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First- and Second-Generation College Students: A Comparison of Their Engagement and Intellectual Development

Students today are different from their counterparts of three and four decades ago. Women have outnumbered men for more than 15 years, and the participation rates for members of historically underrepresented groups have made impressive gains. Many of these “new” students are the first in their families to attend college (Carnevale & Fry, 2000; Schroeder, in press; Terenzini, Springer, Yeager, Pascarella, & Nora, 1996). It is important that these students succeed in college. The baccalaureate degree is an avenue of upward social mobility, representing the single most important rung in the educational-attainment ladder in terms of economic benefits (Pascarella & Terenzini, 1991). In addition, many of the 10 million jobs that will be created in the next decade will require skills and competencies beyond those acquired in high school (Callan, 2000). Unfortunately, a disproportionately low number of first-generation students succeed in college. According to Warburton, Bugarin, and Nuñez (2001), there is a 15% gap between the 3-year persistence rates of first- and second-generation students (73% and 88%, respectively).

Although first-generation college students are less likely to persist and graduate, surprisingly little is known about their college experiences and the ways those experiences compare to the experiences of students who have college-educated parents. Several powerful autobiographical accounts provide compelling portraits of the experiences of first-generation college students (see Lara, 1992; Rendon, 1992; Rodriguez, 1982),

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but only a handful of studies have systematically examined the experiences of first-generation students (Attinasi, 1989; Billson & Terry, 1982; Richardson & Skinner, 1992; Terenzini et al., 1994; Terenzini et al., 1996). Even the detailed analysis by Warburton, Bugarin, and Nuñez (2001) failed to examine the nature of first-generation students' college experiences. The present research addresses the gaps in the literature by examining the college experiences of first-generation and second-generation students to see how their experiences affect their learning and intellectual development. The term "first-generation college student" has been defined in a variety of ways. In this study, we will use it to describe a college or university student from a family where no parent or guardian has earned a baccalaureate degree (Choy, 2001). The term "second-generation student" is used to refer to students whose parents or guardians earned at least one baccalaureate degree.

Background

In large part, first-generation students' lower persistence and graduation rates, and their lower scores on standardized assessment measures, are the result of differences in the precollege characteristics of first- and second-generation students. For example, first-generation students tend to come from families with lower incomes and have lower levels of engagement in high school (Terenzini et al., 1996). Both of these characteristics are related to success in college. Anticipatory socialization also appears to be a precursor to success in college (Attinasi, 1989). Whereas finding a way to become acculturated into and manage the challenges of college is very important for first-generation students, acculturation tends to be a given for second-generation students (Terenzini et al., 1994). Evidence about the role of educational aspirations, another form of anticipatory socialization, is mixed. Billson and Terry (1982) found no differences in the educational aspirations of first- and second-generation students. Terenzini and his colleagues (1996), however, found that first-generation students had lower educational aspirations than their second-generation counterparts did.

Several aspects of first-generation students' college experiences also appear to affect success in college, even after controlling for precollege characteristics. For example, first-generation students are less likely to live on campus, to develop relationships with faculty members, and to perceive faculty as being concerned about their development; they also work more hours off campus (Richardson & Skinner, 1992; Terenzini et al., 1996). First-generation students are also less likely to develop strong relationships with other students and to become involved in campus

clubs and organizations (Billson & Terry, 1982; Richardson & Skinner, 1992; Terenzini et al., 1994; Terenzini et al., 1996). In addition, first-generation students tend to be less satisfied with the campus environment (Terenzini et al., 1996).

Although research findings suggest that first-generation status affects college experiences, after controlling for differences in background characteristics and levels of engagement during college, first- and second-generation students do not seem to differ in the gains they make during college (Terenzini et al., 1996). However, research findings do suggest that there may be an interaction between first-generation status and college experiences in that the effects of engagement on learning differ for first- and second-generation students. Terenzini and his colleagues (1996) found that perceptions of faculty concern for students and encouragement from peers were positively related to second-generation students' reading scores but negatively related to first-generation students' reading scores. The interaction reported by Terenzini et al. (1996) is surprising, given that other studies have found that connections with faculty members and peers help to offset the relatively strong connections first-generation students have with home and the workplace (Richardson & Skinner, 1992; Terenzini et al., 1994).

Although the results of previous research are intriguing, most of the studies about the experiences of first-generation students were based on relatively small numbers of participants. Thus, it is difficult to make generalizations about the college experiences of first-generation students. The present research draws on a national survey database to address three questions:

1. Are the relationships among background characteristics, engagement, and learning and intellectual development the same for first- and second-generation students?
2. Do first- and second-generation college students differ in terms of their backgrounds, levels of engagement during college, and reported gains in learning and intellectual development?
3. Are differences between first- and second-generation students directly related to first-generation status, or are they an indirect result of associations between first-generation status and antecedent characteristics or experiences?

Previous research sets some expectations for answers to the research questions. For example, it is reasonable to expect that first- and second-generation students will differ in terms of their precollege characteristics and experiences. Likewise, first-generation students will likely report

lower levels of engagement in college. Whether first- and second-generation students will differ in the gains they make during college is unclear. If differences in gains do exist, it is reasonable to expect that the differences will be an indirect result of differences in first- and second-generation college students' characteristics and levels of engagement. It is also unclear from previous research whether the relationships among student characteristics, levels of engagement, and gains in learning and intellectual development will be the same for first- and second-generation students.

