The Effects of Academic Programs and Institutional Characteristics on Post-Graduate Social Benefit Behavior

Author: **Terry T. Ishitani**
Department of Counseling, Educational Psychology & Research
University of Memphis

ABSTRACT
This study investigated the relationship between college characteristics of bachelor's degree holders, such as academic programs and types of institutions and their post-graduate social benefit behavior. While a myriad of studies have examined the monetary benefits from attaining a college education, little is known about effects of collegiate experiences associated with non-monetary returns conferred by a higher education. A sample of 2,463 drawn from a national database was used in this study. After controlling for pre-college volunteer behavior and other demographic characteristics, students who majored in education and those who graduated from baccalaureate institutions presented significant gains in social benefits.

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Higher education has been perceived as an important governmental investment in our country. Our nation's commitment to educating our citizens beyond the compulsory education is notable compared to other nations. In 2003, expenditure per student for the United States at the higher education level was $24,100, while the same expenditure for United Kingdom and Germany was $11,900 and 11,600 respectively. This expenditure allocated to higher education equaled about 3% of the gross domestic product (GDP), while the proportions of higher education expenditures in United Kingdom and Germany were about 1% of their GDP (National Center for Education Statistics [NCES], 2007). Moreover, a greater number of young adults participated in higher education in our country as compared to other countries. In 2001, 36% of 18 to 24 year olds were enrolled in institutions of higher education in the United States, while participation rates in higher education for young adults of the same age group were 22% and 15% in United Kingdom and Germany, respectively (NCES, 2005).

Given this sizable investment in higher education, discussion revolving around the outcome of higher education has been one of the central issues in the educational research community. Our higher education system is not designed to achieve one common measureable outcome as a whole, but rather is designed to attain different types of outcomes that are measured in different ways. For example, many scholars and researchers have attempted to assess the outcomes of higher education from the benefit perspective; namely, what benefits are derived from higher education. Categorizing benefits of higher education into private and public benefits is commonly done in discussion as well (e.g., Toutkoushian and Paulsen 2006). Each of private and public benefits is further discussed from social and economic viewpoints (e.g., Institute for Higher Education Policy, 1998), and assessment of the benefits based on these classifications have commonly appeared in the literature. Both private and public economic

benefits are typically argued in monetary values. Specifically, researchers have examined the attainment of higher education and its association with individual incomes. Social benefits are described by nonmonetary measures, such as greater health concerns, better nurturance of children, more efficient consumer behavior, and more cultured leisure activities among college-educated individuals (Pascarella and Terenzini, 1991). The literature suggests that attainment of postsecondary education also improves civic responsibilities, such as voting behavior. Approximately 76% of college-educated citizens between the ages of 25 and 44 voted in the 2004 presidential election, while only 49% of high school graduates from the same age group did so (College Board, 2005). Civic engagement is also considered as an important measure for social benefits of higher education. Examples of civic engagement include community engagement and volunteer activities, and attentiveness to current affairs. Participation rates of college-educated Americans engaging in activities, such as raising money for charity and regularly volunteering for an organization other than a political party are well documented (e.g., Keeter, Zukin, Andolina, and Jenkins, 2002; Lopez and Elrod, 2006). The central purpose of this study is to address how higher education contributes to strengthening social benefits, such as participation in volunteer and cultured activities after college.

DISPARITIES IN COLLEGIATE EXPERIENCES

While the undergraduate education clearly strengthens student's overall student development, Astin (1993) further emphasizes the effects of environmental qualities, such as institutional characteristics on specific educational outcomes. For instance, institutional selectivity (as indicated by entrance exam scores, such as SAT) has a positive effect on improving students' communication skills (Toutkoushian and Smart, 2001). Coupled with

