning. The scale items were based on existing research on academic motivation (e.g., Ball, 1977). Examples of constituent items are: "I am willing to work hard in a course to learn the material even if it won't lead to a higher grade"; "When I do well on a test, it is usually because I was well prepared not because the test was easy"; "In high school I frequently did more reading in a class than was required simply because it interested me"; and "In high school I frequently talked to my teachers outside of class about ideas presented during class." Alpha reliability = 0.65.

Precollege composite cognitive development: An individual's score on a composite of the Fall 1992 administration of the CAAP reading comprehension, mathematics, and critical thinking modules. The composite was formed by standardizing each module and then summing across standardized scores. The alpha reliability for the composite measure was 0.83. It was employed as an individual-level measure of precollege cognitive development in the prediction of end-of-second-year science reasoning and writing skills. It had a strong correlation with both end-of-second-year cognitive outcomes (0.72 with science reasoning and 0.77 with writing skills).

TABLE 1 (*Continued*)

Category/Variable
Precollege reading comprehension: An individual's score on the Fall 1992 administration of the CAAP reading comprehension module (employed in the prediction of end-of-third-year reading comprehension).
Precollege critical thinking: An individual's score on the Fall 1992 administration of the CAAP critical thinking module (employed in the prediction of end-of-third-year critical thinking).
Precollege openness to diversity and challenge: An individual's score on the Fall 1992 administration of the openness to diversity and challenge scale (employed in the prediction of end-of-second- and third-year openness to diversity and challenge).
Precollege internal locus of attribution for academic success: An individual's score on the Fall 1992 administration of the internal locus of attribution for academic success scale (employed in the prediction of end-of-second- and third-year internal locus of attribution for academic success).
Precollege learning for self-understanding: An individual's score on the Fall 1992 administration of the learning for self-understanding scale (employed in the prediction of end-of-second- and third-year learning for self-understanding).
Precollege preference for higher-order cognitive tasks: An individual's score on the Fall 1992 administration of the preference for higher-order cognitive tasks scale (employed in the prediction of end-of-second- and third-year preference for higher order cognitive tasks).
Precollege educational plans: An individual's Fall 1992 response to the question, "What is the highest academic degree that you intend to obtain in your lifetime?" (Coded: 1 = none, to 6 = doctoral degree or professional equivalent, e.g., MD, LLB/JD, DDS).
Institutional Characteristics
Average precollege (Fall 1992) composite cognitive development at the institution attended: Estimated by the average level of precollege composite cognitive development (i.e., Fall 1992 reading comprehension, mathematics, and critical thinking) in the sample at each of the 18 institutions in the study. Each student was then assigned the mean score of the sample at his or her institution.
College Academic Experiences
Cumulative credit hours completed: Number of credit hours completed through the second or third year.
Hours per week spent studying: Single-item, 6-point self-report of average hours spent studying per week, where 1 = none and 6 = more than 20 hours (averaged cumulatively through the second or third year).
Social sciences courses taken: Cumulative number of college courses taken through the second or third years in anthropology, audiology/speech pathology, child and family services, communications, economics, geography, history, political science, psychology, sociology, or social work.
Mathematics courses taken: Cumulative number of college courses taken through the second or third years in pre-algebra, algebra, calculus, statistics, computer science, geometry, matrix algebra, accounting, or business math.
Technical/pre-professional courses taken: Cumulative number of college courses taken through the second or third years in drawing, drafting, architectural design, criminology, education, agriculture, business, physical therapy, pharmacy, physical education, nursing, or computer programming.
Arts and humanities courses taken: Cumulative number of college courses taken through the second or third years in art history, art appreciation, studio art, dance, theater, music appreciation, music performance, composition of writing, English literature, foreign language, humanities, philosophy, linguistics, classics, or religious studies.
Natural sciences and engineering courses taken: Cumulative number of college courses taken through the second or third years in astronomy, botany, biology, chemistry, physics, geology, zoology, microbiology, or engineering.
College grades: Self-reported grades through the second or third years, where 5 = A; 4 = A-, B+; 3 = B; 2 = B-, C+, and 1 = C, C-, or lower.
Course-related interaction with peers: An individual's responses on a 10-item scale that assessed the nature of one's interactions with peers focusing on academic coursework. Examples of constituent items were: "Studying with students from my classes"; "Tried to explain the material to another student or friend"; "In classes students teach other in groups instead of having only instructors teach"; and "Attempted to explain an experimental procedure to a classmate." Response options were: 4 = very often; 3 = often, 2 = occasionally, and 1 = never. Alpha reliability = .79. The scale was averaged across the second or third years depending on the outcome predicted.

TABLE 1 (*Continued*)

