

EXPLORING RACE DIFFERENCES IN CORRELATES OF SENIORS' SATISFACTION WITH UNDERGRADUATE EDUCATION

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This study employed multiple linear regression and decision tree analysis to examine the correlates of overall satisfaction with undergraduate education for white, Asian American, Latino and African American seniors enrolled at 17 doctoral/research universities. Satisfaction with the overall quality of instruction and social involvement were the strongest predictors of overall satisfaction for all seniors. The predictive importance of other measures of the academic experience, social integration and performance varied both within and across race groups. Findings argue for adopting a variety of institutional strategies to address the needs of different segments of the undergraduate population.

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KEY WORDS: race differences; outcomes of college; institutional effectiveness; student satisfaction; multiple regression; hierarchical clustering.

INTRODUCTION

There are a number of compelling reasons for examining student satisfaction as an aspect of the undergraduate experience. From a consumer-oriented perspective, students typically invest substantial time, energy and money in their college education; colleges should give credence to students' evaluations of the worth of those expenditures (Astin, 1993). Research has shown that satisfaction is an important mediating factor in persistence, graduation and grade achievement (Aitken, 1982; Astin, 1993; Bean, 1980; Cabrera, Nora, and Castaneda, 1993; Pascarella, Smart, and Ethington, 1986; Spady, 1971). Compared to measures of student performance, satisfaction is an aspect of the

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educational experience over which institutions conceivably have greater influence (Gielow and Lee, 1988). Taking a more instrumental view, institutions stand to benefit from enhancing the satisfaction of their students. Satisfied students are more likely to endorse their colleges to prospective students (Astin, 1993; Eimers and Pike, 1997). Satisfaction with the undergraduate experience is also positively associated with alumni giving (Clotfelter, 2003; Monks, 2003). Indeed, to repeat an oft-cited quote from Astin, "...it is difficult to argue that student satisfaction can be legitimately subordinated to any other educational outcome" (1993, p. 273).

The first wave of satisfaction research was conducted in the 1970s to mid 1980s (Bean and Bradley, 1986; Betz, Starr, and Menne, 1972; Endo and Harpel, 1982; Hearn, 1985; Morstain, 1977; Pervin, 1967; Schmidt and Sedlacek, 1972; Sturtz, 1971). The last decade has seen renewed scholarly interest in this topic (Bean and Vesper, 1994; Knox, Lindsay, and Kolb, 1992; Pike, 1991, 1993; Sanders and Burton, 1996; Thomas and Galambos, 2004; Umbach and Porter, 2002). Two substantive limitations of the extant literature must be acknowledged. First, with the notable exception of Knox and colleagues' (Knox et al., 1992) use of a national data set, the majority of research on student satisfaction has been conducted at single institutions (Bean and Bradley, 1986; Bean and Vesper, 1994; Endo and Harpel, 1982; Morstain, 1977; Pike, 1993; Sanders and Burton, 1996; Thomas and Galambos, 2004; Umbach and Porter, 2002). Such studies are useful for suggesting interventions that may effectively enhance student satisfaction at a particular institution, but their results cannot easily be generalized to other institutions.

Second, it is clear that the undergraduate experience can vary significantly for students of different races/ethnicities. For example, studies document that students of color experience the campus environment as less supportive than their white peers (Loo and Rolison, 1986; Pascarella, Edison, Nora, Hagedorn, and Terenzini, 1996; Schwitzer, Griffin, Ancis, and Thomas, 1999) and are less likely to persist to graduation (National Center for Education Statistics, 1995; Porter, 1990; The Education Trust, 2004). However, there is limited and conflicting evidence concerning the association between race and satisfaction with college. Several studies have found significant race differences in satisfaction (Ancis, Sedlacek, and Mohr, 2000; Eimers and Pike, 1997; Helm, Sedlacek, and Prieto, 1998; Rorhlick, Alvarado, Zaruba, and Kallio, 1998; Sanders and Burton, 1996; Umbach and Porter, 2002) but others have not (Knox et al., 1992; Thomas and Galambos, 2004). Further, most of the research designs provide limited understanding of race-associated differences in the processes shaping satisfaction. We

located only two studies that estimated separate models of satisfaction by race (Eimers and Pike, 1997; Sanders and Burton, 1996); in both, small sample sizes necessitated combining students of color into a non-white race category. Other studies (Knox et al., 1992; Umbach and Porter, 2002) have simply incorporated indicators for race in pooled-race models.

PURPOSE OF STUDY

The current study attempts to address the above limitations by examining similarities and differences in the correlates of overall satisfaction with undergraduate education for seniors of different races. We draw upon data from multiple institutions and employ two analytical methods—linear regression and decision tree analysis—to compare and contrast the correlates of overall satisfaction for white, Asian American, Latino and African American seniors.

This study poses two major research questions:

1. How do the correlates of seniors' overall satisfaction with their undergraduate education differ by race?
2. Within race, how do the correlates of overall satisfaction differ for seniors who are more satisfied and less satisfied?

To address the first research question, we estimate separate regression models for each race group, thus permitting identification of the strongest correlates of overall satisfaction within race. We use decision tree analysis—a hierarchical clustering method—to address the second question. Decision tree analysis is a data mining technique; as such, it is not appropriate for testing hypotheses and is vulnerable to spurious findings. However, it is a useful method for exploring specific questions within data sets. When used as a complement to more rigorous data analysis methods, decision tree analysis can provide additional information for stimulating campus discussions about student satisfaction. Recent research conducted by Thomas and Galambos (2004) has demonstrated the ability of data clustering analysis to identify distinct predictors of satisfaction for different segments of a student body. The current study seeks to extend their work by comparing the results of regression and hierarchical clustering analyses for seniors of different races. The combined use of these analytical methods should provide a more disaggregated and robust picture of the correlates of satisfaction.

CONCEPTUAL FRAMEWORK

Much of the research on satisfaction stems from the work of Spady (1970) and Tinto (1975, 1993). Consistent with these and other models of college impact (Bean, 1980; Pascarella and Terenzini, 1991), we conceptualize satisfaction with undergraduate education as a function of four general constructs: (1) students' background characteristics, (2) academic integration, (3) social integration, and (4) performance in college.

Students enter college with an array of dispositions, values and goals that are the product, in part, of their family and pre-college academic experiences. These background characteristics are expected to shape the ease with which students become integrated within the academic and social systems of their college (Spady, 1970). As noted above, extant research provides conflicting findings concerning the association of race with satisfaction. There is also mixed evidence concerning the relationship of gender (Bean and Vesper, 1994; Endo and Harpel, 1982; Pascarella et al., 1986) and socioeconomic status (Bean and Vesper, 1994; Knox et al., 1992) to satisfaction. Prior research suggests that low parental educational attainment may hamper students' efforts at social and academic integration (Terenzini et al., 1994). Students' financial status and, in particular, their concern about paying for college is expected to condition their satisfaction with college (Cabrera et al., 1993; Cabrera, Stampen, and Hansen, 1990). In addition, students' high school academic achievement and degree aspirations may affect their academic integration and performance in college (Bean, 1980; Nettles, Thoeny, and Gosman, 1986; Tinto, 1993) and, ultimately, the extent to which they are satisfied with their undergraduate experience (Bean and Bradley, 1986).

We expect measures of students' integration within the academic systems of their college to significantly shape overall satisfaction. Studies have found a positive relationship between satisfaction and students' evaluation of the quality of instruction (Bean and Vesper, 1994) and level of intellectual stimulation in their courses (Spady, 1971). Researchers have also reported a positive relationship between faculty-student interaction and satisfaction (Endo and Harpel, 1982; Pascarella, 1980; Pascarella et al., 1986; Pike, 1991).

Social integration has typically been operationalized as a measure of students' friendships, extracurricular involvement, or subjective sense of "fitting in" or belonging at the institution. Research shows a positive relationship between having a satisfying social life and overall satisfaction (Bean and Bradley, 1986; Bean and Vesper, 1994; Spady, 1971). There have been mixed findings concerning the relationship of extracurricular involvement and satisfaction. In one study, involvement in campus

organizations was not significantly related to satisfaction (Bean and Bradley, 1986) while in another, attending extracurricular events was positively related to satisfaction (Pike, 1989). In contrast, there is strong and consistent evidence of a positive association between students' sense belonging at the institution and their satisfaction (Morstain, 1977; Pervin, 1967; Thomas and Galambos, 2004). Satisfaction with racial/ethnic diversity on campus has been less frequently included as a measure of social integration. Thomas and Galambos (2004) found a positive association between this measure and general satisfaction with college.

There is also conflicting evidence concerning the relationship of academic performance and satisfaction with college. Some researchers have reported a significant positive association between college grade point average and satisfaction (Aitken, 1982; Knox et al., 1992; Liu and Jung, 1980). Others have found that satisfaction has a stronger influence on grades than grades have on satisfaction (Bean and Bradley, 1986; Pike, 1991). Research suggests there is a positive relationship between perceived learning and satisfaction with college (Spady, 1971).