institutional type, attending a selective liberal arts college strengthens educational outcomes, such as critical thinking and overall satisfaction with the undergraduate education (Astin, 1999). Institutional types, such as liberal arts or research institutions differentiate students' collegiate experiences. Seifert, Goodman, Lindsay, Jorgensen, Wolniak, Pascarella, and Blaich (2008) suggested the importance of liberal arts experiences to enhance citizenship and civility. Pascarella, Wolniak, Cruce and Blaich (2004) also investigated how different types of institutions impacted dimensions of good education as theorized by Chickering and Gamson (1991). They collected sample data from 16 different institutions and compared differences in 19 good practice measures over time. They found that students who attended liberal arts colleges reported a significantly higher level of personal development in 12 out of the 19 measures than did students attending research or regional instructions. These 12 measures included the quality of interaction with faculty and cooperative learning. Kuh, Pace, and Vesper (1997) also emphasize greater student gains associated with the quality of relationships with faculty and peers. Additionally they suggest that smaller institutional size promotes student interaction with faculty and peers. When the number of students in class is small, each student has more opportunities to participate, which enriches the interaction between students and faculty (Chickering and Reisser, 1993). Astin (1999) refers to institutional attributes such as small class size and interaction with peer and faculty as student involvement. Those who graduated from liberal arts colleges often attest to the effect of student involvement in their collegiate experiences. Hardwick Day (2002) found that 68% of the alumni who attended liberal arts colleges reported that small class size positively influenced their learning.

Student involvement, such as faculty interaction is often negatively associated with larger institutions (Astin, 1993). While smaller institutional and class sizes are the typical

environmental structure at liberal arts colleges, student involvement is more difficult to facilitate at larger institutions where lower class level courses are often given in a large lecture setting. Furthermore, when the institutional percentage of graduate students was used to assess student learning, a negative effect of a larger graduate student percentage on student learning was found (Toutkoushian and Smart, 2001). This may be induced by faculty who attempts to balance their efforts between teaching and research activities at research institutions, which resulted in having their graduate students teaching lower level courses. Considering the importance of the quality of faculty interaction in student learning during the first-year of college (Pascarella et.al, 2004), it is a reasonable question if large lectures taught by graduate students may be associated with lower overall student satisfaction at public four-year institutions (Astin, 1993).

While students may select majors focusing on their overall intellectual growth, many college students view certain majors or programs as a rite of passage to improving post-graduate financial mobility. Such students are inclined to choose majors that offer job-specific knowledge and rigorous training. However, given that vocational oriented programs are rather narrowly tailored for particular career fields, students in such majors lack gains in certain areas of student development. Using the National Survey of Student Engagement (NSSE), numerous studies have addressed educational outcomes from perspectives of in- and out-of classroom engagement in recent years, and some of these studies addressed the related issues. Kuh and Umbach (2004) reported that social science major students achieved the highest gains in the areas of student development, such as civic responsibility, and ethical development and problem solving, while students majoring in math and science showed the lowest gains in these areas. Students majoring in social science, arts, and education scored higher in learning scales in the NSSE survey than biology major students (NSSE, 2005). Students' experiential learning also varies across different

majors. Cruce and Moore (2007) examined first-year college students and their community service participation behavior during college. They discovered that participation rates of community engagement and volunteer activities differed across different majors. The participation rate for community engagement in the first year was higher for students with an education major than for engineering students. Although math and science major students present lower gains in measures on student engagement than students majoring social science, Zhao, Carini, and Kuh (2005) suggested that female math and science major students were more successful in student engagement than male counterparts.

In addition to examining student engagement using the NSSE survey, Porter (2006) recently investigated effects of institutional characteristics on student engagement using the Beginning Postsecondary Students, a national data set sponsored by NCES. The uniqueness of Porter's study is his inclusion of pre-college engagement variables in the analysis, while other studies limited pre-college characteristics to basic demographic information, such as gender and race. He also found that majors such as humanities had significant positive effects on student engagement compared to students of professional majors.

Pascarella and Terenzini (1991) conclude that net impacts on students are least influenced by differences in institutional characteristics, such as size and selectivity. Astin (1999) also suggests that the effects of environmental factors are indirect rather than direct. Perhaps, net impacts on students are similar, but specific outcomes, such civic responsibilities and the propensity to community engagement may differ across institutions and academic majors. While these studies address how disparities in collegiate experience are associated with various educational outcomes during college, little is known how such disparities are reflected in social behaviors after college. Using a national data set, this study seeks to understand how institutional

characteristics and academic majors influence post-graduate behaviors representing social benefits. The study data contain identifiers for individual students and the institutions they enrolled, which are referred to as nested data (i.e., a group of individual students can be sorted by institution). Hierarchical linear modeling has been recognized as an appropriate statistical technique for nested data, which was therefore selected as an analytical approach in this study.