Category/Variable
Academic effort/involvement: An individual's response on a 37-item, factorially derived, but modified scale that assessed one's academic effort or involvement in library experiences, experiences with faculty, course learning, and experiences in writing. The scale combined four, 10-item involvement dimensions from the CSEQ, minus 3 items that were incorporated into the Course-Related Interactions with Peers Scale described above. Examples of constituent items were: "Ran down leads, looked for further references that were cited in things you read"; "Discussed ideas for a term paper or other class project with a faculty member"; "Did additional readings on topics that were discussed in class"; and "Revised a paper or composition two or more times before you were satisfied with it." Response options were: 4 = very often, 3 = often, 2 = occasionally, and 1 = never. Alpha reliability = 0.92. The scale was averaged across the second or third years depending on the outcome predicted.
Computer use: An individual's response on a 3-item scale indicating extent of computer use: "Using computers for class assignments"; "Using computers for library searches"; and "Using computers for word processing." Response options were: 4 = very often, 3 = often, 2 = occasionally, and 1 = never. Alpha reliability = 0.65. The scale was averaged across the second or third years depending on the outcome predicted.
Reading and writing involvement: An individual's response to 4 single items taken from the CSEQ: 1. Number of textbooks or assigned books read during the school year. 2. Number of non-assigned books read during the school year. 3. Number of essay exams in your courses during the school year. 4. Number of term papers or other written reports during the school year. Response items were 1 = none, to 5 = more than 20. These items were averaged across the second or third years depending on the outcome predicted.
College Non-Academic Experiences
Hours worked per week: Combination of average number of hours of on- and off-campus work per week during the school year, Coded 1 = none, to 9 = more than 35. The item was averaged across the second or third years depending on the outcome predicted.
On-campus residence: A dummy variable coded: 1 = live on-campus, 0 = lived off-campus and commuted. The item was averaged across the second or third years depending on the outcome predicted.
Intercollegiate athletic participation: A dummy variable coded: 1 = participated in an intercollegiate sport, 0 = did not participate in an intercollegiate sport. The item was averaged across the second or third years depending on the outcome predicted.
Greek affiliation: A dummy variable coded: 1 = joined a fraternity or sorority, 0 = remained independent. The item was averaged across the second or third years depending on the outcome predicted.
Non-course-related interactions with peers: An individual's response on a 10-item scale that assessed the nature of one's interactions with peers focusing on non-class, or nonacademic issues. Examples of constituent items were: "Talked about art (painting, sculpture, architecture, artists, etc.) with other students at the college"; "Had serious discussions with students whose philosophy of life or personal values were very different from your own"; "Had serious discussions with students whose political opinions were very different from your own"; and "Discussed with other students why some groups get along smoothly and other groups don't." Response items were: 4 = very often, 3 = often, 2 = occasionally, and 1 = never. Alpha reliability = 0.84. The scale was averaged across the second or third years depending on the outcome predicted.
Extracurricular involvement: An individual's response on a 30-item, factorially-derived scale that assessed one's effort or involvement in campus union activities, campus clubs, and campus athletic and recreational facilities. The scale combined three 10-item involvement dimensions from the CSEQ. Examples of constituent items were: "Heard a speaker at the student union or center"; "Worked in some student organization or special project (publications, student government, social event, etc.)"; and "Played on an intramural team." Response options were: 4 = very often, 3 = often, 2 = occasionally, and 1 = never. Alpha reliability = 0.92. The scale was averaged across the second or third years depending on the outcome predicted.
Engaged in volunteer work: A single item that asked the students how often during the school year they had engaged in volunteer work. Response options were: 4 = very often, 3 = often, 2 = occasionally, and 1 = never. The item was averaged across the second or third years depending on the outcome predicted.

representing level of parental postsecondary education plus individual-level precollege composite cognitive development (i.e., a combination of the Fall 1992 CAAP reading comprehension, mathematics, and critical thinking scores), precollege degree plans, precollege academic motivation, sex, ethnicity, age, parental income, secondary school grades, and volunteer work in secondary school.

The second stage of the analyses estimated the net differences between first-generation and other college students on the nine dependent variables. In this part of the analyses, we estimated both the total and the direct effects of level of parental education. Total effects were estimated using reduced-form equations (Alwin & Hauser, 1975). Each end-of-second-year or end-of-third-year dependent variable was regressed on the dummy variables representing the parental education of each student plus all variables considered causally antecedent or concurrent (i.e., the appropriate Fall 1992 precollege measure and all other demographic and precollege characteristics). Direct causal effects of being a first-generation (versus other) student on each end-of-second- or third-year outcome were estimated by adding the average student-body cognitive development score and the college academic and nonacademic experience variables to the total effects equations.

The third stage of the analyses sought to determine the presence of conditional (or interaction) effects, or the extent to which the academic and nonacademic experiences of college influencing cognitive and psychosocial outcomes differed in importance for first-generation versus other college students. A set of cross-product terms was computed between the dummy variables representing first-generation versus other college students and each of the academic and nonacademic experiences of college. This set of cross-product terms was then added to the previously described direct effects equations in the prediction of each end-of-second- or third-year outcome. A significant increase in R^2 associated with the set of cross-product terms indicates the presence of significant conditional effects (Pedhazur, 1982). This condition being met, the nature of individually significant conditional effects can then be examined. An individually significant conditional effect (cross-product) indicates that the regression coefficient for a particular variable is significantly different in magnitude for first-generation students and either their moderate or high parental postsecondary education counterparts.

Final Samples

Of the 1,613 students participating in the second (spring 1994) NSSL follow-up, useable data were available for 1,518 to 1,524 at the 18 four-year institutions. The breakdown of students by our three categories of

parental education was: high parental postsecondary education = 428; moderate parental postsecondary education = 746; and first-generation = 344. Of the 1,054 four-year college students participating in the third (spring 1995) NSSL follow-up data collection, useable data were available for 1,046 to 1,052 students. The breakdown by level of parental education was: high parental postsecondary education = 361; moderate parental postsecondary education = 471; and first-generation = 214.

All analyses we report are based on weighted sample estimates, adjusted to the actual sample size to obtain correct standard errors. In all analyses where significant effects were yielded, we estimated the size of the effect. This was accomplished by dividing the metric regression weights for the dummy variables representing different levels of parental postsecondary education (versus first-generation) by the pooled standard deviation of the dependent variable (Hays, 1994). The result is that part of a standard deviation that one group is advantaged or disadvantaged relative to the other, net of other influences specified in the regression equation. In the tables summarizing our results, effect sizes are expressed in terms of first-generation students. Thus, a negative effect size indicates that first-generation students are *disadvantaged* on that variable relative to other students, while a positive effect size indicates that first-generation students are *advantaged* on a specific variable relative to other students.

Limitations

The NSSL data have several limitations that should be kept in mind when interpreting the results of this study. First, although the overall sample was multi-institutional and consisted of a broad range of four-year institutions from 15 states, the inclusion of only 18 institutions means that one cannot necessarily generalize the results to first-generation and other students in all four-year institutions in the United States.