To what extent might we expect race-associated differences in the correlates of overall satisfaction? The evidence is somewhat equivocal. Several studies have found few substantive differences between the correlates of adjustment to college for minority and nonminority students (Cabrera, Nora, Terenzini, Pascarella, and Hagedorn, 1999; Eimers and Pike, 1997; Nettles et al., 1986). Conversely, other research suggests academic integration (Donovan, 1984; Terenzini et al., 1994), feeling that one belongs on campus (Sanders and Burton, 1996; Sedlacek, 1987) and perceptions of racial prejudice (Fleming, 1984; Hurtado, Carter, and Spuler, 1996; Loo and Rolison, 1986) may be stronger correlates of overall satisfaction for minority students, while concerns about financing college (Nora, Cabrera, Hagedorn, and Pascarella, 1996), and satisfaction with peer and faculty interactions may be stronger correlates of satisfaction for nonminority students (Nora et al., 1996; Sanders and Burton, 1996; Terenzini et al., 1994). Given this conflicting evidence, we view the current study as an opportunity to systematically explore similarities and differences in the correlates of overall satisfaction for students of different races.

METHODOLOGY

Sample and Data

Data were drawn from a senior survey conducted in spring 2002 by 17 private, selective, research universities from across the country. Research universities afford a worthy context for examining the

correlates of student satisfaction. They have high status among postsecondary institutions and attract very capable and motivated students (Geiger, 1986; Graham and Diamond, 1997). Although they comprise a very small proportion of all postsecondary institutions, they have higher retention and graduation rates than less selective institutions and award almost one-third of all baccalaureate degrees (Boyer Commission on Educating Undergraduates in the Research University, 1998). They are also the target of sharp criticism for their alleged neglect of undergraduate education in favor of their research mission (Boyer Commission, 1998; Education Commission of the States, 1995; Wingspread Group on Higher Education, 1993). Thus, for research universities, measures of students' academic performance (i.e., retention, grade achievement and graduation rates) may be of less institutional concern than are noncognitive aspects of the undergraduate experience.

The survey instrument asked seniors about their educational and employment plans, involvement in campus activities, satisfaction with the undergraduate experience, and gains in knowledge and abilities. The survey was administered via the Internet and mail to seniors enrolled in their final semester of undergraduate study. Completed surveys were received from 14,320 of 24,585 eligible seniors for an overall response rate of 58%. The following subgroups were excluded from this analysis: international students, Native American students, students reporting multiple races that did not include African American or Latino, and students who did not report their race/ethnicity. Mean substitutions, calculated separately by race, were used to replace missing values in the independent variables (missing data did not exceed 2% on any variable). Seniors who reported that a particular survey item was "not relevant" were excluded from the analysis of that item. After listwise deletion of cases with "not relevant" responses, the final sample size was 11,606: 8022 white seniors, 2106 Asian American seniors, 745 Latino seniors, and 733 African American seniors.

Variables

Broadly speaking, satisfaction with college may be understood as students' personal evaluations of their college experiences. However, the aspects of the college experience encompassed by this definition have varied across studies. Several researchers have constructed multi-item scales that measure students' satisfaction with their academic experiences including experiences with faculty, curricular offerings, intellectual growth, and/or classroom facilities (Endo and Harpel, 1982; Knox et al., 1992; Morstain, 1977). Bean and colleagues (Bean and Bradley,

1986; Bean and Vesper, 1994) used a three-item scale of students' satisfaction with their role of being a student as their dependent variable. Other studies have focused on students' overall satisfaction with their major (Hearn, 1985; Umbach and Porter, 2002). Still others have used a single and more global measure of satisfaction – students' evaluations of their overall experiences at their institution—as a dependent variable, while employing measures of satisfaction with more specific aspects of the college experience (i.e., academics, interaction with faculty, social life) as independent variables (Pike, 1993; Sanders and Burton, 1996; Thomas and Galambos, 2004). Consistent with this latter approach, the dependent variable in the current study was seniors' ratings of overall satisfaction with their undergraduate education. The original version of this variable had five response categories: very dissatisfied, generally dissatisfied, ambivalent, generally satisfied, and very satisfied. Given the negatively skewed distribution of the data, the first three response categories were collapsed to create a more normally distributed three-category variable (dissatisfied, generally satisfied, very satisfied). Operational definitions, factor loadings and reliability coefficients for all variables are shown in Table 1.

Race provided the criterion for comparative analyses. For descriptive analyses, race was forced into single categories: white, Asian American, African American and Latino. In a small number of cases ($n=44$) where students reported being both African American and Latino, students were coded as African American. For multivariate analyses, race was measured with dummy variables for white, Asian American, African American and Latino students. The latter two categories were not mutually exclusive; that is, students who reported being African American and Latino were counted in both race categories.

There were 19 independent variables employed in the model. Initially, we intended to reduce the independent variables to a smaller number of factors reflecting measures of academic integration, social integration, and gains achieved in college. Factor analysis performed on the pooled sample suggested a three-factor solution for integration measures corresponding to constructs for satisfaction with instructional quality, interaction with faculty, and social involvement on campus. However, these solutions did not hold up consistently when factor analysis was performed within each race group. Some variation was evident across white, Asian American and Latino seniors, but the largest differences were observed in the factor structures and item loadings produced for African American seniors. This argued for retaining most variables as single indicators to allow us to examine their specific association to overall satisfaction within and across race groups. Ultimately, we

TABLE 1. Listing and Operational Definitions of Variables

Variable	Factor loading	Operational definition
Overall satisfaction		Overall satisfaction with undergraduate education (1 = dissatisfied, 2 = generally satisfied, 3 = very satisfied)
Sex		1 = female, 0 = male
White		1 = yes, 0 = no
Asian American		1 = yes, 0 = no
Latino		1 = yes, 0 = no
African American		1 = yes, 0 = no
Mother less than BA		1 = yes, 0 = no (reference is graduate degree)
Mother has BA		1 = yes, 0 = no (reference is graduate degree)
Father less than BA		1 = yes, 0 = no (reference is graduate degree)
Father has BA		1 = yes, 0 = no (reference is graduate degree)
Financial impact		Impact on family of paying for college (1 = none/slight, 2 = moderate, 3 = considerable, 4 = severe)
Education aspirations: master's		1 = yes, 0 = no (reference is no plans for advanced degree)
Education aspirations: PhD or 1st professional		1 = yes, 0 = no (reference is no plans for advanced degree)
Satisfaction: overall quality of instruction ^a		Satisfaction with overall quality of instruction
Satisfaction: instruction in major ^a		Satisfaction with quality of instruction in courses in major field
Satisfaction: intellectual excitement in major ^a		Satisfaction with intellectual excitement in courses in major
Satisfaction: class size ^a		Satisfaction with size of classes
Satisfaction: faculty availability ^a		Satisfaction with faculty availability outside classroom

Satisfaction: social involvement		3-item scale of satisfaction with social involvement on campus. $\alpha = 0.77$
Campus community ^a	0.80	Satisfaction with sense of community on campus
Community where live ^a	0.74	Satisfaction with sense of community where live
Social life on campus ^a	0.72	Satisfaction with social life on campus
Satisfaction: extracurricular opportunities ^a		Satisfaction with opportunities to participate in extra-curricular activities
Satisfaction: campus diversity ^a		Satisfaction with ethnic/racial diversity of the campus
Grades		Self-report of overall grades: 1 = B or less 2 = B+, 3 = A-, 4 = A
Intellectual gains		6-item scale of gains in intellectual skills and abilities since entering college. $\alpha = 0.78$
Think analytically ^b	0.74	Think analytically and logically
Think creatively ^b	0.69	Create original ideas and solutions
Acquire new skills ^b	0.68	Acquire new skills and knowledge on own
Execute projects ^b	0.64	Plan and execute complex projects
Indepth knowledge ^b	0.63	Gain indepth knowledge of a field
Synthesize ideas ^b	0.61	Synthesize and integrate ideas and information
Self-development gains		3-item scale of gains in self-development since entering college. $\alpha = 0.68$
Develop self-esteem ^b	0.80	Develop self-esteem/self-confidence
Resolve conflicts ^b	0.79	Resolve interpersonal conflicts positively
Understand self ^b	0.66	Understand myself: abilities, interests, limitations, personality

^a1 = very dissatisfied, 2 = generally dissatisfied, 3 = generally satisfied, 4 = very satisfied.

^b1 = weaker now, 2 = no change, 3 = stronger now, 4 = much stronger now.

employed three scaled factors; these corresponded to social involvement, gains in self-development and gains in intellectual abilities.

Our multivariate model of overall satisfaction included measures of students' sociodemographic characteristics: gender, maternal and paternal educational attainment, and perceived financial impact on the family of paying for college. Our data set did not contain measures of high school academic performance. We used students' education aspirations as a proxy for entering academic ability. Academic integration was measured by single indicators of students' satisfaction with the overall quality of instruction, quality of instruction in the major, and intellectual excitement in major courses. Social integration was operationalized with three measures: a three-item social involvement factor reflecting satisfaction with the sense of community and social life on campus, and with single indicators for satisfaction with extracurricular opportunities and campus racial/ethnic diversity. Finally, achievement in college was measured with a single indicator of self-reported grades, and scaled factors of perceived gains in intellectual abilities and self-development.