Research Methods

In order to examine differences in the backgrounds, college experiences, and learning outcomes of first- and second-generation students, we used multigroup structural equation models with latent variables. An advantage of this approach is that using latent variables allowed us to calculate relatively unbiased estimates of the effects in the model (see Terenzini & Wright, 1987). In addition, multigroup modeling allowed us to identify interactions between group membership and the effects of student characteristics and engagement on learning outcomes, assess differences in the levels of engagement and learning for first- and second-generation students, and determine whether the differences were a direct or indirect result of first-generation status (see Jöreskog & Sörbom, 1999; Pike, 2000).

Conceptual Model

The conceptual model used in the study drew on elements of Astin's (1970) input-environment-output (I-E-O) model of college effects and Pascarella's (1985) model of environmental influences on college outcomes (see Figure 1). The model has been successfully used to examine the effects of group differences on students' college experiences and learning outcomes (Pike, 1999, 2000; Pike & Killian, 2001; Pike, Kuh, & Gonyea, in press).

The model focuses on two important aspects of the college experience: student engagement and integration of experiences. Chickering (1974) argued that learning requires both active participation in a variety of academic and social activities and integration of these diverse experiences into a meaningful whole. A considerable body of research points to the positive influence of student engagement in educationally purposeful activities on learning (Astin, 1993; Feldman & Newcomb, 1969; Pace, 1990; Pascarella & Terenzini, 1991). Only a few studies focus on

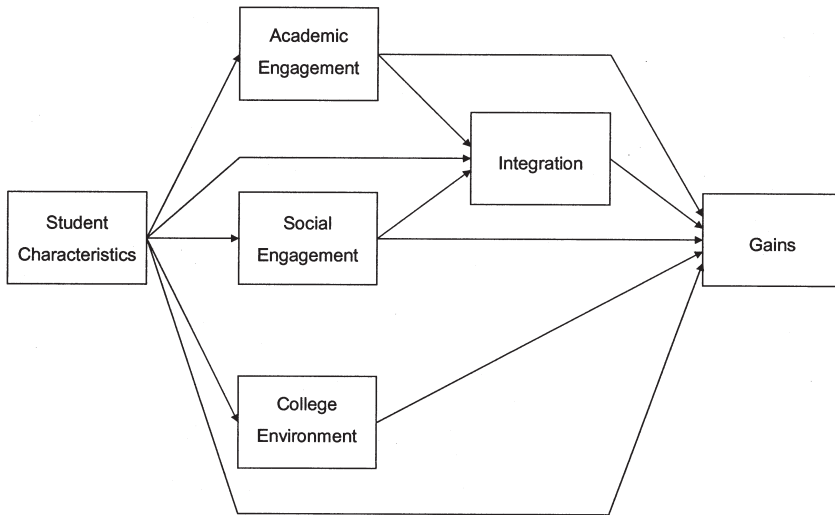


FIG. 1 Conceptual Model

integrating diverse curricular and cocurricular experiences. Davis and Murrell (1993) and Pike (1995) provided indirect evidence of the importance of integration by documenting strong reciprocal relationships among different types of college experiences. Four recent studies using variations of Chickering's concepts of engagement and integration found that both constructs were needed to represent the effects of students' college experiences on learning outcomes (Pike, 1999, 2000; Pike & Killian, 2001; Pike, Kuh, & Gonyea, 2003). The results of these studies support defining academic and social engagement as separate constructs and support the causal ordering of engagement, integration, and intellectual development used in the current research. In this study, academic and social engagement, along with integration, were presumed to affect learning and intellectual development directly. In addition, academic and social engagement were presumed to have indirect effects on learning, acting through the direct effect of integration on learning and intellectual development.

Students' perceptions of the college environment represented another source of influence on learning and intellectual development. Consistent with Pascarella's (1985) model, perceptions of the college environment were expected to be related to academic and social engagement. Unlike Pascarella's model, no causal ordering of engagement and environmental effects was presumed. Rather, we assumed that engagement and perceptions of the environment would be mutually shaping. That is, perceiving

the environment to be positive would lead to greater academic and social engagement; at the same time, engagement would produce positive perceptions of the environment. We made no inferences about the relationship between perceptions of the college environment and the integration of academic and social experiences. Chickering noted that it is student engagement, not the college environment, that affects integration. Chickering's claim has been supported by the results of two studies using this model (Pike & Killian, 2001; Pike, Kuh, & Gonyea, 2003). Although not related to integration, perceptions of the college environment were presumed to be directly linked to gains in learning and development.

Student characteristics, in the form of background characteristics (e.g., gender and minority status), precollege educational aspirations, and general characteristics of college attendance (e.g., living on campus), were also included in the model. These measures have been found to affect the engagement of students in general and first-generation students in particular. Because student characteristics were included as controls, it was presumed that they would be related to all of the other constructs in the model.

Data Source

We used a stratified random sample of 3,000 undergraduates from across the nation who completed the *College Student Experiences Questionnaire (CSEQ), Fourth Edition* (Pace & Kuh, 1998). The strata for the sample were the six dominant Carnegie 2000 classifications for 4-year colleges and universities: Doctoral/Research-Extensive, Doctoral/Research-Intensive, Master's I, Master's II, Baccalaureate Liberals Arts, and Baccalaureate General (McCormick, 2000). Random samples of 500 participants in each Carnegie classification were selected from the population of students who completed the *CSEQ*. Because students from the six types of institutions did not differ in systematic or significant ways in terms of their college experiences or learning outcomes (Pike, Kuh, & Gonyea, 2003), students from the six categories were pooled for this analysis.

