

“NSSE and Retention:

Does integration affect the probability of leaving?”

Raymond Hicks
Nava Lerer
Adelphi University

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The focus of this paper is on the importance of early educational engagement in the retention of postsecondary students. Tinto (1975, 1987) argues that greater academic and social integration in college leads to higher rates of retention. Empirical tests of the claim have been mixed and a frequent criticism of such studies is that the variables used to construct the academic and social integration measures are not consistent across studies, making it difficult to replicate the results of individual studies. Questions on the National Survey of Student Engagement (NSSE), however, offer a way around the difficulty of generalization. NSSE, administered nationally to freshmen and seniors by the Center for Postsecondary Research and Planning at Indiana University, is designed to measure student engagement. Since many of the questions about engagement are concerned with various aspects of students' integration, by using the questions on NSSE to measure social and academic integration we hope to provide an easy and replicable way to examine the effect of integration on student retention.

To do this, we examine the relationship between responses on NSSE and student retention at one participating institution, Adelphi University. The results are very supportive of the idea that integration improves retention. After controlling for high school GPA, gender, and SAT scores, academic and social integration are significantly and positively related to retention—students who are more integrated are more likely to stay at Adelphi. By constructing measures of social and academic integration from questions on NSSE, we allow for easy replication of our results at other institutions.

Brief Literature Review:

There is a voluminous literature on retention. While some studies examine the retention of adult students (Wlodkowski, Mauldin, and Gahn 2001) or student-athletes (McArdle and Hamagami 1994) or differentiate between students who drop-out and those who transfer to

another institution (Porter 2002), the main focus has been on the retention and graduation of traditional undergraduates (Gravelly 2003; Adelman 1999; Astin 1993). The majority of studies of persistence start from Tinto's model of student retention (Carbrera, Castaneda, Nora and Hengstler 1992; Kahn and Nauta 2001). Put simply, Tinto's model contains a feedback loop: while students' goal and institutional commitments affect their academic and social integration (through the academic and social system), integration in turn affects commitment which influences the dropout decision (Tinto 1975, 1987).

Empirical evidence for the validity of Tinto's model appears to be mixed (Cabrera, Castaneda, Nora, and Hengstler 1992; Towles and Spencer 1993; Braxton, Sullivan, and Johnson 1997; Berger and Braxton 1998; Berger and Millem 1999; Brunsdn, Davies, Shevlin, and Bracken 2000; Elkins, Braxton, and James 2000). Braxton, Sullivan, and Johnson (1997) examine 13 propositions from Tinto's model, finding support for only 5, including the importance of social integration. Brunsdn, Davies, Shevlin, and Bracken (2000) test Tinto's entire model at once, finding little evidence in support of it. The problems have led some scholars to try to elaborate on Tinto's basic model by including new perspectives or by integrating Tinto's model with other arguments. Overall, though, there seems to be some evidence that social integration is positively related to retention even if other aspects of Tinto's argument remain unsettled.

Alternatively, Draper (2003), suggests that one problem with testing Tinto's model is that operationalization of the key components is unclear and that many studies use different questions when constructing social and academic integration measures. This makes it difficult to replicate existing findings as it is difficult for other institutions to determine whether significant results are simply an artifact of the measure used in the initial study. This problem can be overcome by

deriving measures of social and academic integration from survey instruments such as NSSE. First, NSSE is administered at a large number of colleges using the same set of questions, so results will be easily replicable. Second, the NSSE instrument includes numerous items that can be aggregated into scales to measure Tinto's two types of integration.

The National Survey of Student Engagement. Starting from the argument that students who are more engaged in college benefit more from their education than students who are less engaged, the National Survey of Student Engagement attempts to measure the degree of student engagement or the "time and effort students put into their studies and other educationally purposeful activities" (Kuh, Gonyea, and Palmer 2001). NSSE asks about 70 questions—questions have been added or removed different surveys—on a range of topics from the amount of work required in class to participation in extracurricular activities to the quality of the relationship with administrative personnel. Only seniors and first-year students are surveyed, which allows institutions to investigate its impact on students' opinions over time.

To make the results of the survey manageable, the developers of NSSE utilize factor analysis to devise benchmarks that "reduce the more than 60 questions on the NSSE survey to a handful of self-evident concepts" (Kuh 2001). The resulting 5 benchmarks include only 41 of the items from the survey so a large amount of information is excluded. Four of the five benchmarks largely differ from Tinto's types of integration: "Active and collaborative learning" includes questions about classroom behavior, tutoring other students, the number of pages in students' papers, and discussing ideas with others outside of class. "Student interactions with faculty" includes talking to faculty about grades, career plans, or ideas from class, working with faculty, and receiving feedback from faculty. The "level of academic challenge" benchmark includes components such as the number of hours spent preparing for class, the number of

textbooks and written papers, emphasis of coursework, and campus emphasis on studying.