Analyses

We conducted factor analyses, using principal components as the extraction method and varimax rotation, to create scales of social involvement and estimated gains. Race differences in variables were tested with ANOVA. We used ordinary least squares regression to identify statistically significant predictors of overall satisfaction for each race. Standardized regression coefficients (β 's) were examined to compare the relative strength of predictors within each race-specific model. Unstandardized coefficients (b 's) were examined to compare the strength of predictors across the models. We tested the statistical significance of race differences in coefficients by estimating regression models on the pooled sample with race-based interaction terms for all predictor variables (i.e., sex*Asian, financial impact*Asian, etc.). In keeping with Pedhazur's (1997) recommendation, a more liberal p value of 0.10 was used when testing the significance of race differences among the unstandardized coefficients.

Decision tree analysis was employed to identify the characteristics and experiences that most differentiate satisfied and dissatisfied seniors. Decision tree analysis is a hierarchical clustering procedure that segments a sample in relation to a specified target variable. This analysis employed the CHAID (chi-squared automatic interaction detector) algorithm to identify mutually exclusive subsets of seniors based on their overall satisfaction. When the target variable is continuous, CHAID

uses *F*-tests to construct a tree of associations. Clustering is performed using one predictor variable at a time. The independent variable with the strongest association to overall satisfaction becomes the first or parent node of the tree. Subsequent nodes (termed child nodes) are created for each category of that variable that has a significantly different relationship with overall satisfaction. Using this process, successive levels of parent and child nodes are created until no further significant associations with the target variable are found.

We estimated separate decision trees for each race group. Stopping rules for creating nodes are set by the analyst. To aid interpretability and comparability of results, we restricted the trees to five levels of nodes and adjusted stopping rules for sample size. For white seniors, a minimum of 500 cases was set as the stopping rule for creating parent nodes and a minimum of 250 cases was set for creating child nodes. For Asian American seniors, the parent/child stopping rules were set at 125 and 65 cases respectively, and for African American and Latino seniors, the parent/child stopping rules were set at 50 and 25 cases, respectively.

RESULTS

Descriptive Analyses

As seen in Table 2, there were statistically significant differences by race on all model variables except aspiring to earn a master's degree and perceived gains in self-development. Asian American and African American seniors reported significantly lower satisfaction with college than white and Latino seniors, and were generally less satisfied with their instructional experiences. White seniors reported the highest satisfaction with aspects of the campus social environment. The largest race differences were associated with parental education, satisfaction with racial/ethnic diversity on campus and grades. Compared to white and Asian American seniors, Latino and African American seniors had lower maternal and paternal educational attainment. Latino and, particularly, African American seniors were also less satisfied with campus diversity and reported achieving lower grades. Despite the statistical significance of these differences, an examination of effect sizes (calculated as eta-squared) indicated that race accounted for no more than 5% of the variability in any measure.

Regression Analyses

Results of regression analyses are shown in Table 3. Adjusted R^2 values for the regression models ranged from 0.36 for Asian American

TABLE 2. Variable Means and Standard Deviations by Race

Variable	White		Asian Am		Latino		African Am		F	η^2
	Mean	SD	Mean	SD	Mean	SD	Mean	SD		
Overall satisfaction	2.25	0.67	2.06	0.65	2.16	0.69	2.00	0.67	68.29***	0.017
Sex	0.53	0.50	0.56	0.50	0.56	0.50	0.65	0.48	13.85***	0.004
Mother less than BA	0.18	0.38	0.26	0.44	0.46	0.50	0.36	0.48	148.52***	0.037
Mother has BA	0.32	0.47	0.32	0.47	0.24	0.43	0.26	0.44	11.17***	0.003
Father less than BA	0.12	0.33	0.14	0.35	0.38	0.49	0.36	0.48	209.45***	0.052
Father has BA	0.23	0.42	0.18	0.38	0.19	0.40	0.25	0.43	9.87***	0.003
Financial impact	2.30	0.91	2.52	0.89	2.47	0.97	2.52	0.93	43.17***	0.011
Aspire to master's	0.29	0.45	0.30	0.46	0.30	0.46	0.25	0.44	2.55	0.001
Aspire to PhD/1st professional	0.52	0.50	0.56	0.50	0.54	0.50	0.62	0.49	11.92***	0.003
Satisfaction: overall quality of instruction	3.29	0.63	3.10	0.63	3.29	0.63	3.16	0.62	55.83***	0.014
Satisfaction: instruction in major	3.37	0.69	3.14	0.73	3.35	0.72	3.21	0.72	65.86***	0.017
Satisfaction: intellectual excitement in major	3.08	0.69	2.29	0.73	3.08	0.67	2.99	0.69	29.95***	0.008
Satisfaction: class size	3.17	0.68	3.05	0.67	3.16	0.67	3.18	0.67	19.56***	0.005
Satisfaction: faculty availability	3.32	0.65	3.18	0.66	3.26	0.68	3.23	0.66	25.98***	0.007
Satisfaction: social involvement	2.22	0.53	2.11	0.52	2.12	0.54	1.98	0.52	71.12***	0.018
Satisfaction: extracurricular opportunities	3.41	0.63	3.32	0.65	3.33	0.68	3.32	0.64	17.34***	0.004
Satisfaction: campus diversity	2.93	0.76	2.95	0.78	2.64	0.95	2.38	0.85	136.98***	0.034
Grades	2.51	0.91	2.45	0.92	2.05	0.90	1.73	0.78	205.60***	0.051
Intellectual gains	2.04	0.30	2.00	0.31	2.06	0.32	2.02	0.30	14.22***	0.004
Self-development gains	2.18	0.44	2.19	0.45	2.19	0.46	2.22	0.47	1.24	0.000

TABLE 3. (Continued)

	White (n = 8022)			Asian American (n = 2106)			Latino (n = 745)			African American (n = 733)		
	b	β	Sig	b	β	Sig	b	β	Sig	b	β	Sig
<i>Social integration</i>												
Satisfaction: social involvement	0.320	0.250	***###	0.241	0.193	***##	0.215	0.167	***#	0.254	0.196	***
Satisfaction: extra curricular opportunities	0.053	0.049	***	0.032	0.032		0.046	0.044		0.038	0.036	
Satisfaction: campus diversity	-0.004	-0.005	##	0.010	0.012		0.016	0.022		0.067	0.085	*##
<i>Performance</i>												
Overall grades	0.057	0.077	***###	0.090	0.127	***#	0.104	0.136	***#	0.087	0.101	***
Intellectual gains	0.202	0.090	***	0.241	0.115	***	0.264	0.121	***	0.303	0.135	***
Self-development gains	0.140	0.092	***	0.130	0.090	***	0.150	0.099	**	0.049	0.034	#
Adjusted R ²	0.383			0.355			0.451			0.370		

Asterisks denote coefficients statistically significant within race: *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$. Pound signs denote unstandardized coefficients significantly different compared to other races: # $p < 0.10$, ## $p < 0.05$, ### $p < 0.01$.

seniors to 0.45 for Latino seniors. Similarities in the correlates of overall satisfaction were evident. Satisfaction with various aspects of instruction, social involvement, grades and perceived gains in intellectual abilities emerged as positive and statistically significant predictors in all models. Seniors' background characteristics, and their satisfaction with extracurricular opportunities and campus ethnic/racial diversity were generally weaker predictors of overall satisfaction. However, differences in the relative importance of correlates were also observed across race groups.

Background characteristics

The relationship of background characteristics with overall satisfaction varied significantly by race. Asian American seniors were the only group for whom being female was significantly associated with overall satisfaction. All else being equal, Asian American females were more satisfied with their undergraduate experience than their male peers. The most striking race-related differences were associated with measures of maternal educational attainment and education aspirations. For Latino seniors only, having a mother with less than a bachelor's degree was a statistically significant and comparatively stronger negative predictor of satisfaction; a similar but smaller effect was associated with having a mother with a bachelor's degree. In contrast, lower maternal education was a positive, albeit weaker, correlate of overall satisfaction for Asian American seniors. Seniors' perception of the impact on their family of paying for college was significantly and negatively correlated with the overall satisfaction of white and Asian American seniors. Planning to pursue an advanced degree, either a master's degree or a doctoral or first professional degree, was significantly and positively associated with the overall satisfaction of white and African American seniors. However, the education aspiration coefficients for African American seniors were significantly larger than those for seniors of other races.

Academic integration

Students' instructional experiences, overall and within their major courses, were important correlates of overall satisfaction for all seniors. Satisfaction with the overall quality of instruction was the key predictor within this cluster. It was the strongest predictor of overall satisfaction for African American, Latino and Asian American seniors, and was a significantly stronger predictor for African American seniors compared to seniors of other races. Satisfaction with instructional quality and

intellectual excitement in the major were also statistically significant and moderately important predictors of overall satisfaction for all seniors. Satisfaction with class size was a significant but comparatively less important correlate of overall satisfaction for white and Latino seniors; the coefficient for class size for Latino seniors differed significantly from that for seniors of other races. Satisfaction with faculty availability out of class was a significant and moderately important predictor of overall satisfaction for white and Asian American seniors only.