The first year of college is very important to college success (see Upcraft & Gardner, 1989), particularly for first-generation students who face significant challenges making the transition to college (Terenzini et al., 1994). Consequently, the present research focused on the experiences of first-year students. After eliminating students who were not freshmen (1,466 students) or had missing data on any measure (407 students), 1,127 student remained. Of this group, 439 (39%) were first-generation students and 688 (61%) were second-generation students.

Almost one third of the participants (32%) attended Doctoral/Research universities, 30% were from Master's institutions, 27% attended Baccalaureate Liberals Arts colleges, and 11% were from Baccalaureate General colleges. Nearly two thirds of the students were female, and 16% were from historically underrepresented groups (5% African American, 3% Asian/Pacific Islander, 4% Hispanic/Latino, 2% Native American, and 2% Multiracial or Other). Approximately 85% of the students lived on campus, and fully two thirds aspired to postbaccalaureate degrees. Despite the substantial presence of first-generation students in the study, the participants represented a fairly traditional college-going population. Almost 95% of the students were less than 20 years of age, 93% were enrolled full time, and 98% met less than half of their college expenses themselves.

Measures

All of the measured variables, both items and scales, that were used to represent the latent constructs in the conceptual model were based on questions from the *CSEQ*. The *CSEQ* asks students to report the frequency with which they engage in activities that represent good educational practices and that are related to positive learning outcomes (Kuh, Pace, & Vesper, 1997). Self-report data are widely used in research on college effects, and the validity and credibility of these data has been extensively studied (Baird, 1976; Berdie, 1971; Pace, 1985; Pike, 1995; Pohlmann & Beggs, 1974). Research has shown that self-reports are likely to be valid under five conditions:

1. the information requested is known to the respondents;
2. the questions are phrased clearly and unambiguously;
3. the questions refer to recent activities;
4. the respondents think the questions merit a serious and thoughtful response;
5. answering the questions does not threaten, embarrass, or violate the privacy of the respondent or encourage the respondent to respond in socially desirable ways (Kuh et al., 2001, p. 9).

The four student characteristics in the conceptual model were derived from individual items. Gender was a dichotomous item indicating whether students classified themselves as female (1) or male (0). Ethnicity was represented by a dichotomous item indicating whether students classified themselves as members of a minority group (1) or white (0). Although research has shown that college experiences can differ substantially across minority groups, the proportions of students in the various ethnic groups

were too small to permit analyses to be conducted at this level. Due in part to the small number of students in the minority groups, analysis of variance results revealed that these groups did not differ significantly on the engagement, environment, integration, and gains scales used in the study.

Students' educational aspirations were represented by a dichotomous variable indicating that students intended (1) or did not intend (0) to enroll for an advanced degree. Campus residence was represented by a dichotomous measure indicating whether students reported that they lived on campus in a residence hall (1) or lived off campus (0).

Academic engagement was represented by four scales: library experiences, active and collaborative learning, writing experiences, and interactions with faculty. Social engagement was represented by three scales: personal experiences, student acquaintances, and topics of conversations. Students' perceptions of the college environment were represented by two scales: the perceived quality of the academic environment and the perceived quality of the interpersonal environment. The latent variable representing students' integration of their college experiences was measured using two scales: academic integration and social integration. Students' gains in learning and intellectual development were represented by four scales: gains in general education, gains in communication skills, gains in interpersonal development, and gains in intellectual development. A list of the items included in each scale and reliability indices for the scales are provided in the appendix.

Data Analysis

The data analysis was conducted in three phases. First, the data for the total sample were analyzed using latent variable structural equation models in *LISREL 8.5* (Jöreskog & Sörbom, 1999) to determine if the conceptual model accurately represented the data—a prerequisite for all subsequent analyses.¹ This process allowed a model to be specified, tested, respecified, and retested until an acceptable model was identified. The final model from the first phase of the analysis provided the starting point for the second phase of the analysis.

In the second phase, the stability (i.e., invariance) of the model across groups was examined to determine if the effects of background characteristics and college experiences on learning outcomes were different for first- and second-generation students.² This phase of the analysis provided a direct test of the first research question. Based on the results of the goodness-of-fit tests, a specification search was planned to identify those parameters that should be free to vary across groups. Freeing parameters would indicate the presence of interactions between group membership and college effects.

The final phase of the data analysis involved the specification and testing of structural equation models with means and intercepts.³ The results of this phase of the data analysis directly assessed whether there were statistically significant differences in the background characteristics, college experiences, and learning outcomes of first- and second-generation students (i.e., the second research question). These results also addressed the third research question, indicating whether significant differences were related directly or indirectly to first-generation status.

