

# **Factors Influencing Retention Behavior at IUB**

## ***The Role of Ability, Financial Aid, and Academic and Social Integration***

Dean of the Faculties, Office of Institutional Research  
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### **Background**

Over the past year the Dean of the Faculties' Office of Institutional Research has been engaged in research designed to understand factors that influence first-to-third semester retention<sup>1</sup> behavior on the Bloomington campus. Considering the widespread interest in this topic and its far ranging implications for our campus, the importance of understanding student persistence factors cannot be overstated. Approximately one-thousand students from each of our freshman cohorts<sup>2</sup> between 1996 and 1999 did not return for their third semester. Although some temporarily leave IU-B (about one-hundred from each of these cohorts reenroll at some later date), the majority never return to the Bloomington campus—some may no longer pursue higher education, while others continue towards their first degree at other institutions.

### **Methods**

In order to understand the complex, multi-faceted nature of student retention behavior, we developed two statistical models (using logistic regression analysis) to help explain the role different factors play with Indiana and non-Indiana residents' decisions to persist to the third semester at IUB<sup>3</sup>. Statistical models such as these allow for relationships between individual factors and outcome variables, in this case third semester enrollment, to be assessed, holding all other factors constant. When using logistic regression analysis, in particular, we can estimate the change in probability or likelihood for students being retained given certain characteristics. Although looking at purely descriptive retention rates can be informative, one might incorrectly conclude that certain factors influence retention<sup>4</sup>. Only by holding a variety of factors constant, as these models do, can one evaluate the direct, independent relationships<sup>5</sup> of background factors and first year experiences with retention. As with most social scientific studies, we cannot conclude that any factors "cause" retention, just that there exists statistically significant relationships with varying degrees of strength.

***Population and Data Sources.*** The Indiana resident and non-Indiana (domestic) models use approximately 17,000 and 7,300 student records, respectively, from the 1996 thru 1999 freshman cohorts. Considering the complexity of these models, a variety of data sources were called upon, including the federal financial aid form, the Student Background Survey (administered with the help of University Division administrators prior to first semester), StarNet (academic advising

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<sup>1</sup> Students are considered retained if they enroll in classes on the IU-Bloomington campus during their third semester.

<sup>2</sup> Freshman cohorts include first-time, degree-seeking students only. Transfer and Continuing Studies students have been excluded.

<sup>3</sup> With the help of statistical tests, we determined that two separate models were warranted to adequately explain the behavior of Indiana and non-Indiana residents. International students have been excluded from the non-Indiana resident model because of their unique reasons for not persisting.

<sup>4</sup> Official retention rates can be found at <http://www.indiana.edu/~rrlilly/>, as reported by the University Budget Office.

<sup>5</sup> **A caveat readers of this report should keep in mind is that a factor may demonstrate a strong relationship to retention on its own, but after taking into account other model factors the relationship can diminish to the point of insignificance. In these situations, one would conclude that other factors better explain retention, rather than no relationship exists at all.**

contact data system), and Registrar institutional files that provide semester GPA, intended major, and a variety of other data items.

## Research Objective

A number of important concepts for understanding student retention have been identified across time by various retention researchers across the country.<sup>6</sup> Our hope was to identify the most central of these concepts, find appropriate ways to measure these concepts with available data, and to test their statistical significance and strength in predicting retention behavior. In addition to this overarching objective, we were also interested in answering particular questions that might have campus policy implications.

The major concepts identified, measured and tested include:

- Demography (e.g., gender)
- Socio-Economic Status (e.g., parental education)
- Academic Ability (e.g., SAT scores)
- Academic Preparation (e.g., hours studied outside of class during high school)
- Financial Aid (e.g., amount of grants received)
- Student Commitment to Institution prior to first semester
- Social Integration (e.g., number of friends on campus)
- Academic Integration (e.g., first semester grades)

Some specific research questions answered in this report include:

- Are Exploratory/Undecided majors more likely to drop-out than students who have an intended major during their first semester?
- Is there any relationship between the frequency of academic advisor visits and retention?
- How important are first semester grades to the likelihood of persisting?