DATA AND METHODOLOGY

Data Source and Sample

This study used the National Education Longitudinal Study of 1988 (NELS:88/2000) and the Postsecondary Education Transcript Study (PETS: 2000) sponsored by NCES. The initial data collection began in 1988 when students were eighth graders, and these students were followed up over 12 years. Follow-up questionnaires were administered every two years until 1994. These questionnaires included various items related to students' educational progress. After 1994, the last questionnaire was administered in 2000. The original sample consisted of students who graduated from high school in either 1992 or 1993 and attained a bachelor's degree or higher by the year 2000. After removing survey respondents with missing data, the number of college-degree holders was 2,463. This group of respondents was used as the effective sample in this study.

Table 1 includes descriptive statistics of the study sample. Among 2,463 respondents, about 41% were male and 77% were Caucasian. Thirty-two percent of respondents were first-generation students whose parents never graduated from college, while 35% had both college-educated parents. Family income and SAT scores were converted in quartiles, and were estimated as dummy variables. Approximately 13% of the study sample held graduate degrees.

Insert Table 1 here

Academic majors were determined by degree programs for bachelor's degrees for all the respondents in the study sample. The largest group in academic majors was social science (22%), followed by business (14%), and arts and humanities (13%).

Certain students were predisposed to participating in volunteer activities prior to college entrance. Thus, this study takes student's predisposition to volunteerism into account. One of the explanatory variables included in the study was pre-college (high school) engagement behavior, which served as a proxy to control varying pre-college propensities to volunteer among the respondents. Eight dichotomous items measured one's participation in specific volunteer activities. Each item offered the response options of "Yes" (coded as 1) and "No" (coded as 0). Details for these eight items are included in Appendix A. To gauge the level of one's volunteerism, the eight items were aggregated as a pre-college engagement variable with the score range of 0 and 8.

Although one may wish to participate in civic activities more often, it is reasonable to assume that certain post-graduate socioeconomic conditions may hinder one from allocating personal time to do so. This study considers being employed full-time, being married, and having children as such conditions. Thus, to estimate associations more precisely between post-graduate civic engagement and institutional characteristic and academic major variables, post-graduate annual earning, full-time employment status, marital status, and having children were included in the analysis to control confounding effects on civic participation.

Turning to institutional characteristics, the study sample included 775 postsecondary institutions, in which 42% were classified as Research, Class I and II institutions using the

Carnegie classification, about 13% as Doctoral, Class I and II, 29% as Comprehensive, Class I and II and 17% as Baccalaureate, Class I and II institutions. Selectivity index in the PETS:2000 includes three bands of selectivity for four-year institutions based on application/acceptance rates and SAT/ACT scores. Ten percent of the institutions included in the study sample were categorized as highly selective.

Student/faculty ratio was derived by the total institutional enrollment divided by the number of faculty. In Porter's study (2006), student/faculty ratio showed a significant negative effect on student engagement. In other words, increasing the number of students per faculty reduces the level of student engagement. In the study by Toutkoushian and Smart (2001), higher tuition indicated less gain in interpersonal skills during college. These variables were also considered in the present study to examine if such institutional characteristics had effects on later civic engagement behavior.

Given the wide scope of institutions and academic majors in the study sample, this study aims to assess an overall level of social benefit behavior, instead of specific activities. Thus, the outcome variable for the study was created by aggregating scores of 14 items related to social benefits from the NELS:88/2000 (Appendix B). This variable was constructed in a similar manner as the pre-college engagement variable. However, eight out of the 14 items were continuous variables with different scales, and needed to be dichotomized. An average for each continuous variable was first estimated, and responses that were higher than an average were coded as 1. This resulted in an actual estimated score range of 0 to 13 with the mean of 6.11 for the post-graduate social benefit behavior variable. Bivariate correlation between the outcome variable and pre-college engagement variables were 0.185.

Table 2 includes means and standard deviations for pre-college volunteer activities and the social benefit variable by academic major and by institutional type. Survey respondents majored in programs in arts and humanities presented the highest mean scores for pre-college engagement, followed by those majored in social science. Regarding the social benefit behavior variable, education major students attained the highest mean score followed by social science major students. Respondents who graduated from baccalaureate institutions, such as liberal arts colleges earned the highest mean score in the outcome variable, and they also had the highest mean in pre-college engagement. Based on the descriptive statistics in Table 2, students enrolled in baccalaureate institutions were likely to have a greater level of pre-college volunteer experience and they were also likely to participate in activities associated with social benefits after college.