Results

Tests of the Conceptual Model

Goodness-of-fit tests revealed that the conceptual model as originally specified did not adequately represent the relationships among the observed variables ($\chi^2 = 916.098$; $df = 120$; $p < 0.001$; RMSEA = 0.079; SRMR = 0.042). Because the criterion for the RMSEA was exceeded, t -values for the effect parameters were examined to determine if any nonsignificant paths could be eliminated from the model. Nineteen nonsignificant relationships were identified and fixed to zero. The resulting model provided a better representation of the relationships among observed variables ($\chi^2 = 956.616$; $df = 139$; $p < 0.001$; RMSEA = 0.074; SRMR = 0.046), but the criterion for the RMSEA was still exceeded. After we examined the modification indices for the relationships among observed variables, three bivariate relationships among uniquenesses in the measurement model were set free to vary: active/collaborative learning and academic integration, topics of conversation and social integration, and topics of conversation and gains in general education. Upon reanalysis, goodness-of-fit statistics indicated that these revisions produced a model that adequately represented the observed data ($\chi^2 = 671.618$; $df = 136$; $p < 0.001$; RMSEA = 0.061; SRMR = 0.043).

The relationships among latent constructs were generally consistent with expectations. The standardized effect coefficients for the revised model in Table 1 show that higher levels of academic engagement were positively related to minority-group membership, educational aspirations beyond a bachelor's degree, and, to a lesser extent, living on campus. Social engagement was also positively related to minority-group membership, postgraduate educational aspirations, and living on campus. Of all the background characteristics, being female was most strongly related to higher levels of social engagement. Positive perceptions of the college environment were associated with only one background characteristic—students' educational aspirations.

None of the background characteristics used in this study was directly

TABLE 1
Standardized Direct and Indirect Effects

	ACADENG	SOCLENG	COLLENV	INTEGRAT	GAINS
GENDER	0.000	0.150***	0.000	0.000	0.000
				0.081***	0.045**
ETHNIC	0.103***	0.088**	0.000	0.000	0.000
				0.086***	0.048**
EDASPIR	0.151***	0.126***	0.128***	0.000	0.000
				0.134***	0.121***
RESIDEN	0.071*	0.101**	0.000	0.000	0.082**
				0.092***	0.052**
ACADENG				0.439***	0.000
					0.246***
SOCLENG				0.538***	0.000
					0.301***
COLLENV					0.358***
INTEGRAT					0.559***
SMC	0.037	0.055	0.016	0.863	0.632

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$
 GENDER = Gender (Female); ETHNIC = Ethnicity (Minority); EDASPIR = Educational Aspirations; RESIDEN = Residency (On Campus); ACADENG = Academic Engagement; SOCLENG = Social Engagement; COLLENV = College Environment; INTEGRAT = Integration; GAINS = Gains in Learning and Intellectual Development.

related to the integration construct, although all four indirectly affected integration as a function of the strong positive relationships between academic and social engagement and integration. Only living on campus had a direct, positive effect on learning and intellectual development, whereas all four background variables were indirectly related to gains. Though neither academic nor social engagement directly affected student-reported learning gains, the indirect relationships between both engagement constructs and gains were substantial. As expected, both perceptions of the college environment and integration were directly related to gains in learning and intellectual development.

The standardized factor loadings (i.e., standardized lambda coefficients) for the measurement model also indicated that the revised model fairly represented the latent constructs (Table 2). All measured variables significantly loaded on the latent variables they were intended to represent and were not related to any other latent variables. With one exception, the magnitudes of the standardized lambda coefficients for a given latent variable tended to be very similar, suggesting that the measured variables were contributing equally to the latent constructs. The lone exception was the relatively high loading of the faculty experiences scale on the academic engagement construct. Although not dramatic, the difference was much larger than for any other variables and constructs.

TABLE 2
Standardized Factor Loadings* for the Measurement Model of Endogenous Variables

Variable	ACADENG	SOCLENG	COLLENV	INTEGRAT	GAINS
LIBRARY	0.314				
ACTCOLL	0.430				
WRITING	0.414				
FACULTY	0.574				
PERSONAL		0.485			
STUDENTS		0.482			
TOPICS		0.397			
ACADENV			0.702		
INTRENV			0.636		
ACADINT				0.477	
SOCLINT				0.454	
GENED					0.444
COMMUNIC					0.482
INTERPER					0.512
INTELLCT					0.558

*All Factors loadings were statistically significant ($p < 0.001$).

LIBRARY = Library Experiences; ACTCOLL = Active and Collaborative Learning; WRITING = Writing Experiences; FACULTY = Interaction with Faculty; PERSONAL = Personal Experiences; STUDENTS = Interaction with Students; TOPICS = Topics of Conversation; ACADENV = Academic Environment; INTRENV = Interpersonal Environment; ACADINT = Academic Integration; SOCLINT = Social Integration; GENED = Gains in General Education; COMMUNIC = Gains in Communication Skills; INTERPER = Gains in Interpersonal Skills; INTELLCT = Gains in Intellectual Skills; ACADENG = Academic Engagement; SOCLENG = Social Engagement; COLLENV = College Environment; INTEGRAT = Integration; GAINS = Gains in Learning and Intellectual Development.

Tests of Invariance across Groups

The goodness-of-fit results for the model in which all measurement and effect parameters were invariant across groups revealed that this restrictive model adequately represented the data ($\chi^2 = 921.625$; $df = 326$; $p < 0.001$). The RMSEA coefficient (0.058) and the SRMR coefficients for the first- (0.067) and second-generation (0.049) groups indicate that neither the measurement nor structural equation models for first- and second-generation students differed. Thus, we could now examine whether differences existed in means and intercepts for the structural equations.

