

Engagement Pathways to Transfer Student Success

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I. Introduction

As the number of students entering higher education institutions from high schools decreases and the number of adults needing to complete or continue their education increases, we must develop a deeper understanding of the factors that contribute to transfer student retention and success. What role do out-of-the-classroom engagements play in transfer student success in comparison to first-time freshmen? This continuation of a previous study of undergraduate students who matriculated in summer/fall of 2012 through summer/fall of 2018 focuses on which library, co-curricular, extracurricular, pre-entry (high school GPA, number of incoming credits, Pell grant eligibility), and demographic factors (under-represented minority status) contribute to transfer versus first-time freshman student retention and success at a large, public, research university in the southeast with a high transfer student population. The study investigates which student-level engagements in activities in the library (and total engagements in academic support and extracurricular activities) for transfer students versus first-time freshmen relate to student success as measured by year 1 to year 2 retention, cumulative GPA after 4 years, and time to graduation. The study reveals the role of library and other academic support and extracurricular engagements in transfer student success and helps institutions understand what engagements they should emphasize with incoming transfer students.

This study analyzes transfer versus First Time in College (FTIC) freshmen at UNC Charlotte, an urban, research institution with the Carnegie Classification Doctoral Universities: Higher Research Activity and an enrollment of 30,146 FTE (24,175 undergraduates). Incoming classes are 60 percent new freshmen (3,999) and 40 percent transfers (2,632), which means it is a higher transfer student institution.¹ The university emphasizes student participation in research with faculty and in internships in the Charlotte community. According to the most recent statistics for UNC Charlotte (fall 2020), 64.4% (1,684 students) of transfers came from the NC Community College system, 12.9% (337) transferred from one UNC-to-UNC system university to another, 5.8% (153) transferred from a NC private institution to one of the 17 UNC System universities, and 16.9% (442) transferred from out-of-state. The total number of transfers was 2,632 in fall 2020.²

II. Literature Review

Transfers are a significant and increasing sub-population at colleges and universities. High-transfer, four-year institutions strive to understand the institutional and individual indicators of transfer student matriculation, adjustment, retention, and success to inform policies and services to support transfer students in achieving their academic goals. According to the National Center for Public Policy and Higher Education, “more than half of low-income students, approximately half of Hispanic students, and about one third of African American students begin their college careers at a two-year institution.”³ “A majority of students enter community colleges with the aim of transferring to a 4-year institution and earning a bachelor’s degree.”⁴

II.1 Year to Year Persistence

Transfer students overall have a “lower rate of persistence than do their counterparts who first begin their higher education in a four-year institution.”⁵ In the 2014-2015 academic year, the UNC system-wide

retention rate remained flat at 87% while exceeding the national average. Transfer students graduate at lower rates when compared to native UNC juniors, 68% compared to 85%, respectively.⁶

II.2 Major Models

Nearly all studies on student retention and success stem from Tinto's 1993 study in which he "theorized that the intention to persevere in college depends upon the degree to which students are integrated into the academic and social spheres of the institution."⁷ Through the lens of Tinto's *student integration theory*,⁸ student engagement with both the formal and informal academic and social system of the university enhances student success. Such engagements that lead to success include: (1) library engagement, (2) use of student academic support services, and (3) participation in co- and extracurricular activities. Another model that is useful in understanding the differences in engagement, retention, and graduation of transfer students in comparison to FTIC students is Hills's theory of "transfer shock,"⁹ which describes the significant dip in GPA in the semester following the transfer to a four-year school and leads to increased likelihood of dropping out, more credits and years to graduation, and lower post-graduate income.

II.3 Predictors of Success

Several studies indicated that "promoting the success of community college transfer students should be centered on academic engagement."¹⁰ A study by Flynn investigated the effects of academic and social engagement on the persistence of 8,700 students from 1,350 colleges and universities and of baccalaureate degree completion of 8,250 students in 2004 and 2006.¹¹ The study explored the interactions of student engagement behaviors in relation to degree completion using student demographics, GPA, major, and institutional attributes. Student engagement was "directly connected with persisting"¹² and "students' educational aspirations, first-year GPA, and academic and social integration" reduced drop-out risk.¹³

II.4 GPA

According to Barbera, "higher GPA is almost invariably linked with persistence across different contexts."¹⁴ Umbach investigated individual and institutional indicators of students transferring from North Carolina community colleges to four-year universities and their relationship to student success as judged by achievement, persistence, and degree completion and found that "capital accumulated while at the community college enhances the likelihood of success at the four-year institution."¹⁵

Laanan found that community college students who have a lower GPA and less confidence in their academic abilities will encounter more difficulty in adjusting at a four-year university¹⁶ and participating in academic campus organizations and working on projects with other students helps them feel a part of the campus.¹⁷ According to Xu, Jagers, Fletcher, and Fink, "vertical-transfer (community college to four-year institution) students had typically earned more college credits at graduation, which supports the notion that they suffer from either credit loss at the time of transfer or excess crediting requirement."¹⁸ Xu et al. also found "vertical transfer" students who resembled "native four-year" students in their accumulated college-level credits and performance at their point of entry into the same four-year institution in Virginia performed comparably in graduation with the baccalaureate when they were matched according to prior credits earned, accumulative GPA, and institution.¹⁹