Social integration

For seniors of all race groups, satisfaction with social involvement was the social integration measure with the strongest relationship to overall satisfaction. Compared to seniors of other races, social involvement satisfaction was a significantly stronger predictor of overall satisfaction for white and Asian American seniors, and comparatively weaker predictor for Latino seniors. Whites were the only race group for whom satisfaction with opportunities to participate in extracurricular activities was significantly associated with overall satisfaction. Satisfaction with racial/ethnic diversity on campus was a statistically significant predictor only for African American seniors. The campus diversity coefficient was significantly larger for African Americans and smaller for Whites than for seniors of other races.

Performance

Self-reported grades and perceived gains in intellectual development were positive and statistically significant predictors of satisfaction for all seniors. However, grades were a comparatively stronger predictor for Asian American and Latino seniors, and weaker predictor for white seniors. Perceived gains in self-development were significantly associated with overall satisfaction for all but African American seniors. The self-development gain coefficient was significantly smaller for African American seniors compared to other races.

Decision Tree Analyses

Figures 1 through 5 display complete decision tree results for each race group. For this study, we found it most instructive to concentrate on the pattern of variables that distinguish the least satisfied seniors from the most satisfied in each race group. Thus, our presentation of decision tree results focuses on these aspects of the tree diagrams.

Before moving to the results, a few words about navigating these diagrams are in order.

The box at the top of each decision tree diagram indicates the dependent variable for the analysis—overall satisfaction with undergraduate education—and the overall mean for the dependent variable for the specified race group. The independent variable with the strongest association to overall satisfaction forms the first level or branch of the tree below the dependent variable. Variables appearing in subsequent levels have statistically significant but progressively weaker associations to overall satisfaction. Each box or “node” shown on a level represents a cluster of seniors. The numeric values appearing above each node refer to score ranges for the associated independent variable. Within each node, “*M*” indicates the mean score for overall satisfaction for seniors within that node; “%” is the percentage of seniors from the race group contained in the node. For every independent variable, each node is associated with a significantly different overall satisfaction score; the node with the lowest overall satisfaction score is displayed on the left and the node with the highest overall satisfaction score is displayed on the right. Nodes from which no subsequent levels are created are deemed “terminal nodes.” In any decision tree diagram, the terminal node to the extreme left of the diagram will represent the cluster of students in the race group with the lowest mean score for overall satisfaction, and the terminal node to the extreme right of the diagram will indicate the cluster of students with the highest mean score for overall satisfaction. Profiles of the predictors associated with being “least satisfied overall” and “most satisfied overall” can be identified by tracing up the path of associations from these extreme nodes to the first level of the tree diagram.

Due to the breadth of the diagram produced, the decision tree results for white seniors are presented in Figs. 1 and 2. As shown in the top box in each diagram, the mean for overall satisfaction for this race group as a whole was 2.25 (where 1 = dissatisfied, 2 = generally satisfied and 3 = very satisfied). For white seniors, satisfaction with the overall quality of instruction was the variable that most differentiated those who were less satisfied with their undergraduate experience from those who were more satisfied. Three nodes were created in this first level, each reflecting a different score range of satisfaction with the overall quality of instruction and a significantly different overall satisfaction score.

Nodes 1 and 2 and their subsequent levels are shown in Fig. 1. The cluster of white seniors represented in node 1 (representing 7.5% of all white seniors) was least satisfied with the overall quality of instruction (the associated score range of 2 or less means they were generally or very dissatisfied); they were also significantly less satisfied with their

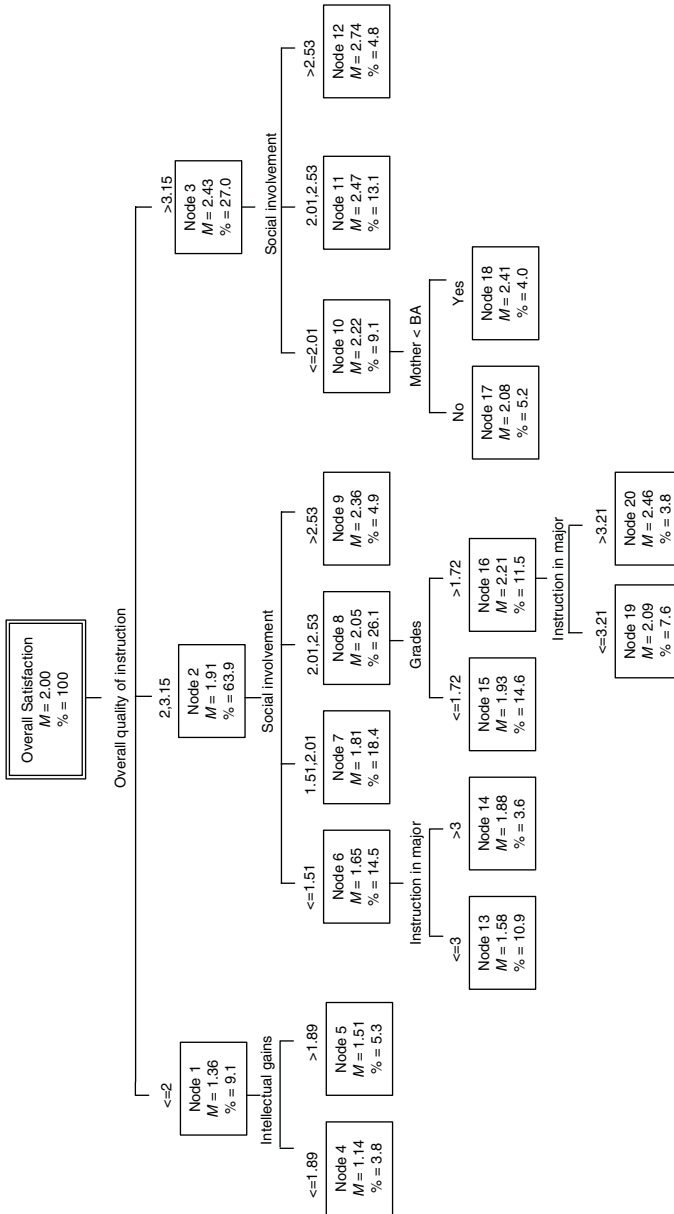


FIG. 2. Decision tree results for white seniors, high satisfaction with overall quality of instruction.

overall education ($M=1.48$) than seniors in nodes 2 ($M=2.13$) and 3 ($M=2.59$). The overall satisfaction of node 1 seniors was further differentiated by their evaluation of intellectual excitement in the major. As shown in node 4, seniors who were generally or very dissatisfied with the level of intellectual excitement in their major courses (a score of 2 or less) also reported significantly lower overall satisfaction ($M=1.40$) than seniors in node 5 who were more satisfied with intellectual excitement in the major ($M=1.58$). In fact, this combination of low satisfaction with overall quality of instruction *and* low satisfaction with intellectual excitement in the major was associated with the lowest overall satisfaction among white seniors.

For white seniors in the middle range of satisfaction with the quality of instruction (node 2), mean overall satisfaction was further differentiated by a mix of academically and socially oriented measures: satisfaction with opportunities for extracurricular involvement, satisfaction with instruction in major courses, perceived gains in intellectual abilities and self-development, satisfaction with social involvement on campus, and aspiring to earn a doctoral or first professional degree.

Moving to the right side of the decision tree for white seniors, as shown in Fig. 2, we see that for seniors who were most satisfied with the overall quality of instruction (node 3), overall satisfaction with undergraduate education was further conditioned by satisfaction with extracurricular opportunities and, following that, by satisfaction with social involvement on campus. The cluster of white seniors with the highest overall satisfaction in this tree (node 33, $M=2.89$) shared the following profile: high satisfaction with the overall quality of instruction (node 3), high satisfaction with opportunities to participate in extracurricular activities (node 10), high satisfaction with social involvement (node 21), and high satisfaction with intellectual excitement in courses in the major (node 33).

There were more similarities than differences in the correlates of overall satisfaction produced by decision tree and regression analyses. Quality of instruction and measures of social involvement were identified in both as the strongest correlates, although their order of relative importance differed in the two analyses. The importance of extracurricular opportunities and perceived gains emerged in both analyses, as did the less important association between education aspirations and overall satisfaction. Weaker correlates from the regression model for Whites (e.g., maternal education, financial impact, class size, faculty availability and campus diversity) did not appear in the decision tree results.