Tests of Means and Intercepts

Goodness-of-fit results indicated that the baseline (i.e., saturated) measurement model, which included factor means for the latent variables, provided a satisfactory representation of the observed data ($\chi^2 = 890.753$; $df = 317$; $p < 0.001$). The RMSEA coefficient for the model was 0.058, and the SRMR coefficients for first- and second-generation

students were 0.061 and 0.048, respectively. Tests of the factor means indicated that first- and second-generation students differed significantly in terms of their characteristics, college experiences, and learning outcomes. Table 3 presents the factor means for the measurement model. An examination of these means reveals that, in comparison to second-generation students, first-generation students were significantly more likely to be males and members of a minority group. First-generation students also tended to have lower educational aspirations than second-generation students did, and they were much less likely to live on campus. Examination of the factor means for the college-experience constructs indicated that first-generation students reported significantly lower levels of academic and social engagement than second-generation students did. First-generation students' perceptions of the college environment also were less favorable than the perceptions of their second-generation counterparts. Similarly, first-generation students reported significantly lower levels of integration and gains.

A follow-up analysis revealed that a model in which the means for first- and second-generation students' characteristics were free to vary, but intercepts for engagement, the environment, integration, and gains were constrained to be equal, also provided an acceptable representation of the data ($\chi^2 = 946.099$; $df = 342$; $p < 0.001$). The RMSEA coefficient for the model was 0.057, and the SRMR coefficients were 0.067 for first-generation students and 0.049 for second-generation students.

TABLE 3
Factor Means and Intercepts for the Structural Equations

	Factor Mean	Mean Intercept
GENDER	-0.057*	-0.057*
ETHNIC	0.044*	0.044*
EDASPIR	-0.078**	-0.078**
RESIDEN	-0.114***	-0.114***
ACADENG	-0.058*	0.000
SOCLENG	-0.078**	0.000
COLLENV	-0.075**	0.000
INTEGRAT	-0.113***	0.000
GAINS	-0.125***	0.000

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$
 GENDER = Gender (Female); ETHNIC = Ethnicity (Minority); EDASPIR = Educational Aspirations; RESIDEN = Residency (On Campus); ACADENG = Academic Engagement; SOCLENG = Social Engagement; COLLENV = College Environment; INTEGRAT = Integration; GAINS = Gains in Learning and Intellectual Development.

This model was selected because it represented the most parsimonious model that provided an acceptable fit to the observed data. Acceptance of this model indicated that observed differences in first- and second-generation students' levels of engagement, perceptions of the college environment, integration of experiences, and gains in learning were indirectly related to first-generation status. That is, differences in first- and second-generation students' college experiences and learning outcomes were a product of differences in the characteristics of the two groups.

Limitations

The participants in this study were a stratified random sample of *CSEQ* respondents and were generally representative of *CSEQ* respondents nationally. However, because the participants were not randomly sampled from their respective institutions, it is not possible to estimate the extent to which sampling or nonrespondent biases may have affected the results. The first-generation students in this study may not be typical of all first-generation students attending 4-year colleges. Their profile certainly differs from their counterparts enrolled at 2-year colleges, a much larger fraction of whom are older and attend college part time. Thus, the findings of this study are more likely to hold for traditional-age (i.e., 18–23 years old), full-time students at 4-year institutions.

The pooling of all minority students represents another limitation of the research, even though significant differences in the college experiences of minority groups were not found in this study. Future research on first-generation students should examine differences across minority groups, given that many first-generation students are members of racial/ethnic minorities. In addition, this study did not take into account students' socioeconomic status (SES), which may obscure the relationships between family income, first-generation status, and engagement. Perhaps one reason few substantial differences were found between the two groups is that the first- and second-generation students in the study were from families with similar incomes.

Reliance on self-reported gains in learning and intellectual development represents another possible limitation of this study. Pascarella (2001) raised important questions about the internal validity of self-reported gains, noting that these gain measures may be confounded by students' response tendencies. He recommended regressing these self-report measures on self-reports of gains in high school. Because measures of gains in high school were not available, it was not possible to assess or control for the confounding effects of response tendencies.

Discussion

The findings from this study indicate that on some key indicators of college success first-generation college students do not compare favorably with their peers from families where at least one parent graduated from college. Specifically, first-generation students were less engaged overall and less likely to successfully integrate diverse college experiences; they perceived the college environment as less supportive and reported making less progress in their learning and intellectual development. Most of these differences, however, were due to educational aspirations and where students lived when attending college. These findings are generally consistent with those reported by Terenzini et al. (1996). However, unlike the findings of that study, what students did in college had similar effects for both first-generation and second-generation students.

Also noteworthy is the magnitude and direction of the relationships among background characteristics, college experiences, and gains. Females, minority students, students who planned to pursue an advanced degree, and students living in campus residence halls tended to be more engaged overall. As a result, these students reported greater gains in their learning and intellectual development. Consistent with the findings of Chickering (1974) and others (see Blimling, 1993), living on campus had a direct, positive effect on learning outcomes, and educational aspirations had the greatest indirect effects on learning and intellectual development. In fact, living on campus had the greatest total effect (i.e., the combination of direct and indirect effects) on learning outcomes of any student characteristic. That campus residence is relatively powerful is understandable, because of the propinquity principle (Newcomb, 1962): living on campus puts students in close physical proximity so they cannot avoid being confronted on an almost daily basis by others who look, talk, and hold values different from their own. Other studies show that the frequency of diversity experiences decrease after the first year of college, probably for this reason (Hu & Kuh, in press; Kuh, 2003; National Survey of Student Engagement, 2002). Additional thought should be given to how colleges and universities can approximate these conditions in classrooms.