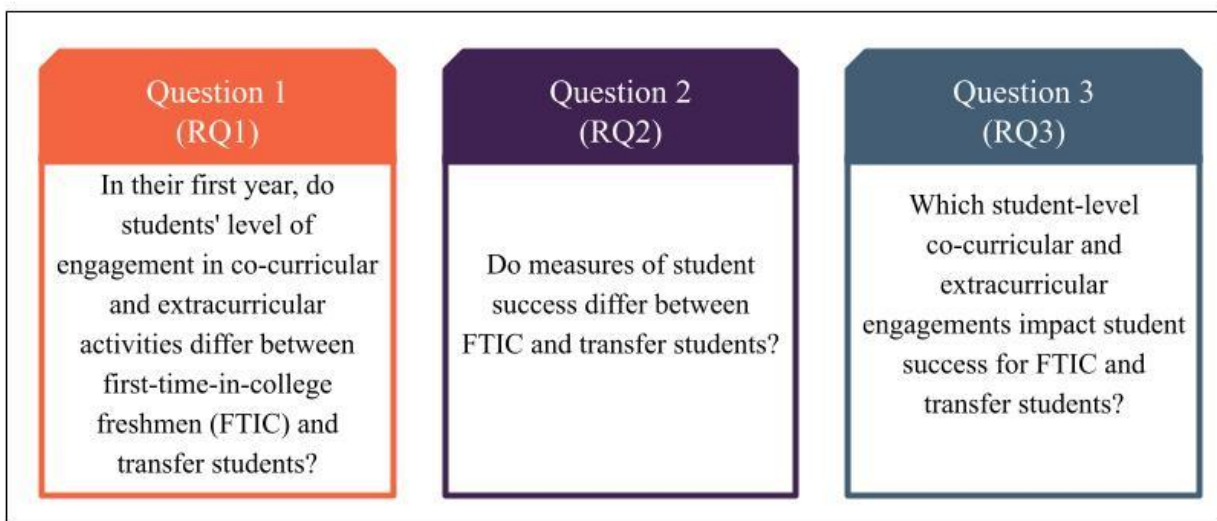
II.5 Engagement on College/University Campus

Transfer students have distinctive adjustment needs from native students.²⁰ Hills hypothesized that "transfer shock" results from "inferior preparation."²¹ Empirical investigations into the causes of transfer shock have focused on activities of the community college to help students transfer despite inadequate resources and of the four-year institution to welcome²² and integrate transfer students into a vastly larger and more complex environment.²³ Factors that overcome shock include identification with the four-year institution,²⁴ involvement,²⁵ and engagement.²⁶ Qualitative studies point to several major barriers transfer

students from two-year institutions experience that impede their adjustment to the larger, four-year institution: a) challenges in finding campus representatives to help them,²⁷ b) more academic demands and larger class sizes; c) difficulty making friends in comparison to native students who might have come together from high school;²⁸ d) isolation; and e) preference for academic-oriented activities such as research with faculty or academic clubs over extracurricular social activities such as leisure clubs and sports.²⁹ The last result indicates that Tinto's landmark theory of social integration³⁰ does not apply in the same manner to transfer students in that transfer students gain integration from academic and career-oriented activities rather than social activities. Laanan expanded the construct of transfer shock to suggest that transfer student success depends on their psychological, climate, and environmental adjustment at the receiving institution.³¹

The research questions identified for the study are illustrated below in Figure II-1.

Figure II-1. Research questions



III. Methods

This project is part of an ongoing, longitudinal study of undergraduate student engagement and success data of students who matriculated in summer/fall 2012 through summer/fall 2018. The researchers conducted a comprehensive comparative analysis of students who entered the university as FTIC freshmen and transfer students, including a deeper exploration of transfer student data to better understand the co-curricular, extracurricular, pre-college, and demographic factors that are associated with their success. The full dataset was analyzed using Analysis of Variance (ANOVA) and binary logistic regression with propensity score matching related to three measures of student success: Year 1 to Year 2 Retention, 4-Year Cumulative GPA, and 6-Year Graduation.