## Findings

### *Demography*

**Gender.** Gender is a statistically significant predictor of retention. All else equal, females are less likely to be retained than their male peers, according to both models. Resident and nonresident (non-Indiana) female retention probabilities are on average 5.4% and 3.6% less than that of male students, respectively<sup>7</sup>. In other words, if you took 100 resident men and 100 resident women with

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<sup>6</sup> Please see “Reworking the Student Departure Puzzle” (Edited by John Braxton, 2000) for an extensive review of current research being done in the area of student retention. This text served as a primary resource for identifying the major theoretical concepts used in this research project.

<sup>7</sup> These estimates use the *Delta-p* statistic, which gives the expected change in probability from the group mean probability for a single unit change in each independent variable. Due to the non-linear nature of logistic regression models, subsequent unit changes for continuous variables (e.g., SAT scores) would not have the same effect. See “Logistic Regression Analysis in Higher Education: An Applied Perspective” by Alberto Cabrera (Higher Education: Handbook of Theory and Research, Vol. X, 1994) for more detailed information on the calculation of this statistic.

identical backgrounds and first-year experiences, one would expect approximately five more females not to persist.

**Race.** The primary question we intended to answer involving race was “how do underrepresented minority students persist in relation to otherwise similar students?” In order to answer this question, a set of design (or “dummy”) variables were created so that African-American and Latino students could be compared to non-African-American and non-Latino students (the reference group)<sup>8</sup>. Both models found African-Americans to be more likely to persist relative to the reference group, with a 4.4% and 5.5% greater probability among residents and nonresidents, respectively. Although retention rates for African-American students are lower than the rates for the reference group, this difference is explained by other model factors. No statistically significant difference appears to exist for Latino students in relation to the reference group.

**Rural Indiana County.** Students coming from rural Indiana counties (counties with population densities of less than 50 people/sq. mile of land area) have no lesser probability of being retained<sup>9</sup> compared to their non-rural peers. Although retention rates for rural students are approximately 7% lower than other Indiana resident students, model results lead one to conclude that other factors explain the disparity. (Although not included in the final model, we did test to see if rural females were any less likely to persist. Results showed no significant effect.) A rural identifier was not available for the nonresident model.

### ***Socio-Economic Status***

**Parental/Student Income.** Indiana residents (financial aid applicants only) with combined parental and student incomes greater than \$11,000 are more likely to persist than students with incomes below \$11,001 (by 2.6% to 4.7% depending upon the income bracket—see attachment for detail). This suggests that students at the lowest income levels are at a disadvantage. No statistically significant relationship could be found among the nonresident population.

**Parental Education.** Although a relationship between father’s educational attainment and retention exists, no statistically significant relationship exists for mother’s educational attainment. Resident and nonresident students with fathers having less than a high school education are 8.1% and 10.9% less likely to persist than those with a high school education, respectively. Among the resident population, students with fathers holding a college degree are 2.8% more likely to persist than those only having a high school education, holding all other variables constant.

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<sup>8</sup> Although Native American Indians are typically included among underrepresented minorities, their extremely small number within our cohorts led us to merge them within the reference group.

<sup>9</sup> We also tested our office’s historical definition based on the largest city within a county and similar results emerged. No universal definition of “rural” exists, therefore making the current definition a bit arbitrary. We did attempt to be as conservative as possible before labeling students as coming from rural areas. County population density information was taken from the U.S. Census Bureau (1992). This office plans to do further research to help refine a “rural” identifier with the help of Geographical Information Systems software.

## *Academic Ability*

**SAT Scores.** While looking at the relationship between SAT scores<sup>10</sup> and retention, we did not find a significant effect among Indiana residents. For nonresidents, however, a statistically significant, negative relationship exists. Nonresident students that score in the higher SAT ranges (greater than 1,300) are less likely to persist than their lower scoring classmates, accounting for all other model factors.