The mean overall satisfaction for Asian American seniors was 2.06 (see Fig. 3). The associated decision tree diagram demonstrates how

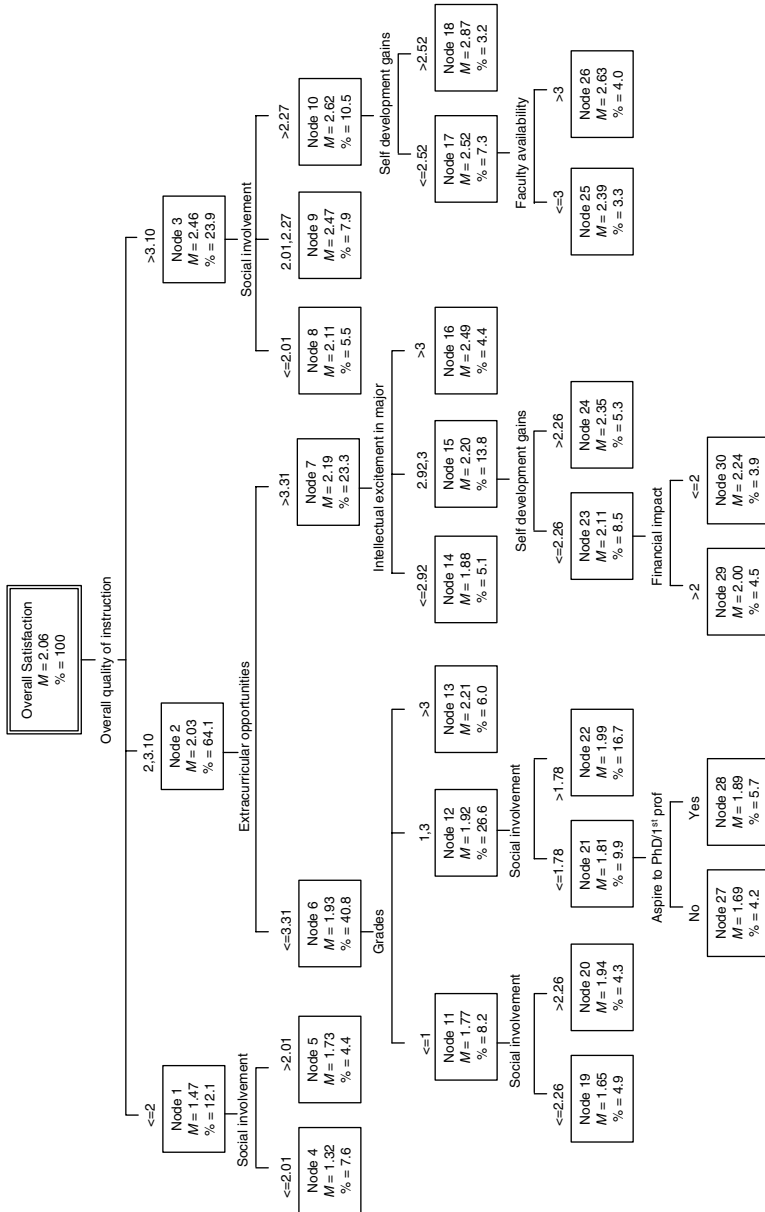


FIG. 3. Decision tree results for Asian American seniors.

overall satisfaction and its correlates varied from this overall mean for different segments of this race group. For Asian American seniors as a whole, overall satisfaction was most strongly associated with satisfaction with the overall quality of instruction. Seniors who were least satisfied with the overall quality of instruction (node 1) reported significantly lower overall satisfaction with their education ($M=1.47$) than seniors who were in the middle score range (node 2, $M=2.03$) and highest score range (node 3, $M=2.62$) of satisfaction with overall quality of instruction. The overall satisfaction of node 1 seniors was further differentiated by their satisfaction with social involvement on campus. The cluster of Asian Americans with the lowest mean score for overall satisfaction in this analysis (node 4, $M=1.32$) shared the following profile of correlates: low satisfaction with the overall quality of instruction (node 1) and low satisfaction with their social involvement on campus (node 4).

For Asian American seniors in the mid-range of satisfaction with overall quality of instruction (node 2), a variety of significant correlates emerged, listed in descending order of the strength of their association with overall satisfaction: opportunities for extracurricular involvement, grades, intellectual excitement in major courses, social involvement, self-development gains, and, finally, aspiring to attain a doctoral or first professional degree, and financial impact on the family of paying for college.

Asian American seniors with the highest overall satisfaction (node 18, $M=2.87$) had the following profile of correlates: high satisfaction with the overall quality of instruction (node 3), high satisfaction with social involvement (node 10), and high estimation of gains in self-development (node 18). For seniors reporting comparatively lower gains in self-development (node 17), overall satisfaction was further differentiated by satisfaction with the availability of faculty outside class (node 26, $M=2.63$).

Consistent with regression results, these decision tree results confirm the primary importance of overall instructional quality and social involvement, grades and self-development as correlates of Asian American seniors' overall satisfaction, and the lesser influence of demographic characteristics. Satisfaction with extracurricular options emerged as an important correlate of overall satisfaction for the large cluster (almost two-thirds) of Asian American seniors who were moderately satisfied with the overall quality of instruction (node 2); satisfaction with extracurricular opportunities was not a statistically significant predictor in the regression model. Conversely, gains in intellectual abilities and satisfaction with the quality of instruction in major courses—both moderately strong predictors in the regression model for Asian

Americans—did not appear as significant correlates in the decision tree analysis.

As shown in Fig. 4, a clear pattern of hierarchical associations with overall satisfaction emerged for Latino seniors. For all seniors, satisfaction with the overall quality of instruction had the strongest association with overall satisfaction, followed by satisfaction with social involvement on campus. The cluster of Latino seniors who reported the lowest satisfaction with their overall undergraduate experience (node 4, $M=1.19$) was also least satisfied with the overall quality of instruction (node 1) and social involvement (node 4). Conversely, Latino seniors reporting the highest overall satisfaction with college (node 12, $M=2.88$) were in the highest score ranges of satisfaction with the overall quality of instruction (node 3) and social involvement (node 12). For seniors who were most satisfied with the overall quality of instruction (node 3) and moderately satisfied with their social involvement on campus (nodes 10 and 11), perceived intellectual gains and satisfaction with the quality of instruction in the major emerged as additional predictors of overall satisfaction.

For Latino seniors in the middle range of satisfaction with instructional quality (node 2), overall satisfaction was further differentiated by satisfaction with social involvement, satisfaction with instruction and intellectual excitement in the major, perceived gains in intellectual abilities, grades and satisfaction with the out of class availability of faculty.

The importance of instructional quality, social involvement, grades and intellectual gains as correlates of Latino seniors' overall satisfaction was consistent with regression results. Satisfaction with faculty availability out of class was a significant correlate, albeit of lesser importance, in this analysis but was not a significant predictor in the regression model estimated for Latino seniors. Other predictors from the regression model—gains in self-development, maternal education and class size—did not surface as significant correlates of overall satisfaction in the decision tree analysis.

Figure 5 displays the decision tree results for African American seniors. As was observed in the regression analysis, satisfaction with the overall quality of instruction was the primary measure that differentiated African American seniors who were less satisfied with their undergraduate experience (node 1, $M=1.36$) from those who were more so (node 3, $M=2.43$). The least satisfied seniors were those who reported low satisfaction with the overall quality of instruction (node 1) and perceived they had made smaller gains in their intellectual abilities since entering college (node 4, $M=1.14$). For seniors falling in the middle range of satisfaction with the overall quality of instruction (node 2), overall satisfaction was further differentiated by satisfaction with

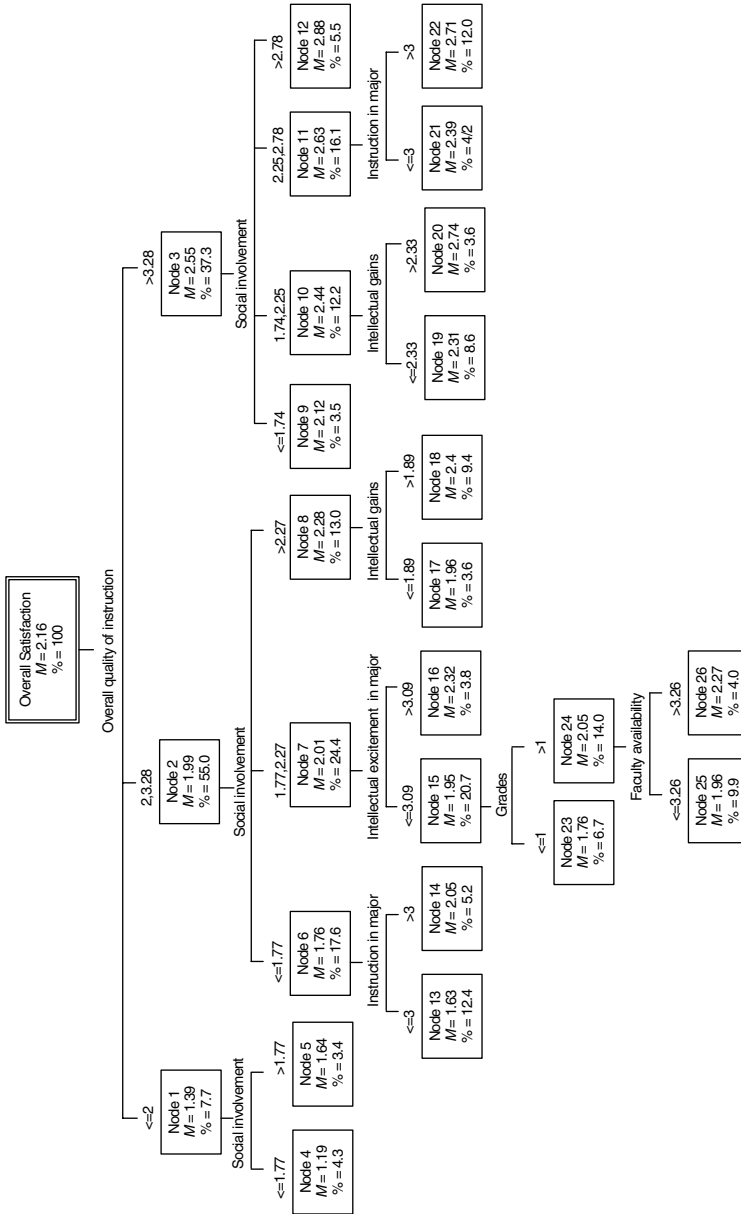


FIG. 4. Decision tree results for Latino seniors.