III.1 Population

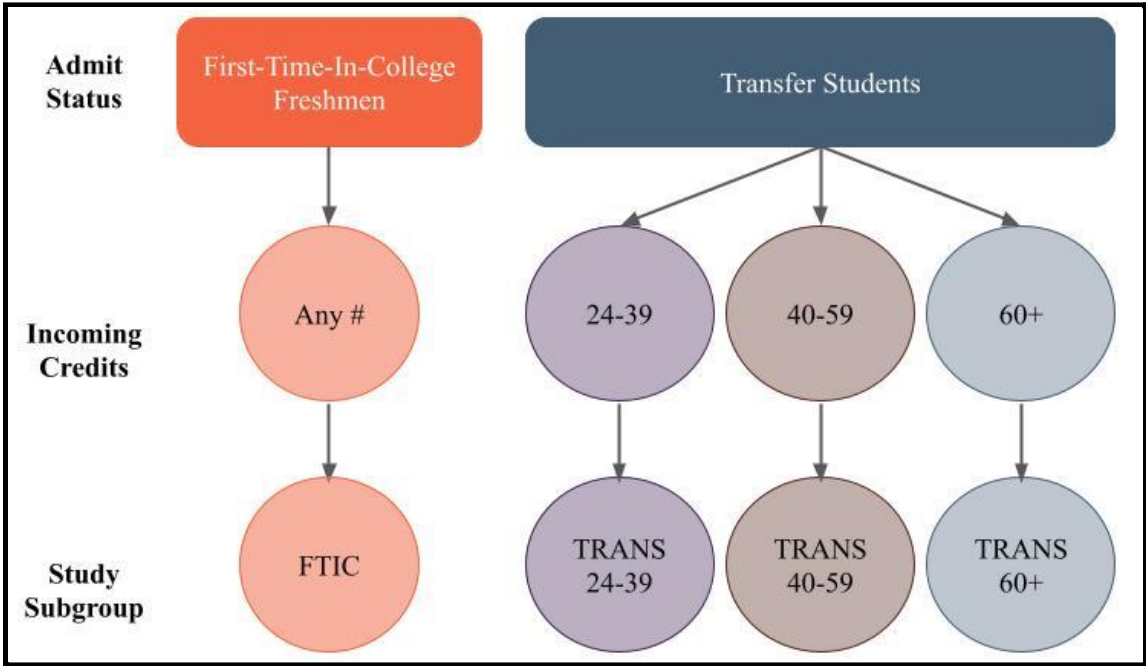
The data set includes 98,782 student records of all undergraduate, degree-seeking students who matriculated into the university from Summer/Fall 2012 through Summer/Fall 2018. Each record included information about the numbers and types of co-curricular and extracurricular activities that a student engaged in, demographic and pre-entry variables, and the three measures of student success identified for this study. The full dataset was then subdivided into three separate subsets for analysis, based on the dependent variables of interest and the corresponding student engagements during the relevant periods of time as outlined in Figure III-1.

Figure III-1. Data subsets and student matriculation years

Data Subset	2012	2013	2014	2015	2016	2017	2018
Year 1 to Year 2 Retention <i>Student engagements in first year</i>	←————→						
4 Year Cumulative GPA <i>Student engagements in first 4 years</i>	←————→						
6 Year Graduation <i>Student engagements in first 6 years.</i>	←————→						

Within each data subset, separate analyses were conducted for four separate admission status subgroups based on a student's initial admission status to the university and the number of incoming credits, as illustrated in Figure III-2.

Figure III-2. Admission Status Subgroups



Subdividing the dataset in this way allowed the researchers to minimize confounding effects that may be associated with initial admission status and incoming credits. Frequencies and percent totals for the three data subsets and the four admission status subgroups are outlined in Table III-1, with a more comprehensive listing of descriptive statistics available in [Appendix A](#).

Table III-1. Admission status subgroups & data subsets: Frequencies & Percent Totals

Admission Status Subgroup	Data Subsets					
	Year 1 to Year 2 Retention (N=35,972)		4 Year Cumulative GPA (N=24,375)		6 Year Graduation Rates (N=11,519)	
	N	% of Total	N	% of Total	N	% of Total
FTIC	20,208	56.2	13,406	56.2	6,490	57.6
TRANS 24-39	4,124	11.5	2,834	11.9	1,282	11.4
TRANS 40-59	4,188	11.3	2,682	11.2	1,208	10.7
TRANS 60+	7,452	20.7	4,942	20.7	2,284	20.3

III.2 Variables

To respond to the study's three research questions, the dependent and independent variables for each question were treated in slightly different ways as illustrated in Figure III-3 and further described below.

Figure III-3. Dependent and independent variables

Research Question	Variables of Interest
RQ1	Dependent: Total Student Engagements Independent: Admission Status Subgroup Membership
RQ2	Dependent: Measures of Success Independent: Admission Status Subgroup Membership
RQ3	Dependent: Measure of Success (binary) Independent: Total Student Engagements Other: Covariates
Variable Categories	
Admission Status Subgroup <ul style="list-style-type: none"> • FTIC • TRANS 24-39 • TRANS 40-59 • TRANS 60+ 	Measures of Success <ul style="list-style-type: none"> • Year 1 to Year 2 Retention • 4-Year Cumulative GPA • 6-Year Graduation
Total Student Engagements <ul style="list-style-type: none"> • Co-curricular • Extracurricular • Library • Career Center (RQ3 only) • UCAE (RQ3 only) • Specific Library (Info Literacy, EZ Proxy, Book Checkouts, Laptop Checkouts, Library Computer Logins, Study Room Reservations) 	Covariates <ul style="list-style-type: none"> • ACT/SAT Scores • Pell Grant • College • Underrep. Minority • Total HIPs (Experiential Education, Learning Community (Yr 1), Undergraduate Research, 1st Yr University Writing Course w/ passing grade)

III.2.A RQ1 & RQ2 Variables

To respond to Research Question 1, the researchers calculated the total number of engagements for each student record and the means to assess differences in levels of engagement in the first year of the study between the four admission status subgroups. [Appendix B](#) outlines the composition of the engagement variables. The RQ1 response includes one independent variable, membership in the 4 different admission status subgroups.