Similarly, although we attempted in the initial sampling design and subsequent sample weighting to make the sample as representative as possible at each institution, the time commitments required of each student undoubtedly led to some self-selection. The responses of the students who participated in the study might have differed from those of the students who were invited to continue participation but declined, as well as those who dropped out of the institution during the study. While our weighting procedure provides at least some adjustment for bias in the samples we analyzed by ethnicity, sex, and institution, it cannot adjust for nonresponse bias. However, several additional analyses reported elsewhere (e.g., Pascarella, Edison, Nora, Hagedorn, & Terenzini, 1998) have examined differences in the characteristics of students who partici-

pated in all years of the NSSL and those who dropped out of the study. The dropouts consisted of two groups: (1) those who dropped out of the institution during the study, and (2) those who persisted at the institution but dropped out of the study. Initial participants who dropped out of their institutions had somewhat lower levels of precollege cognitive development (as measured by the CAAP), socioeconomic background, and academic motivation than their counterparts who persisted in the study. Yet, students who remained in the study, and those who dropped out of the study but persisted at the institution, differed in only small, chance ways with regard to precollege cognitive development, age, race, and socioeconomic background.

Finally, we have treated ethnicity as a white/person of color dichotomy in our study. While we recognize that the effects of being a first-generation student may differ by race, we judged that the overall person of color group encompassed such a broad range of racial and cultural heterogeneity that it would be difficult to interpret conditional effects of first-generation status based on our dichotomous ethnicity variable. Moreover, we judged that we had too few students within the subcategories of the person of color group (i.e., African American, Asian American, Latino) to have much faith in the findings of a more disaggregated analysis.

Results

College Experiences

Compared to their first-generation counterparts, students having parents with a high level of postsecondary education attended institutions with a significantly higher average level of entering student academic selectivity (Beta = 0.119, b = 0.357, $p < 0.01$). The disadvantage accruing to first-generation students was slightly more than a quarter of a standard deviation in institutional selectivity (-0.268); and this disadvantage persisted in the presence of controls for such precollege/demographic influences as individual-level cognitive development, degree plans, academic motivation, secondary school grades, ethnicity, and parental income. There was no significant net difference in the selectivity of institutions attended by first-generation students and their counterparts whose parents had a moderate level of postsecondary education (Beta = 0.008, b = 0.021, $p > 0.05$).

Table 2 summarizes significant net differences among first-generation and other college students in the academic and nonacademic experiences of college. As the table indicates, even when controls are made for an extensive battery of precollege/demographic variables (e.g., cognitive

development, parental income, ethnicity, sex, and the like), as well as for the average cognitive development of entering students at the institution attended, first-generation students had a somewhat different experience of college than their peers. This is particularly the case in comparison to students whose parents have both completed a bachelor's degree or higher (i.e., high parental postsecondary education). Across both the second and third years of postsecondary education, first-generation students completed significantly fewer credit hours and worked significantly more hours per week than their peers whose parents had a high level of postsecondary education. They were also significantly less likely to live on campus while they attended college than other students. Greater work responsibilities and living off campus probably contributed substantially to the tendency for first-generation college students to also have significantly lower levels of extracurricular involvement, athletic participation, and volunteer work than other students in the second year of college, and significantly lower levels of noncourse-related interactions with peers in the third year of college

Because first-generation college students tend to complete significantly fewer credit hours than their peers, it is not particularly surprising that, with a few exceptions, they also tend to take significantly fewer courses in several areas, such as the social sciences, arts and humanities, and technical/preprofessional. Yet, despite their somewhat lighter academic load, and the fact that the regression equations include controls for individual-level precollege cognitive development, secondary school grades, and academic motivation, first-generation students had lower grades through the third year of college than did their peers with parents who had both graduated from college.

College Outcomes

If first-generation students experience college differently than other students, to what extent does that translate into differences in the outcomes of college? The answer would appear to be: only in isolated areas, and even then the direction of the effects is inconsistent, and the magnitude of the net differences between first-generation and other college students do not appear to be large. Furthermore, most of the significant net differences we uncovered were between first-generation students and students whose parents were both college graduates (the high parental postsecondary education group).

Tables 3 and 4 summarize the estimated net total and direct effects of level of parental postsecondary education (compared to first-generation students) on end-of-second- and end-of-third-year outcomes, respectively. As the tables indicate, there were no significant, net differences

TABLE 2

Statistically Significant Estimated Effects of Level of Parental Postsecondary Education (versus First-Generation College Students) on Second- and Third-Year College Experiences

	High Parental Postsecondary Education[a]			Moderate Parental Postsecondary Education[a]		
Experience	Metric Coefficient	Beta	Effect Size[b]	Metric Coefficient	Beta	Effect Size[b]
Part A: Second Year						
Cumulative Credit Hours Completed	0.575**	0.114	–0.254			
Hours Studied				–0.458*	–0.096	0.191
Social Science Courses Taken	0.707*	0.086	–0.193	0.546*	0.075	–0.149
Technical/Preprofessional Courses Taken	0.455*	0.086	–0.193			
Arts and Humanities Courses Taken	0.737*	0.074	–0.161			
Number of Term Papers/Written Reports	0.240*	0.069	–0.154			
Hours Worked	–1.577**	–0.142	0.317			
On-Campus Residence	0.325**	0.151	–0.337			
Participated in Intercollegiate Athletics	0.100*	0.075	–0.168			
Extracurricular Involvement	6.650**	0.107	–0.241	5.501**	0.099	–0.199
Volunteer Work	0.240*	0.073	–0.163			
Part B: Third Year						
Cumulative Credit Hours Completed	0.644*	0.098	–0.214			
Hours Studied				–0.539*	–0.078	0.179
Mathematics Courses Taken	–1.228**	–0.147	0.323			
College Grades	0.435*	0.071	–0.156			
Number of Term Papers/Written Reports	0.508*	0.108	–0.235			
Hours Worked	–1.286*	–0.087	0.189			
On-Campus Residence	0.570**	0.191	–0.418	0.250*	0.091	–0.183
Non-Course Related Interactions With Peers	2.207*	0.098	–0.213			

[a]Comparison group is first-generation college students. Equations also include controls for: individual precollege composite cognitive development, sex, ethnicity, age, parental income, secondary school grades, precollege academic motivation, volunteer work in secondary school, and average precollege cognitive development of entering students at the institution attended.
[b]Effect size is in terms of first-generation students. Thus, a positive sign indicates an advantage for first-generation students, while a negative sign indicates a disadvantage for first-generation students.
*$p < 0.05$. **$p < 0.01$.

between first-generation and other students in second-year writing skills or in third-year reading comprehension or critical thinking. However, net of precollege/demographic characteristics, being a first-generation student had a small, but statistically significant, negative total impact on second-year science reasoning, relative to the moderate parental education group. This negative total effect was reduced to non-significance when college experience measures were taken into account in the prediction equation (direct effects). (Recall that the dummy variables in our regression analyses compared students whose parents had either a "high" or "moderate" level of postsecondary education with first-generation students. Thus, significant positive regression coefficients indicated a *disadvantage* for first-generation students, as shown by the negative sign of the effect size estimate. Conversely, significant negative regression coefficients for the dummy variables indicated an *advantage* for first-generation students, as shown by the positive sign of the effect size estimate.)