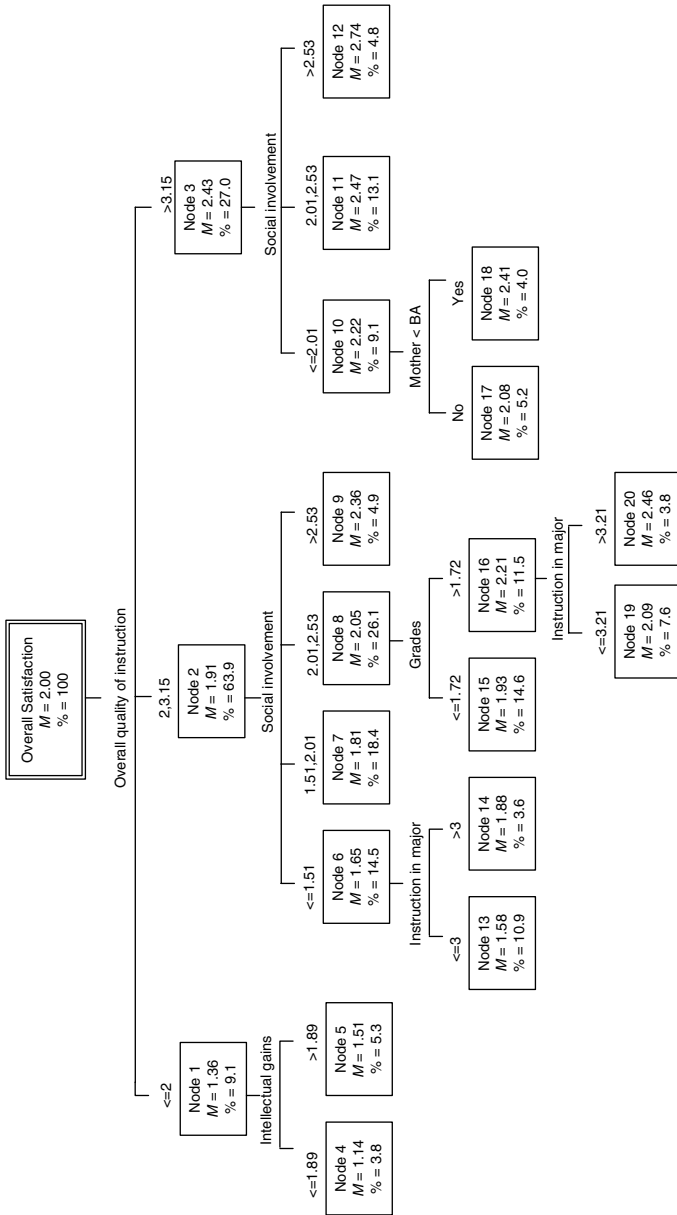


FIG. 5. Decision tree results for African American seniors.

social involvement, satisfaction with the quality of instruction in courses in the major and grade achievement. Finally, African American seniors who were most satisfied with the overall quality of instruction (node 3) and most satisfied with their social involvement on campus reported the highest overall satisfaction with college (node 12, $M=2.74$).

Consistent with regression results, decision tree findings support the primacy of overall instructional quality in shaping African American seniors' overall satisfaction with college, followed by social involvement, intellectual gains, quality of instruction in the major, and grades. Interestingly, maternal education emerged as a significant correlate in the decision tree analysis. For African American seniors who were very satisfied with the overall quality of instruction but comparatively less satisfied with their social involvement, having a mother with less than a bachelor's degree was associated with significantly higher overall satisfaction (node 17, $M=2.41$) than having a mother with a graduate degree (node 18, $M=2.08$). Several significant predictors from the regression model did not emerge in the decision tree analysis: financial impact on family of paying for college, education aspirations, satisfaction with intellectual excitement in the major, and satisfaction with campus diversity.

LIMITATIONS

The design of this study benefits from the participation of multiple institutions. Nevertheless, our results may only be generalized to other private, selective, research universities. As involvement effects on satisfaction may not be fully realized until the senior year (Bean and Kuh, 1984; Pike, 1991), it is defensible to restrict research participants to seniors. However, this means our survey data only reflect the experiences and perceptions of students who have successfully persisted to their final semester of undergraduate study. We know from our own institution that African American and Latino seniors have lower survey participation rates than white and Asian American seniors. Further, there are race differences in our graduation rates, favoring white and Asian American seniors; that said, these differences are considerably smaller than at less selective institutions and the gap in degree attainment is narrowing. We do not have access to institutional files from the other universities participating in this survey but assume the same patterns apply. Taken together, this raises a possibility of non-response bias in survey results. Variables for the model were necessarily restricted to those available in the survey instrument. The model would be strengthened by the inclusion of measures of seniors' high school achievement, whether or

not the university attended was their first choice, expectations of college, actual rather than self-reported grades, and measures of informal interactions with other students during college.

Decision tree results are highly dependent on the measurement scale of the variables, stopping rules, and clustering algorithm employed. Changing any of these conditions can produce different clustering patterns. Because of this variability and the associated likelihood of producing spurious relationships, decision tree analysis is not appropriate for hypothesis testing. However, we believe it is a useful procedure for exploring data, particularly when used in combination with other analysis methods. A key strength is the ability of decision tree analysis to identify conditional effects on overall satisfaction for different subsets of the student population. This helps inform campus discussions about possible explanations for race-associated differences in the undergraduate experience. As noted by Thomas and Galambos (2004), the enhanced disaggregation afforded by decision tree results is also a liability. Data results, as presented in these diagrams, can be complex and confusing for administrators or researchers unfamiliar with this analysis method, and need to be packaged appropriately for consideration by various audiences. At our own institution, we have focused on the correlates differentiating students who are “most satisfied” from those who are “least satisfied,” omitting detailed findings concerning students in the mid-ranges of satisfaction.

DISCUSSION

This study employed multiple linear regression and decision tree analysis to examine race-specific correlates of seniors' overall satisfaction with college. There was substantial consistency between the correlates identified by the two methods. The strongest correlates from regression analyses were generally replicated within the decision tree results. However, regression and decision tree analyses identified different secondary correlates of overall satisfaction. This is a consequence of the analytical procedures utilized by the methods. Multiple linear regression identified the strongest correlates of overall satisfaction for each race group of seniors as a whole. Decision tree identified the strongest correlates of overall satisfaction for subgroups of seniors within each race. Thus, a variable may be significantly correlated with overall satisfaction for a subgroup of seniors within race, but may not be significantly correlated with overall satisfaction for the whole race group; the converse also holds true. Considered together, the two methods offer a richer

understanding of the correlates of overall satisfaction for seniors of different races than would be possible through using either method on its own.

For the most part, seniors' background characteristics do not appear to be important correlates of overall satisfaction. However, some differences were found both across and within race. In regression analyses, Asian American females were significantly more satisfied with their college experience than their male counterparts. Gender was not a significant correlate of overall satisfaction for seniors of other races. These results parallel mixed findings concerning the relationship between gender and satisfaction reported in previous research (Bean and Vesper, 1994; Endo and Harpel, 1982; Pascarella et al., 1986; Umbach and Porter, 2002).

In regression analyses, low maternal educational attainment was a significant and comparatively stronger negative correlate of overall satisfaction for Latino seniors. Latino seniors also reported significantly lower maternal educational attainment than seniors of other races. The negative association between low maternal education and satisfaction might reflect greater difficulties experienced by these seniors in adapting to highly selective university environments. Yet, decision tree results suggest a positive association between low maternal educational attainment and overall satisfaction for the cluster of African American seniors who were very satisfied with the quality of instruction but relatively dissatisfied with their social involvement on campus. Our data do not shed light on the reasons for this seemingly counterintuitive finding.

Perception of the financial impact on the family of paying for college was negatively associated with overall satisfaction for white and Asian American seniors only. Other data from this survey show that parental resources were a significantly greater source of funding and institutional financial aid was a significantly lesser source of funding for white and Asian seniors, while the converse was true for Latino and African American seniors. This difference in funding strategies appears to shape seniors' overall satisfaction.

In regression analyses, aspirations of post-baccalaureate education were positively associated with overall satisfaction for white and African American seniors both, but the associated beta coefficients were significantly larger for African American seniors. Aspiring to attain a doctoral or first professional degree was also a significant correlate of overall satisfaction for subsets of Asian American and African American seniors in the decision tree analysis. Presumably, planning for further education implies a certain degree of comfort with respect to the student role; this may subsequently be reflected in higher overall satisfaction with college.