It appears that the conceptual model used in this study may be profitably employed in future research on college student development. The model accurately represented the relationships among the engagement variables, perceptions of the college environment, integration of diverse experiences, and learning and intellectual development gains. The results also lend credence to the presumed causal ordering of the model's major constructs. Gains in student learning were directly related to

integration of diverse experiences and perceptions of the college environment. Academic and social engagement were indirectly related to gains in learning through their effects on integration. That is, the effects of engagement were mediated by integration, or the extent to which students were able to incorporate information from their courses and other learning activities in their conversations with peers and others.

The goodness-of-fit results suggested that the differences between first- and second-generation students were not meaningful. One possible reason is that the characteristics of the first- and second-generation college students in this study were very similar except for students' educational aspirations and their places of residence. It is also possible that educational interventions designed to improve the learning and success of first-generation students may have reduced the magnitude of the differences between the groups in terms of college experiences and self-reported outcomes, similar to what Richardson and Skinner (1992) reported a decade ago. The nature of the database makes it impossible to determine if students had participated in special programs intended to improve their success in college.

Another reason first-generation students may be less engaged is because they know less about the importance of engagement and about how to become engaged. That is, compared to second-generation college students, they have less tacit knowledge of and fewer experiences with college campuses and related activities, behaviors, and role models. In addition, parents are unable to help much, even if they are so inclined as they, too, lack knowledge of, or in some instances may find off-putting, certain activities that could lead to greater levels of engagement (Kenny & Stryker, 1996; London 1992). This is especially problematic for students attending institutions where the predominant racial, ethnic, or religious culture differs from their own and where they may encounter a unique set of adjustment challenges (Allen, 1992).

Implications

Previous studies of first-generation students tended to attribute their lower levels of academic and social engagement and learning and intellectual development to the immutable characteristic of being born to parents who did not go to college. Such findings may have been largely due to the analytical approaches employed. The findings from this study suggest that low levels of engagement are an indirect result of being the first in one's family to go to college and are more directly a function of lower educational aspirations and living off campus. Thus, those committed to improving success rates of first-generation students should

address these proximate causes. Admissions officers could design presentations and publications specifically for first-generation students that emphasize the behaviors common to successful first-generation students who have graduated from the institution. To raise educational aspirations, institutions could work with local school systems in implementing programs akin to Project GEAR UP that focus on raising educational aspirations, including postbaccalaureate degree work. Workshops for advisors and others who may work closely with first-generation students should address issues that may be particularly relevant to this group; at the least, advisors should know who among their advisees are the first in their family to go to college and should discuss on multiple occasions how students can get involved in activities inside and outside the classroom that will increase their overall level of engagement with learning resources and that will promote greater social and academic integration.

If an institution is serious about improving first-generation student success rates, then it should require them to live on campus at least for the first year of college. For low-income first-generation students, such a policy will clearly require additional financial assistance. Innovative work-study or co-op arrangements should be explored as ways to offset differences in cost between living on and off campus or at home. Of course, for older students with families and full-time jobs, this is not an option. In those instances, innovative approaches are needed that attract nontraditional students and their families to spend time on the campus.

In addition, more research is needed to understand better the causal connections related to the academic success of first-generation college students. It is widely believed that studies using large national data sets are superior to single-institution studies because national data are more likely to produce results that can be generalized across institutional contexts. At the same time, national data can obscure the impact of institutional interventions. For example, it is possible that in this study some first-generation students participated in educational programs designed to improve their chances for success in college. Single-institution studies are better situated to consider such confounding factors.

In *Lives on the Boundary* (1989), Mike Rose (who directed the writing program at UCLA) tells of how overwhelmingly strange he found the college classroom as a first-year student. The first in his family to go to college, Rose described himself in Perry's (1970) terms as the classic "dualistic" teenager. He lived at home. After several weeks of one confusing class after another, in which he did not understand the words teachers and classmates were using let alone the relationships between concepts they represented, he concluded that he lacked the ability to do college-level work. It is likely that many first-generation students,

especially those from the poorest backgrounds, have experiences similar to those of Rose and find almost everything about the campus to be strange, perhaps even off-putting. If they do not hold the same educational aspirations as their peers and do not establish informal social networks of support to the extent that their counterparts who live on campus do, we should not be surprised that a disproportionately high number engage at lower levels in college activities and leave college prematurely.

Conclusion

Some form of postsecondary education is now within reach of virtually everyone in the U.S., but not all students are equally likely to succeed. Helping those who are first in their families to go to college is challenging for many reasons, one of the more important of which is that many first-generation students do not engage in the wide range of academic and social activities that the research shows are associated with success in college. This appears to be a function of students' educational aspirations and their choice of where to live during college.

An institution of higher education cannot change the lineage of its students. But it can implement interventions that increase the odds that first-generation college students "get ready," "get in," and "get through" by changing the way those students view college and by altering what they do after they arrive.