Insert Table 2 here

Analytical Approach

This study first compared mean scores of the social benefit variable by major and by institution. This procedure was initially conducted to determine if significant mean differences existed to warrant further analysis. Mean scores of seven majors were compared with the mean score of education majors. Aggregated Carnegie institutional types (research I & II, doctoral I & II, comprehensive I & II, and baccalaureate I & II) were used to compare institutional means, using the research institution mean as a reference group mean.

Based on the results of mean comparisons, the study proceeded with multilevel analysis. The multilevel analysis estimated the effects of institutional characteristics and academic majors on post-graduate social benefit behavior while controlling for additional student background

characteristics. Given the nested nature of the study data, inclusion of *both* institutional and student data in a single linear regression equation would fail to take the homogeneity of students who attended the same institution into account. This would result in spurious standard error estimation (Raudenbush and Bryk, 2002). In other words, in a single linear regression equation, standard errors for institutional variables are estimated using the number of subjects in the sample, instead of the number of institutions. This leads to generating smaller standard error values and increasing the chance of making Type I error (Porter, 2006). This study applied two-level hierarchical linear modeling (HLM) to analyze the study data in order to mitigate such limitations for using single linear regression modeling for nested data.

In the HLM analysis, three sets of explanatory variables were entered into the model in order to observe the model fit for each set of variables. The model fit was evaluated by using changes in variance components. Without the institutional level variable, the first model examined the effects of student level variables, except for academic majors, on the outcome variable. All the student level variables were entered in the second model. The third model included all the student and institutional level variables, and estimated their effects on social benefit behavior after college. Since the effect of pre-college engagement was not assumed to be constant across institutions, the pre-college engagement variable was allowed to vary across institutions in Model 3. All the explanatory variables were centered about grand-means. In addition, variance inflation factor (VIF) was tested using linear regression prior to administering the HLM analysis, which resulted in 3.2 being the highest VIF.

RESULTS

Effect sizes for statistically significant mean differences in the social benefit variable are displayed in Table 3. Compared to education major students, mean differences were found to be statistically significant except for social science major students. Effect sizes of ±0.50 (which equals 0.5 pooled standard deviation) are generally considered a medium effect (Cohen, 1988), and effect sizes for engineering/mathematic and business exceeded this level. Effect sizes for other majors fell between small and medium effects, as the effect size for applied social science being the smallest (-0.32). As for mean comparisons across institutions, the mean difference between research and baccalaureate institutions was found to be statistically significant, but its effect size of 0.19 was lower than the small effect suggested by Cohen (1988). By comparison, the level of post-graduate social benefit behavior was associated with academic majors, rather than types of institutions.

Insert Table 3 here

Results of the HLM analysis are provided in Table 4. Prior to entering explanatory variables, the null model that only included an intercept term was estimated. The purpose of the null mode was to provide baseline institutional and student level random effect variances, which were used to estimate model fit. The null model estimated 0.065 for level-2 (institutional-level) and 5.493 for level-1 (student-level). Effects of student-level variables except for academic majors on the outcome variable were estimated in Model 1. Using variances from the null model and Model 1, one can compute (5.493 – 5.135) / 5.135 = 0.065, which indicates reduction in random effect variance due to entering a set of variables in the model. Thus, approximately 7% of the student-level variance associated with post-graduate social benefit behavior was explained

by the explanatory variables included in Model 1. One-point change in pre-college engagement led to a 0.38 points increase in the outcome variable, while being a full-time employee reduced the level of social behavior by 0.27. At this stage of the analysis, having a graduate degree had a statistically significant and positive effect on the outcome variable.

Insert Table 4 here

Basic demographic characteristics, such as gender and race presented significant effects on social benefits after graduation. On average, female students had a 0.29-point reduction in the post-graduate social benefit scale. Being Asian and Native American participants scored 0.67 and 1.09 points lower than their Caucasian counterparts, while Black respondents scored 0.63 points higher. Given the actual score range of 0 to 13 in the outcome variable, the 1.09 point reduction on average for Native American respondents was rather substantial. Annual earning was found to be statistically significant, while its negative effect was rather small. For instance, this particular coefficient was estimated based on its grand mean (= $35,728) and it represents a 0.005 point reduction for every $1,000 increase. Thus, when you compare two respondents with earnings of $35,728 and $135,728, an average point difference between them is about 0.5 (-0.005 x 100).