Finally, “enriching educational experiences” includes items such as participating in co-curricular activities, community service, independent studies, study abroad, and contact with students from different backgrounds or with different beliefs. These four benchmarks, while including items related to social and academic integration, do not directly measure these concepts.

Consequently, they have been excluded from the rest of the analysis.¹

The last benchmark “supportive campus environment” benchmark roughly approximates Tinto’s concept of social integration. It includes items such as relationships with other students, faculty, and administrators, as well as academic and non-academic support from the campus environment.

Since a few items in the benchmark do not closely fit Tinto’s social integration model and other items not included in the benchmark appear to be relevant, we created a new social integration scale. Our “social integration” scale drops the “campus environment provides support you need to help you succeed academically” item and includes the “evaluate your entire educational experience” and “encouraging contact among students from different... backgrounds” items. Although the item asking students to evaluate their entire educational experience may appear at first glance to be an academic integration item, a student’s educational experience will include a strong social component. Moreover, Draper (2002) suggests that one of the components of social integration is how well the students enjoy being at their college which is similar to the evaluation of one’s entire educational experience item in NSSE. The final scale consists of 7 items (alpha = .79).

We also created an academic integration scale which includes selected items corresponding

¹ While all three are significant in bivariate logit regressions of retention, they all drop out of significance when control variables are included.

to Tinto's measure from NSSE questions about class participation, discussing ideas from class with students and faculty, acquiring a broad general education, learning effectively, and academic support by the college. The final scale consists of eight items ($\alpha = .72$). (The questions that comprise both scales appear in Table 1.)

Brief Summary of the Methodology:

To test the argument of the paper, we used logit regression and focused on the one-year retention of Adelphi freshmen who responded to NSSE in the years 2000 through 2003. Logit analysis is the appropriate technique to use when the dependent variable is dichotomous—as it is here—because ordinary least squares does not return the most efficient parameter estimates. Because the error terms are not normally distributed, ordinary least squares may lead to faulty conclusions (Bohrstedt and Knoke 1994). Logit, on the other hand, computes log-odds ratios for each variable to determine the probability of an event occurring. To convert the log-odds to standard probabilities, one takes the anti-log. The dependent variable in the analysis will be one-year retention, coded as 1 if a student was retained and 0 if the student left Adelphi.

Brief Summary of the Data Sources:

Student responses on the NSSE have been matched with demographic and retention information from Adelphi's database. Adelphi has participated in NSSE, which is administered to freshmen and seniors in the spring, for four years (Spring 2000 to Spring 2003). After excluding responses from seniors, each of the four NSSE files has been matched with the corresponding cohort file of Adelphi first-year students. So, the 2000 NSSE has been matched with the fall 1999 cohort; the 2001 NSSE data with the fall 2000 cohort; and so on. Matching the files led to a database of 585 entering students, of whom 77 left Adelphi and 508 were still enrolled after one year for a retention rate of 87 percent.

The supportive campus environment benchmark created by NSSE to assess institutions has been recreated at the individual level. That is, while NSSE created aggregate benchmarks to derive scores for an entire institution, we have applied the same process to create benchmark scores for individual students. In addition, we have created individual scores on the 2 integration scales discussed above in order to assess Tinto's model. Variables used as controls are those found in the literature to affect retention: gender, high school GPA, and scores on the math and verbal components of the SAT.

Results of the logit analysis

As a first step, we conducted bivariate regressions using the supportive campus environment benchmark and the two constructed integration scales as independent variables. The results of the analyses are presented in Table 2. All three measures are positive and significant at the .01 level or higher. As social or academic integration increases, the probability that an Adelphi student will return to Adelphi also increases. Remembering that 87 percent of Adelphi freshmen who responded to NSSE returned to Adelphi for their second year, we can get some sense of how the benchmarks affect the probability of staying at Adelphi by comparing students who scored in the 10th percentile to those who scored in the 90th percentile on each benchmark. For the two measures of social integration, students who scored in the 10th percentile had a probability of staying at Adelphi of a little more than 75 percent. The probability increased gradually so that students scoring in the 90th percentile had a 95 percent chance of staying at Adelphi. A similar picture is found with the academic integration scale. While those scoring in the 90th percentile on the academic measure had a 94 percent chance of remaining at Adelphi, those scoring in the 10th percentile had an 80 percent probability. This suggests that, while social integration, measured either using NSSE's benchmark or our revised

scale, and academic integration are both significantly related to retention, social integration has a slightly larger effect.