Consistent with past research (Bean and Vesper, 1994; Spady, 1971; Tinto, 1986), academic and social integration was strongly associated with seniors' satisfaction with their college experience. Two measures—overall quality of instruction and social involvement—had a strong influence on satisfaction for all seniors, regardless of race. The relative importance of other integration measures appears to vary both across and within race groups.

The quality of the classroom experience figures prominently as a correlate of overall satisfaction for seniors of all races. Satisfaction with the overall quality of instruction was the strongest predictor of overall satisfaction in the regression models for Asian American, Latino and particularly for African American seniors; it was the second strongest predictor for white seniors. In decision tree analyses conducted for each race group, overall quality of instruction was the variable that most strongly distinguished seniors who were satisfied with their overall educational experience from those who were not. In both analysis methods, measures of instructional experiences within the major—quality of instruction and intellectual excitement—emerged as significant but comparatively less important correlates of overall satisfaction.

Satisfaction with class size and faculty availability out of class were positive but generally less important correlates of overall satisfaction across races. In regression results, satisfaction with class size was significantly associated with overall satisfaction for white and Latino seniors. Satisfaction with faculty availability was a statistically significant correlate in regression models for white and Asian American seniors, and appeared as a lower-order correlate for segments of Asian and Latino seniors in decision tree results. Given compelling evidence of the positive impact of faculty–student interaction on a variety of educational outcomes (Astin, 1993; Kuh and Hu, 2001; Pascarella and Terenzini, 1991), we might have expected faculty availability to be a stronger predictor of overall satisfaction. When faculty availability was entered on its own in the regression models after controlling for background characteristics, it had a large and statistically significant association with overall satisfaction for all seniors. However, as measures of instructional quality and social involvement were added to the models, faculty availability became a progressively less important predictor. This is consistent with prior research (Hearn, 1985; Thomas and Galambos, 2004).

After quality of instruction, social involvement—the factor employed here captured seniors' satisfaction with their sense of community and social life on campus—appears to be the next most important correlate of overall satisfaction for seniors. In regression

results, it was no less than the second strongest predictor in all four models. In decision tree analyses, it emerged as a second-level correlate of overall satisfaction for all but white seniors. The influence of other measures of social integration seems to vary by and within race. Having opportunities for extracurricular participation has a stronger association with overall satisfaction for white seniors than for seniors of other races; this may reflect higher rates of participation in extracurricular activities by white students. However, in decision tree results, extracurricular opportunities also appeared as the second strongest correlate of overall satisfaction for almost two-thirds of Asian American seniors. In regression analyses, satisfaction with campus diversity had a significantly larger beta coefficient and was only a statistically significant predictor of overall satisfaction for African American seniors. It did not emerge as a significant correlate of overall satisfaction in the decision tree analysis.

Consistent with some prior research (Aitken, 1982; Knox et al., 1992; Spady, 1971), we found that grades and perceived intellectual development are significant correlates of overall satisfaction for seniors of all races, albeit of less importance than overall quality of instruction and social involvement. Grades were a comparatively less important correlate for white seniors, and more important correlate for Asian American and Latino seniors. Self-development gains appear to be salient predictors of overall satisfaction for all but African American seniors. Freshman surveys conducted at a number of the institutions participating in this study show that African American students rate their personal development and social skills significantly higher than entering students of other races. In this survey, there were no significant race differences in seniors' perceived gains in self-development since entering college. Thus, the nonsignificant correlation between self-development gains and overall satisfaction may reflect a ceiling effect for African American seniors.

IMPLICATIONS FOR PRACTICE

Study results suggest two institutional strategies may be most likely to enhance the overall satisfaction of white, Asian American, Latino and African American seniors alike: improving the quality of undergraduate instruction and strengthening students' sense of belonging on campus.

Clearly, the quality of instruction is a key determinant of how seniors' evaluate their overall undergraduate experience—even among students attending research-focused institutions. Campus efforts to en-

hance the quality of instruction for undergraduates—such as increasing opportunities to be taught by senior faculty, reducing class size, providing professional development to faculty, offering incentives for teaching innovations, ensuring teaching performance is an important criterion in tenure and promotion decisions, and recognizing departments and faculty for teaching excellence—have the potential to produce associated gains in student satisfaction.

Secondly, students who feel a sense of social belonging are more likely to be satisfied with their undergraduate experience. Institutions are encouraged to consider ways to strengthen the sense of community and social engagement for their undergraduate students. Strategies to accomplish this can range from large-scale initiatives such as establishing living/learning programs to smaller-scale efforts such as offering more venues on campus for students to informally socialize. Extracurricular activities, at least as currently configured, appear to offer an avenue for social engagement that reaps greater benefits for white seniors' overall satisfaction. This suggests that institutions should consider building in a more diverse array of extracurricular opportunities to better address the needs and interests of students of other races.

Beyond being taught well and feeling socially engaged, student satisfaction is associated, although to a lesser degree, with academic achievement and gains in intellectual abilities and self-development. Ensuring the availability of academic support, assigning projects that develop and require higher cognitive skills, and building in opportunities for students to test and stretch their personal and interpersonal skills through group projects might contribute to students' sense of development and hence, to overall satisfaction.

Finally, study results suggest the extent to which institutions can offer a racially diverse student body and educational experience should enhance the overall satisfaction of African American seniors. Students from backgrounds of lower parental education may benefit from additional assistance in adapting to the college environment, perhaps through the provision of orientation or mentoring programs. Our results suggest such interventions may benefit Latino students the most.

IMPLICATIONS FOR RESEARCH

Whether the influences on students' adjustment to college vary by race remains a matter of some debate. Several studies have reported similar factors (Cabrera et al., 1999; Eimers and Pike, 1997; Nettles et al., 1986) and others have reported different factors (Fleming, 1984;

Hurtado et al., 1996). Cabrera and colleagues (Cabrera et al., 1999) suggest these inconsistencies stem from the use of different methodologies, with studies examining a single minority group reporting more differences in influences on adjustment than those examining multiple race groups. Results of our research clearly indicate that the same major factors—satisfaction with overall quality of instruction and social involvement—influence overall satisfaction with the undergraduate experience regardless of the racial/ethnic identity of students. However, there were also significant differences in overall satisfaction across race groups, and regression and decision tree analyses identified race-related differences in secondary and tertiary influences on overall satisfaction. Thus we contend there are both similarities and differences in the correlates of overall satisfaction for students of different race groups. We do not suggest that institutions need to cater to the unique needs of all possible subgroups within the undergraduate population, but it seems patently evident that crafting differentiated strategies is called for to realize substantive improvement in the satisfaction of all students.

Our study results support the importance of estimating separate regression models by race. While similarities in the correlates of overall satisfaction were evident across race groups, the emergence of distinctive predictors suggests that the processes affecting seniors' satisfaction do indeed vary within race. This finding would not be evident had we simply controlled for race in a pooled regression model. Our findings also suggest the importance of utilizing single indicators rather than strict reliance on multi-item constructs as predictors of satisfaction. Our preliminary analyses showed that factor structures were not consistent across race groups. Some important differences in predictors of satisfaction (i.e., maternal educational attainment for Hispanic seniors, satisfaction with racial/ethnic diversity for African American seniors) would have been obscured were these items combined with others as scales. Further, the use of single indicators as predictors provides more detailed information concerning the relationship of specific campus experiences to seniors' overall satisfaction and thus enhances the possibility of designing effective campus policies and programs.

Our findings reflect the experiences of seniors enrolled in private, selective, research universities. Given the important position of these institutions in the postsecondary education system, we believe that greater understanding of the influences on students' outcomes in these institutions, and how these vary by race, is of critical importance. However, future research on this issue should include students enrolled in different types of postsecondary institutions.

An implicit objective of this study was to explore the utility of using two different analytic methods to identify race differences in satisfaction correlates. Certainly, we would not advocate dropping regression methods in favor of hierarchical clustering or other data mining techniques. However, decision tree analysis provides a different perspective that can complement regression results. Perhaps its greatest contribution is to remind us of the heterogeneity of the undergraduate student experience, even within race groups. We believe that such awareness is crucial when planning programs and services for undergraduates.