In addition to the set of explanatory variables in Model 1, Model 2 estimated effects of academic majors on post-college social benefits. Including these academic major dummy variables accounted for about 2% increase in explained variance. Compared to education major students, students in all other majors estimated lower scores, and these differences were found to be statistically significant. The magnitude of the differences was most prominent between education major and engineering/mathematic students. Relative to education major students,

engineering/mathematic major students reported 1.43 points lower on average. Business and life science major students also showed 1.30 and 0.92 points lower than education major students.

While most of other student-level variables found statistically significant in Model 1 maintained their significance, slight changes in coefficients were identified. For instance, the negative effect associated with Native American students slightly increased in Model 2. Statistical significance of having a graduate degree or annual earning was reduced to the marginal level of 0.10.

Model 3 addresses the effects of institutional-level variables on post-graduate social benefits. Six institutional variables in Model 3 explain about 12% of between-institution variance associated social benefit behavior after college. Enrolling in baccalaureate institutions presented a positive and statistically significant effect on the outcome variable. Respondents who graduated from baccalaureate institutions showed an increase of 0.3 points on average compared to those who graduated from research institutions. In other words, holding all other variables at the reference level, baccalaureate institution graduates have 6.49 points in the post-graduate social benefit scale on average, while research institution graduates have 6.19 on average.

Tuition had a negative and statistically significant effect on social benefits. Notice that the coefficient of the tuition variable needs to be interpreted in a similar manner as annual earnings, which is based on its grand mean (= $6,827). Therefore, a point reduction of 0.02 for every $1,000 begins after tuition exceeds the amount of $6,827. In spite of the significance of the student/faculty ratio found in other study (e.g., Porter, 2006), this ratio was not found to be statistically significant in the present study. Surprisingly, graduating from highly selective institutions was not significantly associated with the level of social benefits after college.

Noteworthy is that the effects of academic majors remained remarkably strong and stable in Model 3. Changes in coefficients for academic majors between Models 2 and 3 appear to be minimal, and all the academic majors were found to be statistically significant. Pre-college engagement retained its significant effect in Model 3. In addition, a number of race effects remained strong. The negative effects associated with Asian and Native American participants, as well as the positive effect associated with Black students were found to be statistically significant across models. The negative impact of being female was also found to be statistically significant in all three models.

Limitations

Given the wide scope of social benefits, the measure of social benefits in this study was limited to the items available in the NELS:88/2000. Moreover, the social benefit variable was composed of aggregated items. Thus, care should be taken not to generalize the study finding herein to validate specific types of social benefits.

Based on findings from existing studies, this study made the assumption that collegiate experiences may vary greatly across different types of institutions, while remaining homogenous within a group of the same type of institutions. However, except for student/faculty ratio, this study lacks detailed items in collegiate experiences that may differ across a group of the same institutions. Examples of these detailed items are found in comprehensive surveys, as the NSSE. Inclusion of items from such comprehensive surveys will shed light on discussion linking the quality of collegiate experiences to immediate social benefit behaviors after college.

DISCUSSION

Few dispute the notion that both the government and the public perceive higher education as an investment for both the country and citizens who live in it. In contrast to high school graduates, graduating from college improves both economic and non-economic benefits (Perna, 2005). However, as the cost of attending a college increases steeply, the focus of research tends to shift toward assessing monetary returns to examine if the increased cost is offset by future earnings. Many research studies have investigated the relationship between obtaining a college education and future salary. Further, the effects of institutional selectivity and academic majors on earnings have been widely discussed (e.g., Brewer, Edie, and Ehrenberg, 1999; James, Alsalam, Conaty, and To, 1989; Loury, and Garman, 1995; Monks, 2000; Rumberger, and Thomas, 1993). Given that certain occupations offer higher salaries than other occupations (Bureau of Labor Statistics, 2008), it is a reasonable assumption that students' academic majors largely influence their future earnings.

Parents with college-bound children also question the value of specific types of education, such as liberal arts education, for future earnings (e.g., Donadio, 2004). While economic returns are a part of the benefits conferred by higher education, this study highlights the importance of nonmonetary benefits necessary to improve citizenship, and investigated how a higher education enhanced post-graduate social benefits.

Contrary to the significant positive effect of institutional selectivity on earnings found in previous studies (e.g., Monks, 2000; Rumberger, and Thomas, 1993), students in the current study who attended a highly selective institution did not show significant gains in post-graduate social benefit behavior compared to students who attended other institutions. Thus, this study

finding suggests that greater academic abilities prior to college may not be a necessary pre-requisite to improve post-graduate nonmonetary measures.