APPENDIX

Scale/Items/Reliability	Scoring
<i>Female Student</i>	
Sex	Female=1; Male=0
<i>Minority Student</i>	
What is your racial or ethnic identification?	Native American, Asian, African American, Mexican-American Puerto Rican, Other Hispanic=1; Caucasian=0
<i>Pursue Advanced Degree</i>	
Do you expect to enroll for an advanced degree when, or if, you complete your undergraduate degree?	Yes=1; No=0
<i>Live on Campus</i>	
Where do you now live during the school year?	Dormitory or other campus housing=1; residence (house, apartment, etc.) within walking distance of the institution, residence (house, apartment, etc.) within driving distance, fraternity or sorority house=0
<i>Library Experiences</i> $\alpha = 0.82$	
Used the library as a quiet place to read or study materials you brought with you.	Never=1; Occasionally=2; Often=3; Very Often=4
Found something interesting while browsing in the library.	
Asked a librarian or staff member for help in finding information on some topic.	
Read assigned materials other than textbooks in the library (reserve readings, etc.).	
Used an index or database (computer, card catalog, etc.) to find material on some topic.	
Developed a bibliography or reference list for a term paper or other report.	
Gone back to read a basic reference or document that other authors referred to.	
Made a judgment about the quality of information obtained from the library, World Wide Web, or other sources.	
<i>Active and Collaborative Learning</i> $\alpha=0.70$	
Contributed to class discussions.	Never=1; Occasionally=2; Often=3; Very Often=4
Developed a role play, case study, or simulation for a class.	
Worked on a class assignment, project, or presentation with other students.	
Tried to explain material from a course to someone else (another student, friend, co-worker, family member).	
Participated with other students in a discussion with one or more faculty members outside of class.	
Worked with a faculty member on a research project.	
<i>Writing Experiences</i> $\alpha = 0.79$	
Used a dictionary or thesaurus to look up the proper meaning of words.	Never=1; Occasionally=2; Often=3; Very Often=4
Thought about grammar, sentence structure, word choice, and sequence of ideas or points as you were writing.	
Asked other people to read something you wrote to see if it was clear to them.	
Referred to a book or manual about writing style, grammar, etc.	

APPENDIX (*Continued*)

Revised a paper or composition two or more times before you were satisfied with it.

Asked an instructor or staff member for advice and help to improve your writing.

Prepared a major written report for class (20 pages or more).

Interaction with Faculty $\alpha = 0.88$

Talked with you instructor about information related to a course you were taking (grades, make-up work, assignments, etc.)

Never=1; Occasionally=2; Often=3; Very Often=4

Discussed your academic program or course selection with a faculty member.

Discussed ideas for a term paper or other class project with a faculty member.

Discussed your career plans and ambitions with a faculty member.

Worked harder as a result of feedback from an instructor.

Socialized with a faculty member outside of class (had a snack or soft drink, etc.).

Asked your instructor for comments and criticisms about your academic performance.

Worked harder than you thought you could to meet an instructor's expectations and standards.

Personal Experiences $\alpha = 0.84$

Told a friend or family member why you reacted to another person the way you did.

Never=1; Occasionally=2; Often=3; Very Often=4

Discussed with another student, friend, or family member why some people get along smoothly, and others do not.

Asked a friend for help with a personal problem.

Read articles or books about personal growth, self-improvement, or social development.

Identified with a character in a book, movie, or television show and wondered what you might have done under similar circumstances.

Taken a test to measure your abilities, interests, or attitudes.

Talked with a faculty member, counselor, or other staff member about personal concerns.

Interaction with Students $\alpha = 0.91$

Became acquainted with students whose interests were very different from yours.

Never=1; Occasionally=2; Often=3; Very Often=4

Became acquainted with students whose family background (economic, social) was different from yours.

Became acquainted with students whose age was different from yours.

Became acquainted with students whose race or ethnic background was different from yours.

Became acquainted with students from another country.

Had serious discussions with students whose philosophy of life or personal values were very different from yours.

Had serious discussions with students whose political opinions were very different from yours.

Had serious discussions with students whose religious beliefs were very different from yours.

APPENDIX (Continued)

Had serious discussions with students whose race or ethnic background was very different from yours.

Had serious discussions with students from a country different from yours.

Topics of Conversation $\alpha = 0.87$

Current events in the news.

Never=1; Occasionally=2; Often=3; Very Often=4

Social issues such as peace, justices, human rights, equality, race relations.

Different lifestyles, customs, and religions.

The ideas and views of other people such as writers, philosophers, historians.

The arts (painting, poetry, dance, theatrical productions, symphony, movies, etc.)

Science (theories, experiments, methods, etc.)

Computers and other technologies.

Social and ethical issues related to science and technology, such as energy, pollution, chemicals, genetics, military use.

The economy (employment, wealth, poverty, debt, trade, etc.).

International relations (human rights, free trade, military activities, political differences, etc.).

Quality of the Academic Environment $\alpha=0.69$

Emphasis on developing academic, scholarly, and intellectual qualities.

Emphasis on developing aesthetic, expressive, and creative qualities.

Emphasis on developing critical, evaluative, and analytical qualities.

Quality of the Interpersonal Environment $\alpha=0.69$

Relationships with other students.

Weak Emphasis=1 to Strong Emphasis=7

Competitive, Uninvolved, Sense of Alienation=1 to Friendly, Supportive, Sense of belonging =7

Relationships with administrative personnel and offices.

Relationships with faculty members.

Rigid, Impersonal, Bound by Regulations=1 to Helpful, Considerate, Flexible=7

Remote, Discouraging, Unsympathetic=1 to Approachable, Helpful, Understanding, Encouraging=7

Academic Integration $\alpha = 0.78$

Tried to see how different facts and ideas fit together.