To respond to Research Question 2, the dependent variables used to measure success (Year 1 to Year 2 Retention, 4-Year Cumulative GPA, and 6-Year Graduation Rates) were provided by the university's Office of Institutional Research and were obtained through Banner, the university's student information system (SIS). Mean retention rates, cumulative GPA, and graduation rates were calculated and used to determine whether there were significant group differences between the four admission status subgroups. Like RQ1, the single independent variable used to answer RQ2 was membership in the four admission status subgroups. Frequencies and percent totals for each admission status subgroup relating to each of the dependent variables are outlined in [Appendix A](#).

III.2.B RQ3 Variables

To answer Research Question 3, the same dependent variables (measures of success) identified for RQ2 were used. However, for the RQ3 analysis, these variables were converted into binary variables (0=did not meet the condition; 1=met the condition).

Covariate (Confounding) Variables. Findings from prior research suggest that pre-entry academic readiness (measured by ACT/SAT scores), socioeconomic status (measured by Pell Grant status), college of enrollment, underrepresented minority status, and participation in high impact practices are frequently and significantly associated with student success, and thus were included in the present study.³² The covariates addressed in this study were derived from the SIS. SAT scores were converted into ACT scores (36 maximum points) using College Board concordance tables.³³ Pell eligibility and underrepresented minority status were formatted as binary variables (0 = did not meet the condition, 1 = met the condition). College of enrollment was dummy coded for each record (0 = not in the college, 1= in the college). A [High Impact Practices \(HIPs\)](#) score was calculated by summing each student's participation in any of the following, across the relevant periods of time (one, four, or six years): Experiential Education (e.g., internships), Education Abroad, Learning Community Participant in Year 1, Office of Undergraduate Research participant, and completion of the required University Writing Course (UWRT) at the university with a passing grade. The HIPs included in this sum were identified by the researchers as aligning with the HIPs as outlined by the Association of American Colleges & Universities.³⁴ Frequencies and mean values for the covariate variables are outlined in the [Appendix A](#).

To isolate the effects of student co-curricular and extracurricular engagement on student success, the confounding variables were entered into propensity score matching analyses in order to reduce bias due to imbalances in observed covariates.³⁵ The researchers further controlled for the number of incoming credits for FTIC freshmen and the three transfer groups by running separate binary regression analysis for each subgroup for each independent variable.

Engagement (Treatment) Variables. The RQ3 independent variables outlined in Figure III-3 were used to measure the degree to which each type of engagement activity impacted each of the three measures of student success. Variable composition is explained in [Appendix B](#). For the Year 1 to Year 2 retention analysis, each engagement variable was set up as dichotomous (0=No engagements in Yr 1, 1=1+ engagements in Yr 1). For the 4-Year GPA and 6-Year Graduation Rates analyses, engagement variables were continuous (measuring totals across the relevant time periods).

III.3 Data Analysis

To answer Research Questions 1 and 2, Welch's adjusted Analysis of Variance (ANOVA) tests were used to determine whether significant differences exist between and within the four admission status subgroups with respect to student success and levels of engagement. For Research Question 3, binary logistic regression analysis with propensity score matching tests were conducted to identify the student-level co-curricular and extracurricular engagements that impact student success for each admission subgroup.

The Welch's one-way ANOVA test was used in place of the traditional ANOVA F test, as it is a robust test that is particularly useful when there are unequal sample sizes, as was indicated in this study. For all significant ANOVAs with more than two comparison groups, Games-Howell post hoc analyses were conducted to determine where the differences existed. Significance thresholds for all analyses were limited to $p < .05$. Effect sizes are reported using eta squared (η_p^2).

To calculate the degree to which each type of engagement increased chances for student success, binary logistic regression analysis with propensity score matching was conducted using SPSS 26.0. Austin explains,

The propensity score is a balancing score: conditional on the propensity score, the distribution of measured baseline covariates is similar between treated and untreated subjects. Thus, in a set of subjects all of whom have the same propensity score, the distribution of observed baseline covariates will be the same between the treated and untreated subject.³⁶

To begin, the authors created propensity scores for each student record using the steps outlined by Thoemmes and further detailed by Soria et al.³⁷ The RQ3 covariate variables (ACT, Pell grant, college, underrepresented minority status, and total HIPs) were used to generate propensity scores. Propensity scores were then included in the binary logistic regression analyses. Steps for conducting this analysis for the Year 1 to Year 2 retention dataset are described below. These same steps were followed for the 4-year cumulative GPA and 6-year graduation datasets.

Step 1 - Calculating Propensity Scores. For propensity scoring in SPSS, retention (1=yes, 0=no) was used as the dependent variable (group indicator in SPSS) and the covariates identified for RQ3 were used as the independent variables (predictors in SPSS) to calculate the probabilities of belonging to a particular group with like characteristics. Match tolerance was set to .05 and "sampling with replacement" was selected; some students in control groups were "reused" in other matches, a process that has been found to reduce bias (Soria et al., 2017; Stuart, 2010). The "maximize execution performance" option, recommended for large datasets, was also selected.

Step 2 - Checking the Efficacy of Propensity Scoring. Propensity scores were grouped into bins created by the researchers (Group 1: PS < .6; Group 2: PS .6 - < .7; Group 3: PS .7+). Welch's ANOVAs and Games-Howell post-hoc analyses were conducted using the propensity groups as the independent variable and retention as the dependent variable. The mean retention rate for each propensity group was found to differ significantly from each other group ($p < .05$), thereby giving the researchers the confidence that matching procedures helped balance the distribution of variables across the groups.