Similar to the link between college education and future earnings, the findings of the current study point out that the level of post-graduate social benefit behavior is a function of academic programs. Descriptive statistics of mean comparisons for social benefit behaviors indicated that educational major students had the highest mean score, while students who majored in arts and humanities, life science, or social science showed means below the average score. The effects of academic majors on post-graduate social behavior were even significant after controlling for other post-graduate individual and institutional characteristics, such as earnings and institutional types in the HLM analyses.

In addition, based on the study finding, a higher volunteer participation rate significantly increases the likelihood of achieving social benefits after college. Troubling evidence is that arts and humanities, life science, and social science students actually had higher volunteer participation rates in higher school than education students. Therefore, relative to education major students, academic programs such as arts and humanities, life science and social science were found to be less effective in promoting future social benefit behavior in the present study.

The collective findings from this study also offer practical implications. Institutions of higher education need to provide students with educational environments where their propensity to future volunteer is stimulated. However, given that the student/faculty ratio was identified as insignificant, the nexus between collegiate experiences and improving future social benefits needs to be more focused on out-of-classroom environments. Cruce and Moore (2007) suggest that campus residents are more likely to plan to volunteer than non-residents. Thus, residence life is an ideal environment to enthuse students with greater volunteer participation rates in high

school, but planning to major in arts and humanities, life science or social science. For instance, placing students of the same majors on the same floor in residence hall is a common practice. One tenable plan includes assigning arts and humanities, and life science students together on the same floor and coordinating residence life programs tailored toward community involvement. Perhaps, then these students would be able to maintain their interest in volunteerism after matriculation to college.

Student demographics, such as race, are another predictor for future societal benefit behavior that needs to be recognized in student affairs practice. Black students were more likely to participate in activities associated with social benefits after college in the study. Thus, organizing a mentor program where a second-year Black arts and humanities student serves as a mentor for White or Asian arts and humanities student is a feasible option based on the study findings. As students advance to their third and fourth year of college, on-campus activities focusing on community services may be coordinated in conjunction with student associations for specific academic programs. The findings of this study assist practitioners in targeting such specific programs for these on-campus activities.

As for institutional types, graduating from baccalaureate institutions resulted in a higher average social benefit score compared to those who graduated from research institutions, after taking students' volunteer activities in high school into account. As pointed out earlier by Kuh, Pace, and Vesper (1997) earlier, this positive effect of baccalaureate institutions is assumed to be a function of the smaller size of institutions that is typical for baccalaureate institutions. Perhaps, student interaction is more vigorous at baccalaureate institutions than research institutions, which leads to greater participation in community service related activities.

Taking advantage of the smaller institutional size, one feasible long-term strategy for practitioners at baccalaureate institutions may be to study programs offered at their peer institutions, which have been successful in promoting student's propensity to incur future social benefits. Methodologies to develop a list of peer institutions are explained thoroughly in existent studies (e.g., Teeter and Christal, 1987; Weeks, Puckett, and Daron, 2000). Together with the suggested methodology, institutional personnel can proceed with national databases, such as IPEDS (Integrated Postsecondary Education Data System) sponsored by NCES, to select institutional characteristics of importance. Once the list of peer institutions is created, a comparison of on-campus programs offered at these institutions is the next logical examination.

Given that college-graduates have higher gains in non-economic benefits than their counterparts (Perna, 2005), the findings of this study revealed more details regarding the impact of higher education on post-graduate social benefit behavior. Although a linkage between higher education and post-graduate social benefit behavior becomes more difficult to establish as time elapses after graduation, the NELS 88/00 data provide us with questionnaire items measured in 1999. This allows researchers to study the immediate impact of higher education on postgraduate student behavior.

Based on the variance explained by student and institutional characteristics, post-graduate social behavior was more influenced by attributes of individual students than the institutions they attended. However, a large portion of individual attributes is still unobserved in this study. For instance, this study attempted to take post-graduate factors such as marriage and having children into account, while it is still unclear if education major students were more likely to be employed in vocational environments where participation in community services or volunteer activities was expected. Thus, further research that explores unobserved heterogeneity not addressed in the

current study is warranted.