Summarized major points and information from your class notes or readings.

Applied material learned in a class to other areas (your job or internship, other courses, relationships with friends, family, co-workers, etc.).

Used information or experience from other areas of your life (job, internship, interactions with others) in class discussions or assignments.

Worked on a paper or project where you had to integrate ideas from various sources.

Social Integration $\alpha = 0.86$

Referred to knowledge you acquired in your reading or classes.

Explored different ways of thinking about the topic.

Never=1; Occasionally=2; Often=3; Very Often=4

Never=1; Occasionally=2; Often=3; Very Often=4

APPENDIX (Continued)

Referred to something one of your instructors said about the topic.	
Change your opinion as a result of the knowledge or arguments presented by others.	
Persuaded others to change their minds as a result of the knowledge or arguments you cited.	
<i>Gains in General Education</i> $\alpha = 0.80$	
Gaining a broad general education about different fields of knowledge.	Very Little=1; Some=2; Quite a Bit=3; Very Much=4
Developing an understanding and enjoyment of art, music, and drama.	
Broadening your acquaintance with and enjoyment of literature.	
Seeing the importance of history for understanding the present as well as the past.	
Gaining knowledge about other parts of the world and other people (Asia, Africa, South America, etc.).	
Becoming aware of different philosophies, cultures, and ways of life.	
<i>Gains in Communication Skills</i> $\alpha = 0.72$	
Writing clearly and effectively.	Very Little=1; Some=2; Quite a Bit=3; Very Much=4
Presenting ideas and information effectively when speaking to others.	
Using computers and other information technology.	
<i>Gains in Interpersonal Skills</i> $\alpha = 0.82$	
Developing your own values and ethical standards.	Very Little=1; Some=2; Quite a Bit=3; Very Much=4
Understanding yourself, your abilities, interests, and personality.	
Developing the ability to get along with different kinds of people.	
Developing the ability to function as a team member.	
<i>Gains in Intellectual Skills</i>	
Thinking analytically and logically.	Very Little=1; Some=2; Quite a Bit=3; Very Much=4
Putting ideas together, seeing relationships, similarities, and differences between ideas.	
Learning on your own, pursuing ideas, and finding information you need.	
Learning to adapt to change (new technologies, different jobs or personal circumstances, etc.).	

Notes

¹The first phase of the analysis determined whether the covariance matrix implied by the structural equation model and the measurement model differed significantly from the observed covariance matrix. Maximum likelihood estimation was used because it provided goodness-of-fit measures that were robust with respect to departures from multivariate normality (Hu & Bentler, 1999). Two measures were used to assess model fit: the Root Mean Square Error of the Approximation (RMSEA) and the Standardized Root Mean Square Residuals (SRMR). In addition to being robust with respect to departures from multivariate normality, both indices were relatively insensitive to the effects of sample size (Hu & Bentler, 1998, 1999). The RMSEA was sensitive to misspecification

of the measurement model and rewarded models that were more parsimonious. The SRMR was sensitive to misspecification of the structural equation model. Based on their Monte Carlo studies, Hu and Bentler (1999) concluded that acceptable models would produce RMSEA coefficients less than or equal to 0.07 and SRMR coefficients less than or equal to 0.09.

The first model tested was an exact representation of the structural equation and measurement models in Figure 1. Based on the results of the goodness-of-fit tests for the initial model, a specification search was planned to identify a model that provided a better representation of the data. Initially, *t*-values for the effect parameters in the model were examined to determine if any nonsignificant paths between latent variables could be eliminated. Paths were eliminated if the effect parameters were not statistically significant and if excluding the paths did not adversely affect goodness of model fit. Next, modification indices for bivariate relationships among the measured variables were examined to determine if they should be included in the model. A bivariate relationship was included if it was reasonable and substantially improved model fit.

²This phase of the data analysis determined whether there were significant interactions between first-generation status and the effects of engagement on educational outcomes. Covariance matrices for the two groups were calculated and analyzed using a multigroup structural equation model. In the initial model, the patterns and magnitudes of the parameters in the model were constrained to be identical for the two groups. Both the RMSEA and SRMR statistics were used to assess goodness of model fit.

³In the third phase of the data analysis, we calculated means for second-generation students and then subtracted them from the scores of all participants. In this way, the means for traditional (i.e., second-generation) students were set to zero, and the means for first-generation students were expressed as deviations about the means for traditional students. Although not required, centering the means of one group simplified interpretation of the results. Initially, the measurement model was used to test whether there were statistically significant differences in the latent variable means for first- and second-generation students, absent any controls for the effects of antecedent constructs in the conceptual model. If no statistically significant differences in factor means were found, no subsequent analyses would be conducted. However, if there were significant differences in the backgrounds, college experiences, and/or learning outcomes of first- and second-generation students, the full structural equation model was used to assess the net effects first-generation status. In the first structural equation model, means for the background characteristics were free to vary across the two groups, but intercepts for the college experience and outcomes variables were constrained to be the same for both groups. This model represented a scenario in which differences in the factor means for the college experiences and outcomes of first- and second-generation students were indirectly related to first-generation status owing to differences in the characteristics of first- and second-generation students. Based on the results of goodness-of-fit tests, a specification search was planned to determine if freeing intercepts would produce a significantly better representation of the observed data.

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