Step 3 - Using the Propensity Scores in Binary Logistic Regression. Binary logistic regression analyses were then conducted to ascertain the effects of particular types of engagements on the likelihood that a student would be retained for a second year. The dependent variable (e.g., retention) was coded as a dichotomous variable (1=retained, 0=not retained). The propensity score and the engagement variable were entered into the equation as covariates. Confidence intervals for $exp(\beta)$ were held at 95%. Chi-square values (χ^2) generated from SPSS's Omnibus Tests of Model Coefficients were used to test the goodness

of fit for each regression model ($p < .05$) and Nagelkerke's pseudo R^2 served as an indicator of the amount of variance that could be explained by the regression model. If a model was significant, odds ratios (e^B) were interpreted.

IV. Results

This study sought to answer three primary research questions to more clearly understand the factors that contribute to transfer student retention and success and the role that out-of-the-classroom engagements play in this success. Comparisons were also made between transfer students and first-time-in-college freshmen. The results of the analyses relating to these research questions are described below.

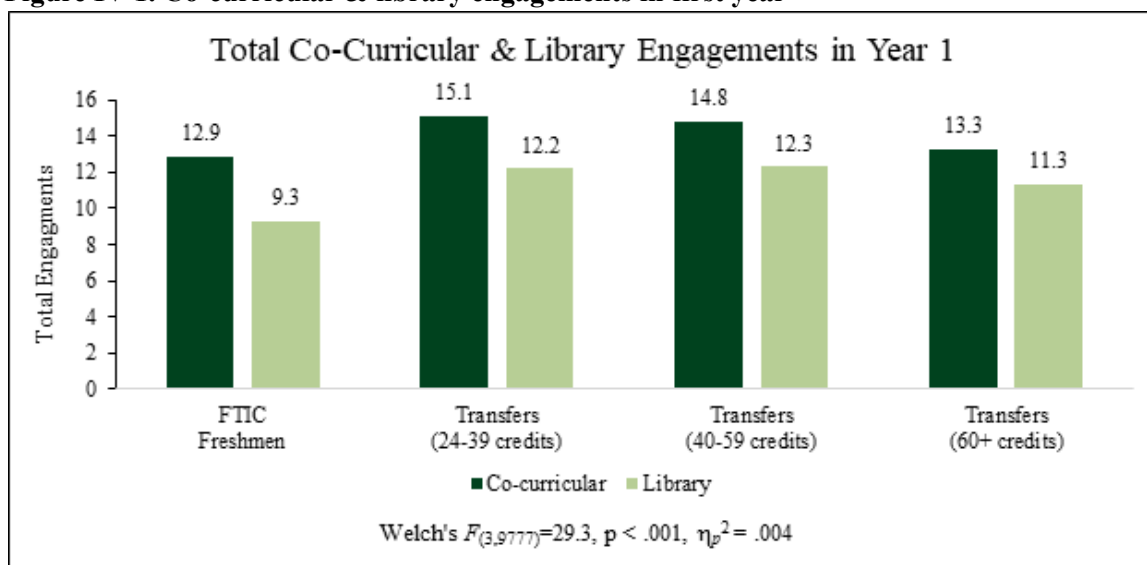
IV.1 RQ1: In their first year, students' levels of engagements differed based on admission status and the number of incoming credits.

To answer Research Question 1, total first-year engagements in the activities outlined for the study were compared across the four admission status subgroups (see Figure III-3). ANOVA analyses related to RQ1 revealed significant differences for all measures of interest, while post-hoc analyses indicated nuanced variations across the admission status subgroups and engagement categories. All relevant findings are described in brief below and further outlined in [Appendix C, Table C.1](#). The majority of effect size findings related to RQ1 fell into negligible category ($< .01$), with the remaining few considered low ($.01 - < .05$).