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TABLE 1.
Descriptive Statistics Summary of Study Sample

Variable	Label	Mean/ Percentage	Standard Deviation
Student Characteristics			
Civic Engagement in 2000	Continuous	6.125	2.356
Gender	Male[b]	0.405	
	Female	0.595	
Race	Asian	0.116	
	Black	0.060	
	Caucasian[b]	0.765	
	Hispanic	0.060	
	Native American	0.002	
Parent's Education	First-generation	0.324	
	One parent with BA	0.248	
	Both parents with BAs[b]	0.354	
	Unknown	0.073	
Family Income (in 1992)	< $34,999	0.212	
	$35,000-$49,999	0.166	
	$50,000-$74,999	0.219	
	> $74,999[b]	0.279	
	Unknown	0.124	
SAT Total Scores	400-910	0.208	
	911-1050	0.209	
	1051-1190	0.207	
	>1190[b]	0.186	
	Unknown	0.190	
Pre-College Engagement	Continuous	1.819	1.159
Graduate Degree	Yes	0.134	
College GPA	Continuous	2.977	1.064
Annual Earning (in 1999)	Continuous	35,728	24,005
Employed Full-Time	Yes	0.653	
Married	Yes	0.322	
Have a Child or Children	Yes	0.097	
Academic Major	Arts and Humanity	0.125	
	Business	0.140	
	Education[a,b]	0.080	
	Engineering and Math	0.097	
	Life science	0.100	
	Physical science	0.081	
	Social science	0.220	
	Social science - applied	0.101	
	Unknown	0.057	
Institutional Characteristics			
Highly Selective Institution	Yes	0.100	
Carnegie Classification	Research, Class I & II[a,b]	0.420	
	Doctoral, Class I & II	0.125	
	Comprehensive, Class I & II	0.287	
	Baccalaureate, Class I & II	0.168	
Student/Faculty Ratio	Continuous	24.189	8.173
Tuition (in 1993)	Continuous	6,827	5,700

NOTE: Columns may not add to 1.000 due to rounding

Sample Size: n = 2,463
a = reference group in mean comparisons
b = reference group in HLM analysis

TABLE 2.

Means for Pre-College Volunteer Activities and Post-Graduate Social Benefit Behavior Variables by Academic Major and by Institutional Type

Group Variable	Pre-college Engagement		Post-Graduate Social Benefit Behavior	
	Mean	SD	Mean	SD
Academic Major				
Arts and Humanities	1.934	1.302	6.082	2.382
Business	1.700	1.014	5.615	2.291
Education	1.753	0.979	6.884	2.419
Engineering and Mathematics	1.728	1.178	5.488	2.136
Life science	1.878	1.136	6.061	2.344
Physical science	1.827	1.188	5.958	2.273
Social science	1.906	1.223	6.308	2.328
Social science - applied	1.694	1.100	6.107	2.348
Institutional Type				
Research, Class I & II	1.834	1.139	5.964	2.302
Doctoral, Class I & II	1.683	1.103	5.951	2.366
Comprehensive, Class I & II	1.781	1.182	6.274	2.438
Baccalaureate, Class I & II	1.952	1.196	6.400	2.308
Overall	1.814	1.160	6.111	2.357

TABLE 3.

Statistically Significant Mean Differences in Post-Graduate Social Benefit Behavior (in Effect Size)

Group Variable	Effect Size
Academic Major	
Arts and Humanities	-0.33
Business	-0.54
Engineering and Mathematics	-0.61
Life science	-0.34
Physical science	-0.39
Social science	
Social science - applied	-0.32
Institutional Type	
Doctoral, Class I & II	
Comprehensive, Class I & II	
Baccalaureate, Class I & II	0.19

* All the mean differences are statistically significant at the .05 level.

TABLE 4.

Effects of Individual and Institutional Characteristics on Post-Gradate Social Benefit Behavior