**High School Rank.** Neither residents nor nonresidents showed a significant relationship between high school rank and retention, controlling for all other factors.

## *Academic Preparation*

**High School Academic Units.** Our models controlled for the number of high school academic units taken in Math, English, Lab Science and Foreign Language. Among residents, an additional unit of Math, English and Lab Science correlates with about a 1.2% to 1.5% increase in retention probability. For nonresidents, we estimate an additional foreign language unit to be associated with a .7% increase in retention likelihood.

**Campus Math Assessment Score.** Among the resident population, no significant relationship was found with on-campus math assessment scores. Nonresident students' retention probabilities, however, increase about .3% for one additional point on the test<sup>11</sup>.

**Hours Studied During High School.** The more resident students studied outside of class during their senior year in high school, the greater their retention likelihood. The nonresident model did not show a statistically significant relationship for this factor.

## *Financial Aid*

**Loans Offered.** The total amount of subsidized and unsubsidized federal loans offered (as a percentage of total cost<sup>12</sup>—tuition, fees, room, board, etc.) was positively related with resident persistence. According to our models, if a resident student were to have an additional 20% of total cost covered by available loans, their likelihood of being retained would increase by about 1.3%. The nonresident model showed no statistically significant relationship.

**Grants Received.** The greater amount of grants received from IU, private, and state/federal government sources, the more likely resident and nonresident students are to persist. For residents, this is a highly statistically significant factor, although only marginally so for nonresidents<sup>13</sup>.

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<sup>10</sup> If a student does not have a SAT score, the models used ACT converted scores instead.

<sup>11</sup> For the nonresident population, scores ranged between 0 and 36, with a mean of 15 and standard deviation of 5.6

<sup>12</sup> Depending upon the year, one-percent of total costs between 1996 and 1999 for resident and nonresident students ranged from \$113 to \$127 and \$193 to \$218, respectively.

<sup>13</sup> If one models with only the 1998 and 1999 cohorts, the significance of the nonresident relationship between grants and retention increases, perhaps pointing to the effects of new institutional tuition discounting policies.

According to our models, if a resident student received an additional grants in the amount of 20% of total cost, their likelihood of being retained would increase by about 1.7%; for nonresidents it would be 1.2%.

**Unmet Financial Need.** Unmet financial need as a percent of total cost is a significant retention predictor for both residents and nonresidents. As one might expect, higher levels of unmet financial need are associated with lower retention probabilities. Because a nonlinear relationship was tested in our resident model, the change in probability varies by amount of unmet need: we estimate a 1% probability drop if need as a percent of cost goes from 10% to 30%; a change from 20% to 40%, however, would decrease a student's retention likelihood by about 1.7%. Our nonresident model (where a linear relationship appeared to fit the data best) estimates that unmet need in the amount of 20% of total cost would be associated with a 2.9% decrease in retention probability.

**Financial Aid Applicant Status.** The likelihood of resident non-financial aid applicants persisting is significantly greater than that of aid applicants by approximately 6%. This would lead one to conclude that even if a financial aid applicant had all their need met (through work study, subsidized loans and grants), a non-aid applicant would still have an advantage, possibly reflecting the enhanced freedom to concentrate on their academic work and be involved in extracurricular activities, as well as a lack of concern about indebtedness. Nonresident results show no statistically significant relationship.

### ***Student Commitment to Institution***

In order to measure student commitment to Indiana University prior to the start of the fall semester, we developed a scale based on eight questions from the Student Background Survey. Some of the questions used included: "I am confident I made the right decision in choosing to attend IUB" and "It is very important for me to graduate from IUB as opposed to some other school."<sup>14</sup> Neither the resident or nonresident model showed this commitment scale to be a statistically significant factor in explaining retention.