IV.1.A Co-curricular, Library, and Extracurricular First Year Engagement

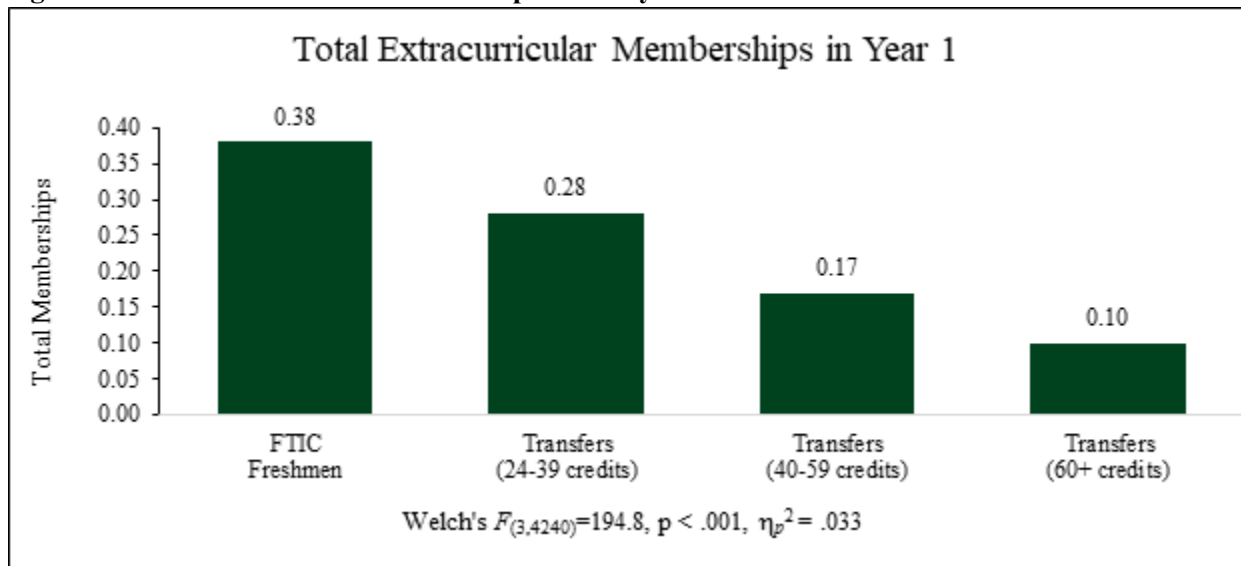
With respect to co-curricular engagement, transfer students with 24-39 credits (Mean=15.0, SD=24.50) and 40-59 credits (M=14.8, SD=26.89) were significantly more engaged in co-curricular activities overall than FTIC freshmen (Mean=12.9, SD=19.54) and transfer students with 60+ credits (Mean=13.3, SD=26.60). (Welch's $F_{(3,9826)}=14.3$, $p < .001$, $\eta_p^2 = .001$). Similarly, all transfer student subgroups were significantly more engaged with the library in their first year than FTIC freshmen (FTIC M=9.3, SD=18.20; TRANS 24-39 M=12.2, SD=23.06; TRANS 40-59 M=12.3, SD=25.81; TRANS 60+ M=11.3, SD=25.21), though with a negligible effect size. There were no significant differences in overall library engagement between the transfer subgroups in their first year. (Welch's $F_{(3,9777)}=29.3$, $p < .001$, $\eta_p^2 = .004$). Findings are illustrated in Figure IV-1.

Figure IV-1. Co-curricular & library engagements in first year



With respect to extracurricular engagement, students who matriculated as FTIC freshmen ($M=.38$, $SD=.73$) were significantly more engaged than all transfer student subgroups. Conversely, transfer students with 60+ credits ($M=.10$, $SD=.41$) were significantly less engaged extracurricularly than all other admission status subgroups, with a small effect size. Among the transfer student subgroups, transfers with 24-39 credits ($M=.28$, $SD=.63$) were significantly more involved in extracurricular activities than those with 40-59 credits ($M=.17$, $SD=.47$) and 60+ credits. (Welch's $F_{(3,4240)}=194.8$, $p < .001$, $\eta_p^2 = .033$). Findings are illustrated in Figure IV-2.

Figure IV-2: Extracurricular memberships in first year

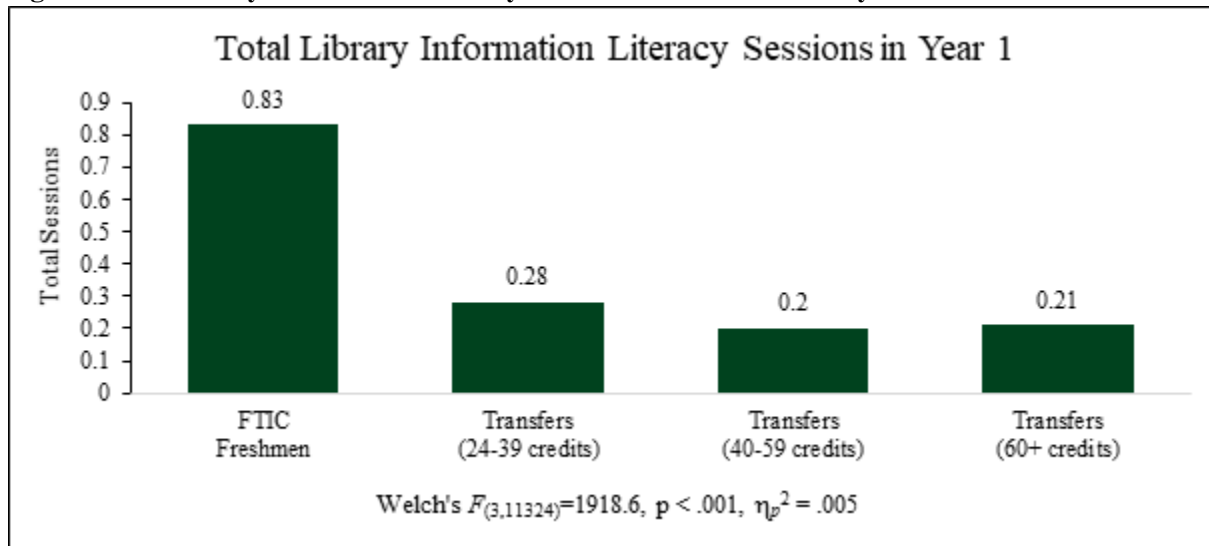


IV.1.B Specific Types of Library Engagement

Analyses of students' first year engagement with specific library activities revealed significant differences between all admission status groups for all comparisons, while post-hoc analyses revealed nuances within comparison groups. Effect sizes largely fell into the negligible range ($\eta_p^2 < .01$).