Variable	Label	*b*	SE	Sig.	*b*	SE	Sig.	*b*	SE	Sig.
Student Characteristics		**Model 1**			**Model 2**			**Model 3**		
Intercept		6.128	0.048	**	6.126	0.047	**	6.189	0.056	**
Gender	Female	-0.286	0.094	**	-0.401	0.094	**	-0.396	0.094	**
Race	Asian	-0.666	0.157	**	-0.611	0.158	**	-0.543	0.159	**
	Black	0.632	0.211	**	0.660	0.207	**	0.695	0.206	**
	Hispanic	0.296	0.207		0.261	0.201		0.298	0.202	
	Native American	-1.090	0.382	**	-1.229	0.374	**	-1.188	0.381	**
Parent's Education	First-generation	-0.156	0.122		-0.127	0.121		-0.175	0.122	
	One parent with BA	-0.206	0.126		-0.172	0.124		-0.207	0.125	+
Family Income (in 1994)	< $34,999	0.062	0.149		0.074	0.146		0.031	0.147	
	$35,000-$49,999	0.087	0.142		0.087	0.139		0.036	0.141	
	$50,000-$74,999	-0.166	0.130		-0.155	0.129		-0.198	0.130	
SAT Total Scores	400-910	0.346	0.157	*	0.230	0.160		0.096	0.163	
	911-1050	0.254	0.153	+	0.209	0.152		0.102	0.155	
	1051-1190	0.044	0.144		0.039	0.146		-0.041	0.146	
Pre-College Engagement	Continuous	0.381	0.041	**	0.376	0.041	**	0.377	0.041	**
Graduate Degree	Yes	0.285	0.139	*	0.249	0.136	+	0.259	0.136	+
College GPA	Continuous	-0.054	0.045		-0.020	0.050		-0.022	0.050	
Annual Earning (in 1,000)	Continuous	-0.005	0.002	*	-0.003	0.002	+	-0.002	0.002	
Employed Full-Time	Yes	-0.271	0.104	**	-0.250	0.104	*	-0.271	0.104	**
Married	Yes	-0.006	0.105		-0.014	0.107		-0.047	0.107	
Have a Child or Children	Yes	-0.016	0.168		-0.086	0.165		-0.105	0.163	
Academic Major	Arts and Humanities				-0.874	0.226	**	-0.844	0.227	**
	Business				-1.298	0.212	**	-1.269	0.211	**
	Engineering and Math				-1.427	0.218	**	-1.380	0.219	**
	Life science				-0.924	0.224	**	-0.890	0.225	**
	Physical science				-0.884	0.232	**	-0.862	0.232	**
	Social science				-0.717	0.202	**	-0.650	0.203	**
	Social science - applied				-0.854	0.227	**	-0.838	0.227	**
Institutional Characteristics										
Highly Selective Institution	Yes							-0.148	0.184	
Carnegie Classification	Doctoral, Class I & II							-0.024	0.146	
	Comprehensive, Class I & II							0.190	0.125	
	Baccalaureate, Class I & II							0.301	0.139	*
Student/Faculty Ratio	Continuous							-0.001	0.002	
Tuition (in 1,000)	Continuous							-0.020	0.010	*

Random Effect	Variance	χ^2	Sig	Variance	χ^2	Sig	Variance	χ^2	Sig
Level-2 Intercept Variance	0.090	*		0.074			0.065		
Pre-College Engagement slope							0.022		
Level-1 Variance	5.135			5.020			4.988		

NOTE: ** = $p < .01$, * = $p < .05$, + = $p < .10$

Level-2 and Levl-1 variances were estimated as 0.069 and 5.486 in the null model

Appendix A

Detailed NELS:88/2000 Items for Pre-College Engagement Variable

NELS:88/2000 Label	Item Description
Which of the following types of organizations are/were you involved with during your unpaid volunteer or community service work?	
F2S39A	A youth organization, such as coaching Little League or helping out with scouts
F2S39B	Service organizations, such as Big Brother or Sister
F2S39C	Political clubs or organizations
F2S39D	Church or church-related groups (not including worship services)
F2S39E	Community centers, neighborhood improvement or social-action associations or groups
F2S39F	Organized volunteer group in a hospital or nursing home
F2S39G	Education organizations
F2S39H	A conservation, recycling, or environmental group

Appendix B

Detailed NELS:88/2000 Items for Outcome Variable

NELS:88/2000 Label	Item Description
How many days in a typical 7-day week you did the following?	
F4IMAGS	Read newspapers or magazines
F4IBOOKS	Read books
F4ITVNEW	Watch the news on TV
F4IFITNS	Participate in physical fitness activities to get in or stay in shape
How many days you did each of the following activities in a typical 30-day month.	
F4ILIBRY	Visit a public library
F4ICULT	Go to a play, concert, or museum
F4IRELIG	Participate in organized religious activities
F4ISPORT	Participate in group or team sports and recreation
Did any of these activities within the past 12 months?	
F4IYOUTH	Volunteer in a youth organization
F4ICIVIC	Volunteer in a civic or community organization
F4IPOLYL	Participate in a political campaign (by more than just voting)
Did any of these activities?	
F4IRVOTE	Registered to vote
F4IVPRE	Voted in 1996 presidential election
F4IVANY	Voted in any election in last 24 months