While there were no differences between first-generation and other students in end-of-second- or end-of-third-year openness to diversity and challenge, being a first-generation student had a small negative total effect on end-of-second-year learning for self-understanding relative to the high parental postsecondary education group. However, first-generation students demonstrated modestly larger end-of-third-year levels of both internal locus of attribution for academic success and preference for higher-order cognitive tasks than did students whose parents were both college graduates. Being a first-generation student also had a modest, positive total effect on third-year preference for higher-order cognitive tasks, relative to their counterparts in the moderate parental postsecondary education group.

The only consistent negative effect of being a first-generation student across both the second and third years of college was on educational degree plans. Relative to students whose parents were both college graduates, first-generation college students had significantly lower levels of end-of-second- and end-of-third-year degree plans. At the end of the second year, this disadvantage for first-generation students remained statistically significant even when differences in academic and nonacademic experiences were taken into account. At the end of the third year, however, this disadvantage for first-generation students was at least partially explainable by differences in students' academic and nonacademic experiences. Recall, for example, that first-generation students had significantly lower grades after three years of college than did students whose parents had both earned at least a bachelor's degree.

Finally, it is worth emphasizing that where we did uncover statisti-

TABLE 3

Estimated Total (T) and Direct (D) Effects of Level of Parental Postsecondary Education (versus First-Generation Students) on End-of-Second-Year Outcomes

	Science Reasoning		Writing Skills		Openness to Diversity and Challenge		Learning for Self-Understanding		Internal Locus of Attribution for Academic Success		Preference for Higher-Order Cognitive Tasks		Degree Plans	
Group	T[b]	D[c]	T[b]	D[c]	T[b]	D[c]	T[b]	D[c]	T[b]	D[c]	T[b]	D[c]	T[b]	D[c]
High Parental Postsecondary Education[a]														
Metric Coefficient	0.070	0.056	0.107	0.267	0.318	0.075	0.223*	0.188	–0.160	–0.176	0.084	0.033	0.381**	0.215*
Beta	0.007	0.005	0.010	0.024	0.029	0.007	0.053	0.045	–0.027	–0.033	0.021	0.009	0.132	0.075
Effect Size[d]							–0.105						–0.295	–0.167
Moderate Parental Postsecondary Education[a]														
Metric Coefficient	0.449*	0.375	0.019	0.024	0.221	0.269	0.211	0.129	0.055	0.091	0.073	0.117	0.133	0.092
Beta	0.049	0.039	0.002	0.002	0.022	0.027	0.045	0.027	0.010	0.015	0.021	0.033	0.052	0.036
Effect Size[d]	–0.094													
Model R^2	0.617**	0.649**	0.612**	0.635**	0.387**	0.450**	0.320**	0.362**	0.260**	0.298**	0.196**	0.259**	0.153**	0.209**

[a]Comparison group is first-generation college students.

[b]Equation also includes controls for: appropriate precollege measure (see Table 1), sex, ethnicity, age, parental income, precollege academic motivation, secondary school grades, and volunteer work in secondary schools.

[c]Equation also includes controls for all variables specified in footnote "b" plus: average precollege composite cognitive development at the institution attended; cumulative credit hours completed; hours per week spent studying; coursework taken in five different areas (social sciences, mathematics, technical/preprofessional, arts and humanities, and natural sciences and engineering); college grades; course-related interaction with peers; academic effort/involvement; computer use; reading and writing involvement; hours worked per week; on-campus residence; intercollegiate athletic participation; Greek affiliation; non-course related interaction with peers; extracurricular involvement; and volunteer work during college.

[d]Effect size is in terms of first-generation students. Thus, a positive sign indicates an advantage for first-generation students, while a negative sign indicates a disadvantage for first-generation students.

*$p < 0.05$. **$p < 0.01$.

TABLE 4

Estimated Total (T) and Direct (D) Effects of Level of Parental Postsecondary Education (versus First-Generation Students) on End-of-Third-Year Outcomes

	Reading Comprehension		Critical Thinking		Openness to Diversity and Challenge		Learning for Self-Understanding		Internal Locus of Attribution for Academic Success		Preference for Higher-Order Cognitive Tasks		Degree Plans	
Group	T[b]	D[c]	T[b]	D[c]	T[b]	D[c]	T[b]	D[c]	T[b]	D[c]	T[b]	D[c]	T[b]	D[c]
High Parental Postsecondary Education[a]														
Metric Coefficient	0.274	0.119	0.044	0.003	0.232	0.235	0.194	0.132	–0.604**	–0.384	–0.460**	-0.569**	0.193*	0.128
Beta	0.023	0.010	0.004	0.001	0.022	0.022	0.043	0.034	–0.102	–0.064	–0.126	–0.155	0.073	0.050
Effect Size[d]									0.223		0.274	0.339	–0.152	
Moderate Parental Postsecondary Education[a]														
Metric Coefficient	0.227	0.126	0.414	0.431	0.050	0.065	0.055	0.006	–0.024	0.022	–0.216*	–0.201	0.150	.066
Beta	0.020	0.011	0.041	0.042	0.005	0.007	0.013	0.002	–0.004	0.006	–0.069	–0.061	0.059	0.024
Effect Size[d]											0.129			
Model R^2	0.590**	0.633**	0.608**	0.644**	0.341**	0.423**	0.207**	0.289**	0.255**	0.299**	0.218**	0.303**	0.130**	0.194**

[a]Comparison group is first-generation college students.