### ***Social Integration***

**Close Friends on Campus.** As the number of close friends residents and nonresidents report having on campus increase (or close friends that plan to attend IU), the more likely they are to persist to third semester. Models predict retention probabilities increasing by .8% for residents and 1.1% for nonresidents when students report having just one additional friend on campus.

**High School Classmates Attending IU.** For nonresidents, the greater the numbers of high school classmates attending IU, the more likely students were to persist (.2% increase for an additional classmate). Rather than model the raw number of classmates, the resident model used the percentage of a student's high school class attending IU as a predictor, which turned to be significant as well (.3% increase for a one percentage point change).

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<sup>14</sup> Survey respondents used a 5-level Likert scale to respond to these items (e.g., Strongly Agree to Strongly Disagree).

**Importance of Joining Organizations.** Although we do not know the extent of student participation in campus organizations, one question from the Student Background Survey served as a proxy. As the importance of joining organizations decreases (moves from “very important” to “important” or “not very important” to “not at all important”) the probability of persisting decreases by approximately 1.3% for residents and nonresidents.

**Expected Greek Involvement.** Resident and nonresident students that expect to participate within the Greek system have a 3.0% and 2.6% greater likelihood of persisting, respectively. This data element could be viewed as a proxy for actual participation and/or as an identifier for certain student personality types (e.g., highly sociable, likely to be involved in other activities, etc.).

### *Academic Integration*

**First semester GPA.** Grades earned during the first semester serve as one of the best retention predictors in our models, being both highly statistically significant and having a large effect size. In order to assess the relationship, we created three design variables (gpa greater or equal to 3.0, less than 3.0 but greater or equal to 2.5, and less than 2.0) that could be compared to a reference group (less than 2.5 but greater or equal to 2.0). We found that students who earned less than a 2.0 had a far lower likelihood of being retained, compared to the reference group: the resident model showed the likelihood of being retained decreasing by 24.8%, while the nonresident model showed a 17.3% decrease. As expected, students who earned a 2.5 gpa or greater were more likely to be retained: among residents there was either a 7% (<3.0 and >=2.5) or 10.2% (>=3.0) increase in probability, whereas nonresidents showed smaller effect sizes (4% and 5.7%).

**Intended School.** The primary question we intended to answer when integrating data on first semester intended school<sup>15</sup> was “are first-semester Exploratory and Undecided majors any less likely to persist into their third semester than students who declared a major?” In order to answer this question, Exploratory and Undecided majors served as the reference group for a set of design variables identifying the various schools on campus (please see attached model results for specifics). The majority of schools for both residents and nonresidents showed no statistically significant difference from our reference group. The few exceptions for residents included Business (2.3% greater likelihood than Exploratory majors), Music (5.8% less likely), and Nursing (14.2% less likely). For nonresidents, COAS students were 2.9% less likely to persist, with all other schools showing no significant difference from the reference group.

**Expected Study Habits.** Both the resident and nonresident model did not demonstrate any relationship between hours per week students planned to spend studying for college courses and retention.

**First Semester Credit Hours.** The more first semester credit hours attempted, the more likely resident and nonresident students are to persist. We approximate that for an additional credit hour attempted, resident and nonresident likelihood of persisting increase 1.4% and .7%, respectively.

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<sup>15</sup> Students directly admitted into the Business and Music school are also included.

**Academic Advising Contacts.** A highly significant relationship exists between the frequency of in-person academic advising contacts at University Division and retention. We estimate that resident and nonresident retention likelihoods increase by 2.4% and 2.0%, respectively, for an additional in-person appointment with an academic advisor. Because freshmen within the Honors program, Groups program, and those directly admitted into a specific school do not use University Division advising services, they have been excluded for the purpose of developing this conclusion.

### ***Factors Affecting Social and Academic Integration***

**Work Plans.** The more hours residents and nonresidents expect to work per week during their freshman year (on or off-campus), the greater their chances of not being retained.<sup>16</sup> For example, if a student were to report they planned to work 11 to 15 hours per week instead of 1 to 10, the chances of them being retained would decrease by approximately 1.6%; for nonresidents, the chances decrease by 2.6%.