The next step is to determine whether the findings stand up to the inclusion of control variables for high school performance (high school GPA and verbal and math SAT scores) and demographic characteristics (gender). Results of these analyses are presented in Table 4. The only control variable that is significant is high school GPA; the other three control variables fail to reach conventional levels of significance. In all of the specifications, as high school GPA increases, the probability that a student will stay at Adelphi also increases. More importantly, the two social integration variables and the academic integration scale remain significant at the .01 level or higher.

So what do these results mean? Using the logit coefficients, we can estimate the probability that a student will remain at Adelphi, given different values of the explanatory variables. In other words, we can estimate the impact changes in the benchmark scores have on the likelihood of retention, leaving all other explanatory variables constant. Based on the results, the key variables to examine are the 3 integration measures as well as high school GPA. For each of the three measures, 9 scenarios are presented: low (10th percentile), mean (50th percentile), and high (90th percentile) secondary school GPAs and low (10th percentile), mean (50th percentile), and high (90th percentile) benchmark scores. The results are presented in Tables 5 through 7. Because the probability of a student remaining at Adelphi is already high (87%), the computed probabilities will be relatively high as well. The key information to note in the analyses is the differences in probability caused by the explanatory variables.

Not surprisingly, the results confirm that, as high school GPA increases, students are more likely to stay in college. In fact, students who have a high school GPA in the 90th

percentile are more likely than average to stay, no matter the score on any of the three benchmarks. This is not to say, however, that the integration measures have no effect. The three tables show that, at a given high school GPA, as academic or social integration increases, the probability that a student will return to Adelphi increases, especially at low and average GPAs.

Supportive campus environment. At a high school GPA in the 10th percentile, moving from a benchmark score in the 10th percentile to one in the 90th percentile increases the probability of staying at Adelphi by 25 percent, from 65 percent to 90 percent. So even students who entered Adelphi with a below average high school GPA were slightly more likely than the average student to stay at Adelphi if they were very well socially integrated at Adelphi. The findings are similar for students with an average high school GPA. Students with a low benchmark are slightly more likely than the average student to drop out while students with an average or high benchmark are more likely to remain at Adelphi.

Social integration. The findings from our constructed scale of social integration are very similar to the findings from NSSE's supportive campus environment benchmark. Again, among students with a low GPA, there is a 25 percent difference in the probability of staying at Adelphi between those scoring in the 10th and 90th percentile on the social integration scale. Also, students who have a low integration score and an average GPA are less likely than average to stay at Adelphi.

Academic integration. Although the academic integration variable does not perform quite as well as the social integration ones, it does demonstrate the importance of academic integration to retention. At a low GPA, there is a 20 percent difference in the probability of staying at Adelphi between students scoring in the 10th and 90th percentile on the academic integration measure. Students who scored in the 10th percentile have a 71 percent probability of

returning to Adelphi while those scoring in the 90th percentile have at 92 percent probability of staying. Students with an average GPA who had a low score on the academic integration scale were as likely as the average student to return to Adelphi.

Overall, then, the results lend support to Tinto's argument that academic and social integration contribute to greater retention. Students who feel more involved at an institution are more likely to stick around. Social integration appears, based on the results found here, to be a little more important than academic integration. This conforms with Braxton, Sullivan, and Johnson (1997) who find that social integration is significant while academic integration is not. At Adelphi, the stronger influence of social integration may also reflect the fact that Adelphi has a large percentage of older and commuting undergraduates. Because Adelphi does not have a large on-campus social scene (about 75 percent of its undergraduates are commuters), it may be more difficult for the more traditional freshmen to integrate themselves socially. This lack of socialization may drive more freshmen away from Adelphi.

Limitations and caveats

The biggest caveat to this analysis is the timing of NSSE's survey. Tinto (1993) asserts that most departures occur in the first semester of college (1993, p. 58), but NSSE administrators do not distribute their survey until the spring semester. While the timing of the survey is beneficial in the sense that students have time to develop opinions about their institution, it does exclude freshmen who drop out before the survey was administered. And, if Tinto is correct that most students leave during the first semester, then the results of the analysis will be somewhat biased since many students who presumably are not engaged have already left college. However, to the extent that the model is correct, the bias in the timing of NSSE should make it more difficult to find a significant relationship between integration and retention.

A second caveat is the question of whether Adelphi's students are representative of college students in general. The more similar the typical Adelphi student is to the average college student, the more confidence we would have in the results. While overall Adelphi has a large proportion of non-traditional students, as mentioned above, its freshmen are largely traditional. The average age of first-time, full-time freshmen is 18.5 and only 2.4 percent of all first time freshmen are 25 years or older. Almost half (45%) of Adelphi freshmen live in campus housing. Adelphi freshmen, therefore, appear to be more or less representative of traditional college students (although fewer live on campus), so the results should be applicable to other schools.