[b]Equation also includes controls for: appropriate precollege measure (see Table 1), sex, ethnicity, age, parental income, precollege academic motivation, secondary school grades, and volunteer work in secondary schools.

[c]Equation also includes controls for all variables specified in footnote "b" plus: average precollege composite cognitive development at the institution attended; cumulative credit hours completed; hours per week spent studying; coursework taken in five different areas (social sciences, mathematics, technical/preprofessional, arts and humanities, and natural sciences and engineering); college grades; course-related interaction with peers; academic effort/involvement; computer use; reading and writing involvement; hours worked per week; on-campus residence; intercollegiate athletic participation; Greek affiliation; non-course related interaction with peers; extracurricular involvement; and volunteer work during college.

[d]Effect size is in terms of first-generation students. Thus, a positive sign indicates an advantage for first-generation students, while a negative sign indicates a disadvantage for first-generation students.

*$p < 0.05$. **$p < 0.01$.

cally significant net differences on second- or third-year outcomes between first-generation and other students, the magnitude of the effects was quite modest. Across all significant differences, the average effect size (irrespective of sign) was less than a fifth (0.198) of a standard deviation.

Conditional Effects

The set of cross-product terms between the dummy variables representing level of parental education and the college experience variables was associated with a statistically significant R^2 increase in the prediction of each of the end-of-second- and end-of-third-year outcomes except reading comprehension. (The significant R^2 increases associated with the set of cross-product terms ranged from 3.5% to 6.1%.) Such a finding permitted the examination of individually significant conditional effects that remained significant in the presence of controls for all the variables in the direct effects equation and all other conditional effects. To determine the nature of the individually significant conditional effects, the direct effects equation was run separately for the appropriate comparison groups (i.e., first-generation and moderate parental postsecondary education and/or first-generation and high parental postsecondary education), and the metric or unstandardized regression coefficients were compared across the independent samples (Pedhazur, 1982).

Table 5 summarizes the significant conditional effects. Part A of the table deals with end-of-second-year outcomes while Part B addresses end-of-third-year outcomes. For all variables shown in the table, the individual cross-product was statistically significant. Thus, all metric regression coefficients shown for first-generation students in the table were significantly different in magnitude at $p < 0.05$ from those shown for the "moderate" and/or "high" parental postsecondary education groups. Perhaps the most notable aspect of Table 5 is the large number of statistically significant conditional effects uncovered in our analyses. Clearly, there are substantial differences between first-generation and other students in how the experiences of college shape cognitive and noncognitive outcomes. Most of the significant conditional effects shown in Table 5 involve differences between first-generation students and students whose parents had a high level of postsecondary education (i.e., both parents had a bachelor's degree or above). Somewhat fewer differences involved first-generation students and students whose parents had a moderate level of postsecondary education. Though not unequivocal, five generalizations appear warranted.

1. Despite the fact that they were somewhat less likely to be involved

TABLE 5

Significant Conditional Effects (Metric Coefficients) for End-of-Second- and End-of-Third-Year Outcomes[a]

Outcome/Predictor Variable	Group		
	First-Generation[b]	Moderate Parental Postsecondary Education	High Parental Postsecondary Education
Part A: Second Year			
Science Reasoning			
Natural Sciences and Engineering Courses Taken	0.255**		0.070
Technical/Preprofessional Courses Taken	–0.178	0.039	0.059
Course-Related Interaction with Peers	–0.068*	0.075*	0.104*
Intercollegiate Athletic Participation	–0.609*		0.315
Non-Course Related Interaction with Peers	0.057**	–0.021	0.052
Writing Skills			
Average Precollege Cognitive Development of Students at the Institution Attended	–0.254		0.432*
Technical/Preprofessional Courses Taken	–0.189**	0.132*	0.004
Arts and Humanities Courses Taken	0.098*	–0.009	–0.003
Number of Term Papers or Written Reports	0.274*		–0.058
Non-Course Related Interaction with Peers	0.063*		–0.037*
Openness to Diversity and Challenge			
Number of Term Papers or Written Reports	0.240*	–0.345*	–0.231*
Greek Affiliation	1.428*	–0.267	–1.077*
Volunteer Work	–0.373*		0.175*
Learning for Self-Understanding			
Cumulative Credit Hours Completed	0.095**	–0.040	–0.020
Technical/Preprofessional CoursesTaken	–0.060*	0.060	
Course-Related Interaction with Peers	0.039*		–0.016
Number of Non-Assigned Books Read	0.192**	0.035	–0.093
Number of Term Papers or Written Reports	0.233**	0.025	–0.076
Internal Locus of Attribution for Academic Success			
Mathematics Courses Taken	0.097*	–0.102*	
Social Sciences Courses Taken	0.104*		–0.062*
Arts and Humanities Courses Taken	0.061*		–0.049*
Course-Related Interaction with Peers	0.102*	–0.043	–0.014
Hours Worked	–0.108*		0.028
Extracurricular Involvement	0.008*	–0.011*	–0.014**
Preference for Higher-Order Cognitive Tasks			
Cumulative Grades	0.110*	–0.024	–0.045
Hours Worked	–0.052**	0.0001	0.016
Extracurricular Involvement	0.013**	–0.004	–0.005
Volunteer Work	–0.096		0.179**
Education Degree Plans			
Academic Effort/Involvement	0.066**	–0.001	
Arts and Humanities Courses Taken	0.044**	0.010	–0.002
Non-Course Related Interaction with Peers	0.024**		–0.009
Extracurricular Involvement	0.006*	0.001	–0.003

TABLE 5 (*Continued*)