**Residence Hall Type.** In order to better understand how special residence halls might relate to student retention, we created three design variables for students in Theme residence halls, Academic residence halls, and living off-campus, thus leaving standard residence halls students to serve as the reference group. For both residents and nonresidents, we found students living in Theme and Academic halls to be more likely to persist compared to those living in standard halls.<sup>17</sup> Indiana residents living in Theme and Academic halls were 4.9% and 7.6% more likely to be retained than those living in standard halls, respectively. For nonresidents, retention likelihoods increase by 5.2% and 6.8% for Theme and Academic hall residents. Models showed no significant difference between students living off-campus and those in standard resident halls.<sup>18</sup>

**Campus Program Participation.** Both models control for various campus programs that could potentially change the likelihood of persisting. In both the resident and nonresident population, controlling for campus program participation appears to significantly improve the overall model fit.

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<sup>16</sup> It should be noted that other published research papers have documented certain types of work (e.g., on-campus positions) without excessive demands promoting student integration, thus having a positive affect on retention.

<sup>17</sup> When analyzing the influence of residence halls, within the context of these models, one must always question whether any existing relationship is based on program substance and/or student characteristics possibly uncontrolled for in the model (i.e., motivation or parental expectations for the student). Using results from both statistical models and student surveys evaluating their experience with any given living arrangement can give more credence to any conclusions one may draw from either source on its own.

<sup>18</sup> These conclusions are based on only 1998 and 1999 data. Analyses using the 2000 cohort (residents only) found retention likelihoods of off-campus residents to be less than that of special and standard residence hall occupants.

## Implications

A number of these findings have implications for the Bloomington campus, in addition to offering evidence for some commonly held assumptions. It appears that initial academic success or failure plays a large role in persistence. One only need refer to the first semester grade point average finding to see this statement's validity. The data shows that even when high ability students fail to make a "C" average their first semester, their likelihood of persisting drops precipitously, possibly indicating that their confidence and academic self-concept have been damaged in some way. On the other hand, lower ability students may have their worst fears (e.g., "I'm not good enough to make it at IU") materialize when they receive less than average first semester grades. Based on this finding, the campus as a whole must continue to make every effort at ensuring a successful first semester, especially through good advising and curriculum planning. Making sure first-year students do not enroll in classes they are not prepared to handle is essential. Our finding regarding academic advising contacts emphasizes the critical need for students to use campus resources, especially when it comes to planning their curriculum.

This study confirms the common assumption that financial aid matters. In these times of increasing tuition levels, satisfying unmet financial need through higher levels of grants and ensuring access to loans (in the case of Indiana residents) should be effective means for enhancing retention, although tailoring financial aid policy for particular groups will be important as well (e.g., minorities have been found to be more unwilling to go into debt than their peers, especially African Americans).

We can also not ignore the strong findings regarding social integration for both resident and nonresident students. In general, it appears the greater number of friends (one would assume the quality of friendships matter, too) and participation in extracurricular activities will help retain students. To the extent our various campus programs intentionally promote friendship development as a specific goal and encourage students to become actively involved in campus, the greater the chances of students persisting.

## Future Research

These initial models represent a good starting point for understanding the complexity of student retention on the Bloomington campus, however more research can be done. In particular, we need to begin utilizing actual first year engagement levels (rather than the many proxy variables we use from the Student Background Survey) as measured by the National Survey of Student Engagement, a relatively new instrument we have just started using during the past two years. Furthermore, we have plans to restructure this model into a multiple equation format to help us understand the indirect relationships between various factors and retention. As always, we look forward to hearing ideas from staff and administrators in order to refine future analytical projects aimed at understanding retention. We encourage all readers of this document to send any ideas or suggestions to [ir\\_data@indiana.edu](mailto:ir_data@indiana.edu).