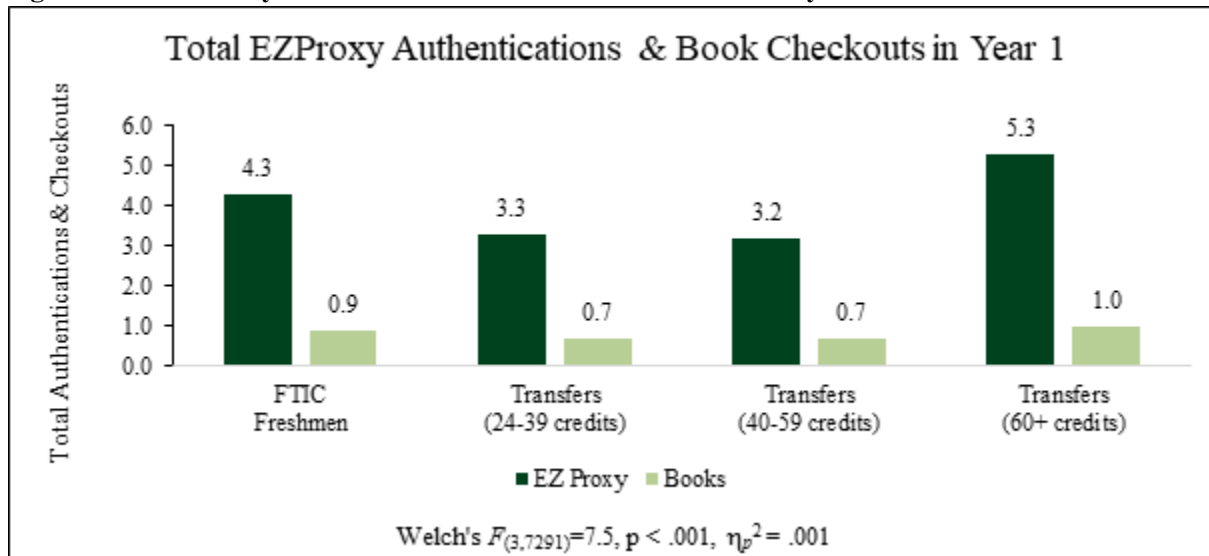
Information Literacy Instruction. FTIC freshmen ($M=.83$, $SD=.90$) participated in significantly more information literacy instruction sessions in their first year than all transfer subgroups. Similarly, transfer students with 24-39 credits ($M=.28$, $SD=.80$) attended significantly more information literacy sessions than those with 40-59 ($M=.20$, $SD=.65$) or 60+ credits ($M=.21$, $SD=.55$). (Welch's $F_{(3,11324)}=1918.6$, $p < .001$, $\eta_p^2 = .005$). Findings are illustrated in Figure IV-3.

Figure IV-3. Library information literacy session attendance in first year



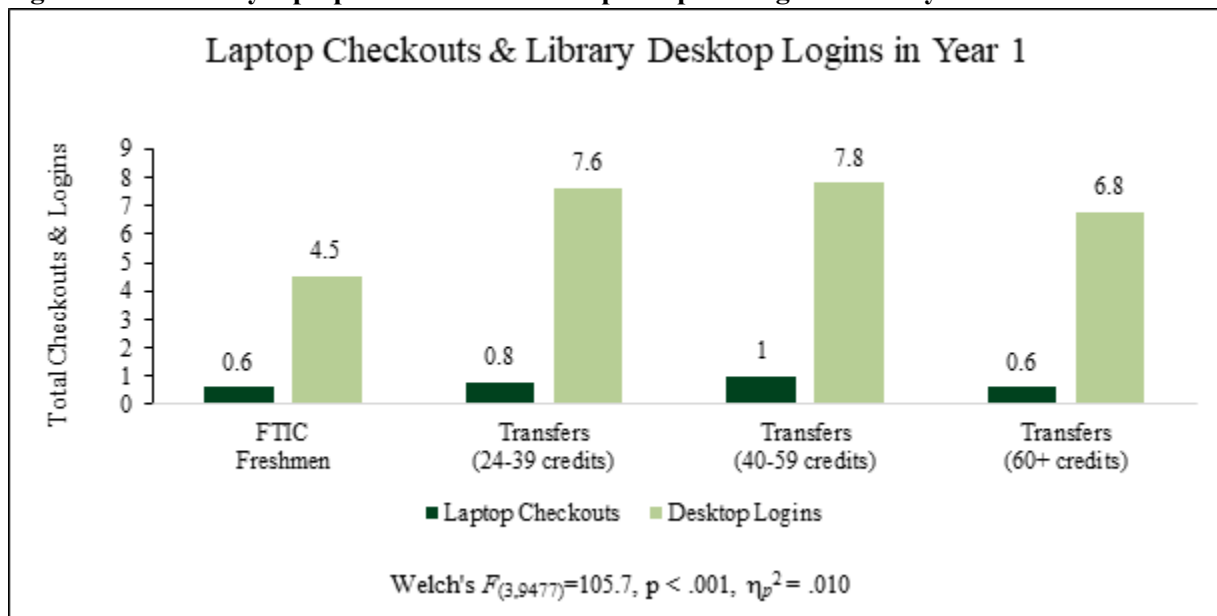
Use of Library Scholarly and Academic Resources. Total EZProxy authentications and library book checkouts were used to assess student engagement with the library's scholarly and academic resources. Transfer students with 60+ credits had a significantly greater number of EZProxy authentications in their first year ($M=5.3, SD=10.89$) than all other admission status subgroups (FTIC $M=4.3, SD=6.00$; TRANS 24-39 $M=3.3, SD=7.84$; TRANS 40-59 $M=3.2, SD=7.07$). FTIC freshmen had a significantly higher number of EZProxy authentications than transfers with 24-39 credit and 40-59 credits. (Welch's $F_{(3,1803)}=13.2, p < .001, \eta_p^2 = .008$). Similarly, transfer students with 60+ credits ($M=1.0, SD=4.70$) had significantly more book checkouts in their first year than all other admission status subgroups (FTIC $M=.9, SD=2.82$; TRANS 24-39 $M=.7, SD=3.40$; TRANS 40-59 $M=.7, SD=2.49$). FTIC freshmen also had significantly more book checkouts in their first year than transfer students with 24-39 and 40-59 credits. (Welch's $F_{(3,7291)}=7.5, p < .001, \eta_p^2 = .001$). Findings are illustrated in Figure IV-4.