Outcome/Predictor Variable	Group: First-Generation[b]	Group: Moderate Parental Postsecondary Education	Group: High Parental Postsecondary Education
Part B: Third Year			
Critical Thinking			
Cumulative Credit Hours Completed	0.003	0.232**	0.196**
Hours Worked	–0.048*		0.031
Hours Studied	0.124*		–0.016
Extracurricular Involvement	0.013*	–0.009	
Openness to Diversity and Challenge			
Average Precollege Cognitive Development of Students at the Institution Attended	1.004*	–0.183	–0.619*
Cumulative Credit Hours Completed	0.210*		–0.017
Academic Effort/Involvement	0.024*		–0.003
Volunteer Work	–0.019.		0.486**
Learning for Self-Understanding			
Average Precollege Cognitive Development of Students at the Institution Attended	0.444*		–0.086
Course-Related Interaction with Peers.	0.059*	–0.008	–0.017
Number of Term Papers or Written Reports	0.141*		–0.072
Volunteer Work	–0.066		0.168**
Internal Locus of Attribution for Academic Success			
Academic Effort/Involvement	0.016*	–0.005	–0.006
Hours Worked	–0.091**		0.003
Extracurricular Involvement	0.010*	–0.012*	–0.013*
Volunteer Work	–0.098*		0.102*
Preference for Higher-Order Cognitive Tasks			
Cumulative Grades	0.127*	0.014	–0.062
Number of Non-Assigned Books Read	0.169**	–0.004	–0.051
Greek Affiliation	0.541**	–0.068	–0.049
Volunteer Work	–0.073		0.159*
Educational Degree Plans			
Extracurricular Involvement	0.007**	0.003*	–0.001
Greek Affiliation	–0.367**		0.192**
Non-Course Related Interaction with Peers	0.003**	–0.0007	–0.0003
Volunteer Work	0.009	0.098*	

[a]Second year sample size: first-generation = 344; moderate parental postsecondary education = 746; high parental postsecondary education = 428. Third year sample size: first-generation = 214; moderate parental postsecondary education = 471; high parental postsecondary education = 361.
[b]Metric regression coefficients shown for first-generation students are significantly different in magnitude at $p < 0.05$ from the coefficients shown for the moderate and/or high parental postsecondary education groups.
*$p < 0.05$. **$p < 0.01$.

in extracurricular activities and noncourse-related interactions with peers (see Table 2), first-generation students tended to derive significantly stronger positive benefits from these involvements than did other

students. For example, extracurricular involvement had significant positive effects on critical thinking, degree plans, internal locus of attribution for academic success, and preference for higher-order cognitive tasks for first-generation students. For students whose parents had either moderate or high levels of postsecondary education, however, extracurricular involvement had either a nonsignificant, smaller positive, or significant negative impact on those same outcomes. Similarly, noncourse-related interactions with peers had impacts on science reasoning, writing skills, and educational degree plans that were significantly more positive for first-generation than for other students.

2. Conversely, other nonacademic involvements, such as work responsibilities, volunteer work, and intercollegiate athletic participation, tended to have either a significantly larger negative impact or a significantly smaller positive impact on outcomes for first-generation than for other students. Compared to their peers, first-generation students worked more hours per week during college, and their work responsibilities tended to have stronger negative implications for their growth during college. For students whose parents were both college graduates, hours worked per week tended to have small and nonsignificant impacts on critical thinking, internal locus of attribution for academic success, and preference for higher-order cognitive tasks. In contrast, work responsibilities had a significant negative effect on each of these outcomes for first-generation students. A similar pattern held for intercollegiate athletic participation. While it had a nonsignificant effect on science reasoning for students whose parents were both college graduates, athletic participation had a significant negative impact on science reasoning for first-generation students. The impact of volunteer work was slightly different, in that it tended to have a stronger positive impact for students whose parents were both college graduates than for first-generation students. For the former group, engaging in volunteer work had significant positive effects on growth in openness to diversity and challenge, learning for self-understanding, and internal locus of attribution for academic success. For first-generation students, however, volunteer work had either a significantly less positive, or even a significant negative influence on these learning orientations.

3. With two notable exceptions, the clear weight of evidence from our findings suggests that one's extent of involvement in academic/classroom activities tended to have stronger positive effects on end-of-second- and third-year outcomes for first-generation than for other college students. For example, hours studied had a stronger positive effect on critical thinking, and number of term papers or written reports had stronger positive effects on writing skills, openness to diversity, and

learning for self-understanding for first-generation than for other students. The same pattern was observed for the effects of academic effort/involvement on openness to diversity, internal locus of attribution for academic success, and degree plans; the effects of number of unassigned books read on learning for self-understanding and preference for higher-order cognitive tasks; the effect of cumulative grades on preference for higher-order cognitive tasks; the effects of cumulative credit hours completed on openness to diversity and learning for self-understanding; and the effects of course-related interactions with peers on learning for self-understanding and internal locus of attribution for academic success. In all the instances mentioned above, the positive impact of the specific academic/classroom involvement measure was significantly stronger for first-generation than for other students. The two notable exceptions to this trend involved the impacts of cumulative credits completed on critical thinking and course-related interactions with peers on science reasoning. In both cases, the impacts were significantly more positive for students whose parents had a moderate or high level of postsecondary education than they were for first-generation students.

4. Types of coursework taken had differential impacts on second- and third-year outcomes for first-generation and other students. Specifically, first-generation students derived greater developmental benefits from coursework taken in the arts and humanities, mathematics, the social sciences, and the natural sciences and engineering than did other students. For example, number of courses taken in the arts and humanities had significantly stronger, positive effects on writing skills, educational plans, and internal locus of attribution for academic success for first-generation students than for students whose parents had moderate or high levels of postsecondary education. The same pattern held for the effects of number of natural science and engineering courses on science reasoning, and the number of mathematics and social science courses taken on internal locus of attribution for academic success. In each case, the positive benefits of coursework taken in these areas accruing to first-generation students was significantly stronger than the benefits derived by other students. The converse was true for the effects of courses taken in technical/preprofessional areas. Such courses tended to have significantly stronger negative effects on science reasoning, writing skills, and learning for self-understanding for first-generation than for other students.

5. Although first-generation students were less likely than other students to attend a selective institution (defined as the average precollege cognitive development of students at the institution attended), there was evidence that they derived greater growth in openness to diversity and

learning for self-understanding from attendance at a selective institution. Conversely, institutional selectivity had a positive impact on writing skills for students whose parents were both college graduates, but a negative impact on writing skills for first-generation students.