Conclusions & Implications for Future Research

The originators of the National Survey of Student Engagement claim that the survey measures a student's engagement in college. They argue that students who are more engaged in college are more successful and get more out of college. Their argument is similar to Tinto's argument that social and academic integration at a university contributes to student retention. In both cases, students who are more involved at the institution gain more from the experience and are more likely to succeed than are students that are not as involved. In this paper, we have tested Tinto's argument using responses to NSSE and found that integration, especially social integration, has a significant effect on the decision to remain in school. Students who feel more integrated into the campus are more likely to stay at Adelphi. To the extent that these scales do measure academic and social integration, they suggest important new avenues of research open to institutional researchers.

The next—and most difficult—step in any such research is to examine the causes of social and academic integration (see also Braxton, Milem, and Sullivan 2000). Why are some

students more completely integrated into an institution than others? While Tinto (1993) briefly mentions it, he does so at the macro-level, attributing the decision largely to a combination of institutional policy and student personality. At individual schools, institutional characteristics are not helpful explanatory variables as they will not vary by student. This suggests that a micro-level explanation, one that focuses on individual students, is needed to explain integration.

Table 1: Components of the Social and Academic Integration Scales

Social Integration Scale	Academic Integration Scale
1. Evaluation of entire experience at institution	1. Asked questions in class or contributed to class discussions
2. Institution emphasizes: helping cope with non-academic responsibilities	2. Came to class without completing readings of assignments
3. Institution emphasizes: providing the support needed to thrive socially	3. Discussed ideas from readings or class with others outside of class
4. Institution emphasizes: encouraging contact among students different economic, social, and racial/ethnic backgrounds	4. Experience at institution contributed to: acquiring a broad general education
5. Quality of relationships with other students	5. Experience at institution contributed to: learning effectively on own
6. Quality of relationships with faculty members	6. Institution emphasizes: spending significant amounts of time studying and on academic work
7. Quality of relationships with administrative personnel and offices	7. Institution emphasizes: providing the support needed to succeed academically
	8. Discussed ideas from readings or classes with faculty members outside of class

Table 2: Descriptive Statistics

	N	Mean	S.D.	Min	10 th %	90 th %	Max
Supportive Campus Environment	566	60.03	18.44	0.00	36.11	83.33	100.00
Academic Integration	556	53.86	16.05	4.17	33.33	75.00	100.00
Social Integration	564	59.19	18.06	0.00	35.71	80.95	100.00
High School GPA	514	3.27	0.54	1.10	2.50	3.99	4.30
Gender	585	0.77	0.42	0	0.00	1	1
SAT – Math	430	52.77	7.78	27.00	43.00	63.00	80.00
SAT – Verbal	430	52.17	7.86	34.00	43.00	64.00	76.00

Table 3: Bivariate Logit Results

	(1)	(2)	(3)
Intercept	-0.006 (0.384)	0.229 (0.430)	-0.138 (0.387)
Supportive Campus Environment	0.034*** (0.007)		--
Academic Integration		0.034*** (0.009)	--
Social Integration			0.038*** (0.007)
Number of observations	564	556	566
-2*log likelihood	401.789	404.435	409.664
Nagelkerke R ²	0.094	0.055	0.082

Table 4: Multivariate Logit Results

	(1)	(2)	(3)
Intercept	-5.434*** (1.700)	-4.394** (1.743)	-5.293*** (1.697)
Supportive Campus Environment	0.035*** (0.010)	--	--
Academic Integration	--	0.032*** (0.011)	--
Social Integration	--	--	0.038*** (0.010)
High School GPA	1.407*** (0.400)	1.432*** (0.410)	1.262*** (0.403)
Gender	-0.512 (0.471)	-0.641 (0.482)	-0.662 (0.491)
SAT – Math	0.001 (0.032)	0.000 (0.033)	0.014 (0.033)
SAT – Verbal	0.031 (0.032)	0.020 (0.033)	0.025 (0.032)
Number of observations	397	389	395
-2*log likelihood	220.165	214.857	215.465
Nagelkerke R ²	0.196	0.157	0.199

Table 5: Conditional probabilities: benchmark 5

	Low GPA	Average GPA	High GPA
Low benchmark	65.1%	84.6%	93.8%
Average benchmark	81.2%	92.7%	97.2%
High benchmark	90.7%	96.6%	98.7%

Table 6: Conditional probabilities: benchmark 6

	Low GPA	Average GPA	High GPA
Low benchmark	71.0%	88.0%	95.4%
Average benchmark	84.0%	94.0%	97.8%
High benchmark	91.7%	97.0%	98.9%

Table 7: Conditional probabilities: benchmark 7

	Low GPA	Average GPA	High GPA
Low benchmark	68.3%	85.0%	93.4%
Average benchmark	84.3%	93.4%	97.2%
High benchmark	92.9%	97.2%	98.8%

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