REFERENCES

- Aitken, N. D. (1982). College student performance, satisfaction and retention: Specification and estimation of a structural model. *Journal of Higher Education* 53(1): 32–50.
- Ancis, J. R., Sedlacek, W. E., and Mohr, J. J. (2000). Student perceptions of campus cultural climate by race. *Journal of Counseling Development* 78(2): 180–185.
- Astin, A. W. (1993). *What Matters in College? Four Critical Years Revisited*, Jossey-Bass, San Francisco.
- Bean, J. P. (1980). Dropouts and turnover: The synthesis and test of a causal model of student attrition. *Research in Higher Education* 12(2): 155–187.
- Bean, J. P., and Bradley, R. K. (1986). Untangling the satisfaction–performance relationship for college students. *Journal of Higher Education* 57(4): 393–412.
- Bean, J. P., and Kuh, G. D. (1984). The reciprocity between student–faculty informal contact and academic performance of university undergraduate students. *Research in Higher Education* 21(4): 461–477.
- Bean, J. P., and Vesper, N. (1994). *Gender differences in college student satisfaction*. Paper presented at the annual meeting of the Association for the Study of Higher Education, Tucson, AZ.
- Betz, E. L., Starr, A. M., and Menne, J. W. (1972). College student satisfaction in ten public and private colleges and universities. *Journal of College Student Personnel* 13(5): 456–461.
- Boyer Commission on Educating Undergraduates in the Research University (1998). *Reinventing Undergraduate Education: A Blueprint for America's Research Universities*, The Carnegie Foundation for the Advancement of Teaching, Stony Brook, NY.
- Cabrera, A. F., Nora, A., and Castaneda, M. B. (1993). College persistence: Structural equation modeling test of an integrated model of student retention. *Journal of Higher Education* 64(2): 123–139.
- Cabrera, A. F., Nora, A., Terenzini, P. T., Pascarella, E. T., and Hagedorn, L. S. (1999). Campus racial climate and the adjustment of students to college: A comparison between white students and African-American students. *Journal of Higher Education* 70(2): 134–160.
- Cabrera, A. F., Stampen, J. O., and Hansen, W. L. (1990). Exploring the effects of ability to pay on persistence in college. *Review of Higher Education* 13(3): 303–336.
- Clotfelter, C. T. (2003). Alumni giving to elite private colleges and universities. *Economics of Education Review* 22(2): 109–120.
- Donovan, R. (1984). Path analysis of a theoretical model of persistence in higher education among low-income black youth. *Research in Higher Education* 21(3): 243–259.

- Education Commission of the States (1995). *Making Quality Count in Undergraduate Education*, Education Commission of the States, Denver, CO.
- Eimers, M. T., and Pike, G. R. (1997). Minority and nonminority adjustment to college: Differences or similarities?. *Research in Higher Education* 38(1): 77–97.
- Endo, J. J., and Harpel, R. L. (1982). The effect of student faculty interaction on students' educational outcomes. *Research in Higher Education* 16(2): 115–138.
- Fleming, J. (1984). *Blacks in College: A Comparative Study of Students' Success in Black and in White Institutions*, Jossey-Bass, San Francisco.
- Geiger, R. L. (1986). *To Advance Knowledge: The Growth of American Research Universities, 1900–1940*, Oxford University Press, New York.
- Gielow, C. R., and Lee, V. E. (1988). *The effect of institutional characteristics on student satisfaction with college*. Paper presented at the annual meeting of the American Educational Research Association, New Orleans.
- Graham, H. D., and Diamond, N. (1997). *The Rise of American Research Universities: Elites and Challengers in the Postwar Era*, Johns Hopkins University Press, Baltimore, MD.
- Hearn, J. C. (1985). Determinants of college students' overall evaluations of their academic programs. *Research in Higher Education* 23(4): 413–437.
- Helm, E. G., Sedlacek, W. E., and Prieto, D. O. (1998). The relationship between attitudes toward diversity and overall satisfaction of university students by race. *Journal of College Counseling* 1(2): 111–120.
- Hurtado, S., Carter, D. F., and Spuler, A. (1996). Latino student transition to college: Assessing difficulties and factors in successful college adjustment. *Research in Higher Education* 37(2): 135–157.
- Knox, W. E., Lindsay, P., and Kolb, M. N. (1992). Higher education, college characteristics, and student experiences: Long-term effects on educational satisfactions and perceptions. *Journal of Higher Education* 63(3): 303–328.
- Kuh, G. D., and Hu, S. (2001). The effects of student–faculty interaction in the 1990s. *Review of Higher Education* 24(3): 309–332.
- Liu, R., and Jung, L. (1980). The commuter student and student satisfaction. *Research in Higher Education* 12(3): 215–226.
- Loo, C. M., and Rolison, G. (1986). Alienation of ethnic minority students at a predominantly white university. *Journal of Higher Education* 57(1): 58–77.
- Monks, J. (2003). Patterns of giving to one's alma mater among young graduates from selective institutions. *Economics of Education Review* 22(2): 121–130.
- Morstain, B. R. (1977). An analysis of students' satisfaction with their academic program. *Journal of Higher Education* 48(1): 1–16.
- National Center for Education Statistics (1995). *Minority Undergraduate Participation in Postsecondary Education*, U.S. Department of Education, Office of Educational Research and Improvement, Washington, DC.
- Nettles, M. T., Thoeny, A. R., and Gosman, E. J. (1986). Comparative and predictive analyses of black and white students' college achievement and experiences. *The Journal of Higher Education* 57(3): 289–318.
- Nora, A., Cabrera, A. F., Hagedorn, L. S., and Pascarella, E. T. (1996). Differential impacts of academic and social experiences on college-related behavioral outcomes across different ethnic and gender groups at four-year institutions. *Research in Higher Education* 37(4): 427–451.
- Pascarella, E. T. (1980). Student–faculty informal contact and college outcomes. *Review of Educational Research* 50(4): 545–595.
- Pascarella, E. T., Edison, M., Nora, A., Hagedorn, L. S., and Terenzini, P. T. (1996). Influences on students' openness to diversity and challenge in the first year of college. *Journal of Higher Education* 67(2): 174–195.

- Pascarella, E. T., Smart, J. C., and Ethington, C. A. (1986). Long-term persistence of two-year college students. *Research in Higher Education* 24(1): 47–71.
- Pascarella, E. T., and Terenzini, P. T. (1991). *How College Affects Students: Findings and Insights from Twenty Years of Research*, Jossey-Bass, San Francisco.
- Pedhazur, E. J. (1997). *Multiple Regression in Behavioral Research: Explanation and Prediction*, 3rd ed. Holt, Rinehart and Winston, New York.
- Pervin, L. A. (1967). Satisfaction and perceived self-environment similarity: A semantic differential study of student–college interaction. *Journal of Personality* 35(4): 623–624.
- Pike, G. R. (1989). *The performance–satisfaction relationship revisited: Specification and testing a structural model*. Paper presented at the annual meeting of American Educational Research Association, San Francisco.
- Pike, G. R. (1991). The effects of background, coursework, and involvement on students' grades and satisfaction. *Research in Higher Education* 32(1): 15–30.
- Pike, G. R. (1993). The relationship between perceived learning and satisfaction with college: An alternative view. *Research in Higher Education* 34(1): 23–40.
- Porter, O. F. (1990). *Undergraduate Completion and Persistence at Four-Year Colleges and Universities*, The National Institute of Independent Colleges and Universities, Washington, DC.
- Rorhlick J., Alvarado D., Zaruba K., and Kallio R. (1998). *From the model minority to the invisible minority: Asian and Pacific American students in higher education research*. Paper presented at the annual forum of the Association for Institutional Research, Minneapolis, MN.
- Sanders, L., and Burton, J. D. (1996). From retention to satisfaction: New outcomes for assessing the freshman experience. *Research in Higher Education* 37(5): 555–567.
- Schmidt, D. K., and Sedlacek, W. E. (1972). Variables related to university student satisfaction. *Journal of College Student Personnel* 13(3): 233–238.
- Schwitzer, A. M., Griffing, O. T., Ancis, J. R., and Thomas, C. (1999). Social adjustment experiences of African American college students. *Journal of Counseling and Development* 77(2): 189–197.
- Sedlacek, W. E. (1987). Black students on White campuses: 20 years of research. *Journal of College Student Development* 40(5): 538–550.
- Spady, W. G. (1970). Dropouts from higher education: An interdisciplinary review and synthesis. *Interchange* 1(1): 64–85.
- Spady, W. G. (1971). Dropouts from higher education: Toward an empirical model. *Interchange* 2(3): 38–62.
- Sturtz, S. A. (1971). Age differences in college student satisfaction. *Journal of College Student Personnel* 12(3): 220–222.
- Terenzini, P. T., Rendon, L., Upcraft, L., Millar, S., Allison, K., Gregg, P., and Jalomo, R. (1994). The transition to college: Diverse students, diverse stories. *Research in Higher Education* 35(1): 57–73.
- The Education Trust (2004). *A Matter of Degrees: Improving Graduation Rates in Four-Year Colleges and Universities*, The Education Trust, Washington, DC.
- Thomas, E. H., and Galambos, N. (2004). What satisfies students? Mining student-opinion data with regression and decision tree analysis. *Research in Higher Education* 45(3): 251–269.
- Tinto, V. (1975). Dropout from higher education: A theoretical synthesis of recent research. *Review of Educational Research* 45(1): 89–125.
- Tinto, V. (1986). Theories of student departure revisited. In: Smart, J. C. (ed): *Higher Education: Handbook of Theory and Research*, Vol. II, Agathon Press, New York, pp. 359–384.
- Tinto, V. (1993). *Leaving College: Rethinking the Causes and Cures of Student Attrition*, 2nd ed., University of Chicago Press, Chicago.

Umbach, P., and Porter, S. R. (2002). How do academic departments impact student satisfaction? Understanding the contextual effects of departments. *Research in Higher Education* 43(2): 209–234.

Wingspread Group on Higher Education (1993). *An American Imperative: Higher Expectations for Higher Education*, The Johnson Foundation and others, Racine, WI.

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