Summary and Conclusions

This study analyzed longitudinal data from 18 four-year colleges to better understand differences between first-generation and other college students in the experience and outcomes of postsecondary education. First-generation college students were defined as students whose parents had no more than a high-school education. Our analyses compared first-generation students with two other groups: students whose parents had both completed a bachelor's degree or above (high parental postsecondary education); and students having one or more parents who had completed at least some college, but no more than one parent who had attained a bachelor's degree or above (moderate parental postsecondary education). The longitudinal nature of the data analyzed permitted statistical controls for an extensive battery of confounding influences such as precollege tested cognitive development, parental income, educational aspirations, academic motivation, secondary school grades, race, gender, age, and the like. The findings suggest that level of parental postsecondary education has a significant unique influence on the academic selectivity of the institution a student attends, the nature of the academic and nonacademic experiences one has during college, and, to a modest extent, the cognitive and noncognitive outcomes of college. Moreover, there were marked differences between first-generation and other college students in the influence of specific academic and nonacademic experiences on the outcomes of college.

College Experiences

Consistent with, but also extending, previous research, our findings suggest that compared to other students, first-generation college students tend to be significantly handicapped in terms of the types of institutions they attend and the kinds of experiences they have during college. This was particularly evident when the comparison was between first-generation students and students whose parents had a high level of postsecondary education (i.e., both parents had a bachelor's degree or above). While this finding may not be particularly surprising, given its consistency with other studies (e.g., Choy, 2001; Dougherty, 1994), the finding *is* striking in that it persists in the presence of statistical controls for a far more extensive and rigorous set of precollege influences than

are found in most previous studies (e.g., tested cognitive development, educational degree plans, parental income, a measure of academic motivation, high-school grades, and the like). Even after taking differences on these variables into account, first-generation students still tended to be enrolled in institutions that, on average, were more than a quarter of a standard deviation less academically selective than the institutions attended by students whose parents had a high level of postsecondary education. Put another way, if one had a large group of high-school graduates who were identical (insofar as measured in this study) in their race/ethnicity and parents' economic circumstances; their reading, critical thinking, and math skills; their high-school performance; their educational aspirations; and their academic motivation—despite all those similarities, the students in that group whose parents had never been to college would be more likely to attend less selective institutions than their peers whose parents both held a bachelor's degree or higher. Even when presenting academic credentials and a level of academic motivation equal to that of their peers whose parents graduated from college, first-generation students are at a somewhat greater risk of being academically, socially, and economically left behind. A substantial body of research suggests that bachelor's degree completion is enhanced, and general educational attainment is positively influenced by institutional selectivity (e.g., Astin, 1975; Ethington & Smart, 1986; Fetters, 1977; Pascarella & Terenzini, 1991; Perrucci, 1980).

Once in college, this relative disadvantage continued and dovetailed into other areas. Net of the battery of precollege controls and irrespective of the selectivity of the institution attended, first-generation students completed significantly fewer credit hours across the three years of the study and worked significantly more hours per week than did the high education group. They were also significantly less likely to live on campus than other students. These tendencies toward part-time enrollment, work responsibilities, and living off campus are probably responsible in large measure for the fact that first-generation students also had lower levels of extracurricular involvement and interaction with peers in noncourse contexts. This may place first-generation students at a disadvantage in terms of the developmental benefits they derive from postsecondary education. There is mounting evidence that extracurricular involvement and interaction with peers can play a significant role in both intellectual and personal development during college (e.g., Baxter Magolda, 1992; Inman & Pascarella, 1998; Pascarella, Palmer, Moye, & Pierson, 2001; Whitt, Edison, Pascarella, Nora, & Terenzini, 1999; Whitt, Edison, Pascarella, Terenzini, & Nora, 2001). Moreover, the added work responsibilities of first-generation students may in part

explain the fact that, despite a lighter academic load, first-generation students had significantly lower cumulative grades than similar students whose parents were both college graduates.

Clearly, the above results might be explainable by influences that remain unspecified in our prediction equations. Yet, our findings are also quite consistent with the expectation that family cultural capital plays a significant role in informing the choices students make about the types of institutions they attend and the kinds of experiences they have once enrolled. Such family cultural capital and the attendant understandings and expectations of a college education that it engenders, are likely to be relatively more modest for first-generation students. Consequently, they may be less prepared than similar students whose parents are highly educated to make the kinds of informed choices about institutions and involvements during college that potentially maximize educational progress and benefits.

College Outcomes

Despite the disadvantages that accrued to them in the selectivity of the institutions they attend and the experiences they have once enrolled, first-generation students who persisted in college appeared to be sufficiently resilient that these disadvantages did not necessarily translate into a parallel pattern of disadvantages in cognitive and noncognitive outcomes. Indeed, we found only trivial, chance differences between first-generation and other students in second-year writing skills, third-year reading comprehension, third-year critical thinking, and both second- and third-year openness to diversity and challenge. At the end of the second year of college, first generation students had modestly lower levels of science reasoning and learning for self-understanding than other students. However, there was counterbalancing evidence suggesting that the three-year gains in internal locus of attribution for academic success and preference for higher-order cognitive tasks made by first-generation students were actually somewhat larger than those made by their peers. The only consistent evidence across both the second and third years of the study was on the degree plans variable. In both analyses, first-generation students made significantly smaller increases in the highest degree they planned to obtain than did the high parental education group. This may also be a function of differences between the two groups in the cultural capital they bring to college. Students with highly educated parents may simply be more aware of the importance that advanced degrees play in one's occupational life and labor-market opportunities than their first-generation counterparts.

Conditional Effects

Perhaps the most interesting set of findings in our study, as well as the most important from a practical and policy perspective, was the fact that there were substantial differences among first-generation and other students in the relative influence of specific college experiences on the outcomes of college. These differences were particularly pronounced and extensive between first-generation students and their counterparts whose parents were both college graduates. Indeed, the differences were of sufficient clarity that one might hypothesize the possibility of different models of success in college for first-generation students and for their peers whose parents are highly educated. Moreover, a number of conditional effects were consistent with theory-based expectations with regard to the acquisition of cultural and social capital during college.

Of notable importance to first-generation students was their level of engagement with their institution's social and peer network. For example, extracurricular involvement had stronger positive effects on critical thinking, degree plans, sense of control over (and responsibility for) their own academic success, and preference for higher-order cognitive tasks for first-generation than for other students. A similar pattern of conditional effects held for the impact of a measure of noncourse-related interactions with peers on science reasoning, writing skills, and educational degree plans. Such findings are consistent with the expectation that the social capital gained through extracurricular and peer involvement during college may be a particularly useful way for first-generation students to acquire the additional cultural capital that helps them succeed academically and benefit cognitively. As suggested by an anonymous reviewer, extracurricular or peer involvement may expose first-generation students to classmates with a better understanding of behaviors that help individuals succeed in, and maximize the benefit they receive from, college (e.g., study strategies or how to choose courses). Such knowledge may be less familiar to first-generation students, and therefore more valuable in terms of its contribution to their academic success and intellectual growth.

Ironically, first-generation students derived greater outcome benefits from extracurricular involvement and peer interaction than other students *even though they were significantly less likely to be engaged in these activities during college*. The fact that first-generation students take fewer credit hours, work more hours per week, and are less likely to live on campus than other students will, of course, place some limits on what institutions can do. Most of these conditional effects, however, are not explainable by differences in students' precollege experiences or

characteristics. The differences are attributable to what happens to students (and particularly to first-generation students) *after* they matriculate. In short, students' college experiences have a bigger bang-for-the-buck for first-generation students than for those whose parents have had some college exposure. To put it another way, most of these conditional effects are related to experiences over which colleges and universities have some programmatic and policy control. One clear implication of these findings is the need for more sharply focused and sustained efforts and campus and public policies (discussed below) designed to increase first-generation students' involvement in the academic and nonacademic systems of the institutions they attend.

Not all college experiences, however, are beneficial for first-generation students. Volunteer work, employment, and participation in intercollegiate athletics all tended to have a more negative impact on first-generation students than on their peers with parents who had some collegiate experience. Such activities, one might suggest, all tend to reduce both the time for, and level of, students' involvement in on-campus academic and nonacademic activities, tending to remove or insulate students from broad exposure to more students and to the general campus culture. This finding, while seemingly in conflict with those discussed above, in fact points in the same programmatic and policy direction—the benefits of, and need for, greater academic and nonacademic involvement for first-generation students.

The conditional effects of students' nonacademic experiences have additional practical (and also theoretical) interest in that they point to the role these activities play in students' *academic and cognitive* development. It is noteworthy, moreover, that these out-of-class effects on cognitive and intellectual growth are apparent *above and beyond* those of students' academic and course-related experiences. The evidence quite clearly points to a broad array of experiences shaping students' cognitive development that goes well beyond the narrow structural and programmatic separations between "academic" and "student" affairs found on most college and university campuses. The implication is for greater programmatic and structural integration and for broader thinking and greater collaboration across structural boundaries when "learning experiences" and policies are being developed.

A second area of particular importance to first-generation students was the level of engagement in academic or classroom activities. There were exceptions to this, but the weight of evidence we uncovered suggests that, compared to students whose parents had moderate or high levels of education, first-generation students tended to derive signifi-

cantly greater educational benefits from engagement in academic or classroom activities. For example, hours studied, number of term papers or written reports completed, number of unassigned books read, and scores on an overall measure of academic effort/involvement all had more positive effects on a range of end-of-second- or third-year outcomes for first-generation than for other students. These outcomes include critical thinking, writing skills, openness to diversity, learning for self-understanding, internal locus of attribution for academic success, preference for higher-order cognitive tasks, and degree plans. Such findings are quite consistent with theory-based expectations regarding the acquisition of cultural capital during college. First-generation students perhaps benefit more from their academic experiences than other students because these experiences act in a compensatory manner and thus contribute comparatively greater incremental increases in first-generation students' stock of cultural capital. This evidence (together with that relating to the importance of first-generation students' out-of-class experiences) may also point to an additional policy lever for enriching the postsecondary educational experience of first-generation students.

While no clear connections can be drawn due to limitations on the data available for this study, the findings reported here at the least raise questions about the role of financial aid. St. John et al. (1994, 1996), for example, twice found evidence of a *negative* relation between financial aid and persistence. More detailed analyses suggested that this relation more likely indicated that aid was *insufficient* rather than ineffective. Evidence from the College Board (1999) supports this proposition, as does the recent report of the Advisory Committee on Student Financial Assistance (2001) on the higher levels of unmet need among low-income students. Moreover, the studies by St. John, Paulsen, and Starkey, as well as one by Cabrera, Stampen, and Hansen (1990), all point to the conclusion that financial aid considerations—by themselves—present only a partial view of the complex dynamics at work at the intersections of socioeconomic status (SES), financial aid, and persistence. For example, Cabrera, Nora, and Castaneda (1992) found that ability to pay shapes not only whether and where students go to college, but also how they interact with their collegiate environment. Cabrera and his colleagues found that, for low-income students, inadequate financial aid can interfere with students' academic and social integration which, in turn, has been shown to be related to persistence decisions. While these studies focused on low-SES students, many (albeit by no means all) of those students also are likely to have been first-generation students. And while those studies also examined the effects of financial aid on student persistence, one might reasonably suggest that the same dynamics may

also be at work with respect to the kinds of students' academic and cognitive development examined in the present study.

It seems reasonable to suggest that federal and state financial aid policies may need to be reexamined in light of their potential effects on the extent to which they facilitate or impede the opportunities of first-generation students to participate *fully* in the college experience—and, thereby, to reap its multidimensional benefits—to the same extent as their peers whose parents have benefitted from college. "Access to higher education" must be understood to mean not only admission to some postsecondary institution, but also "access" to the full range of college experiences and to the personal, social, and economic benefits to which those experiences and degree completion lead. It would be a cruel irony, indeed, if current financial aid policies and packages removed the barriers to college attendance for first-generation students but then had the effect of denying them the opportunity to participate fully in the educational experiences and benefits that lay beyond the collegiate threshold.

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