Figure IV-4. EZProxy authentications & book checkouts in first year



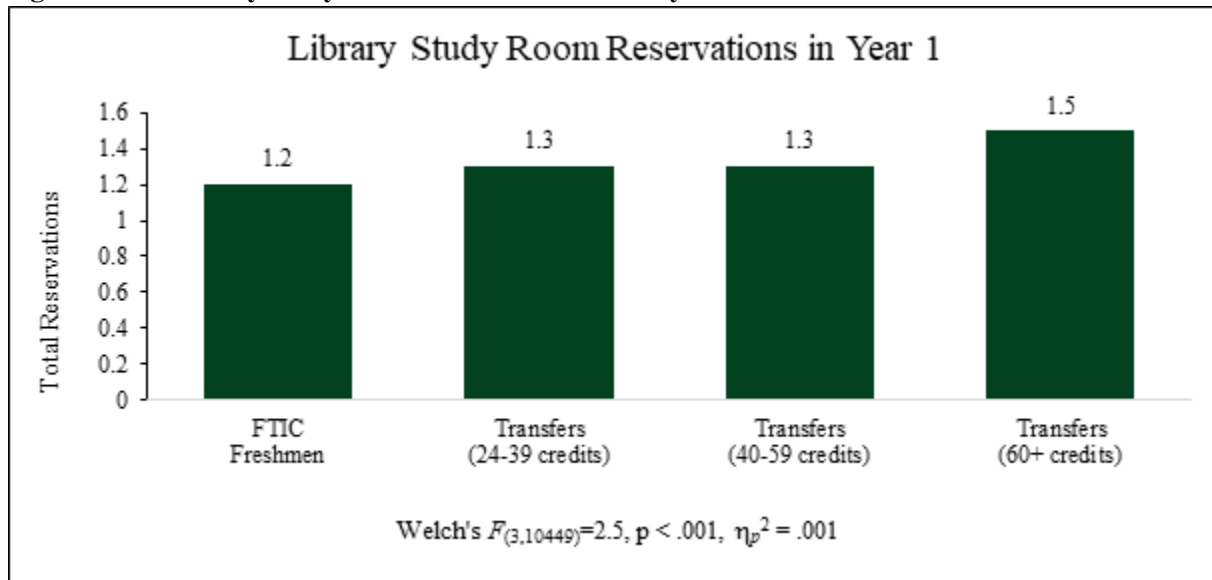
Use of Library Computing Equipment. Library laptop checkouts and library desktop computer logins were used to assess students' engagement with the library's computing equipment. Overall, transfer students with 24-39 credits checked out significantly more library laptops ($M=0.8$, $SD=4.86$) than FTIC freshmen ($M = .6$, $SD=3.80$). Transfer students with 40-59 credits ($M=1.0$, $SD=5.47$) also checked out significantly more laptops than FTIC freshmen and transfer students with 60+ credits ($M = .6$, $SD=4.17$). (Welch's $F_{(3,6953)}=7.1$, $p < .001$, $\eta_p^2 = .001$). Similar trends were noted for library desktop computer usage. All transfer subgroups had significantly more library desktop computer logins in their first year than FTIC freshmen (FTIC $M=4.5$, $SD=11.30$; TRANS 24-39 $M=.7.6$, $SD=16.15$; TRANS 40-59 $M=7.8$, $SD=18.38$; TRANS 60+ $M=6.8$, $SD=17.75$). Transfer students with 40-59 credits also had significantly more library desktop computer logins than transfers with 60+ credits. (Welch's $F_{(3,9477)}=105.7$, $p < .001$, $\eta_p^2 = .010$). Findings are illustrated in Figure IV-5.

Figure IV-5. Library laptop checkouts & desktop computer logins in first year



Use of Library Spaces. Library study room reservations were used to assess student engagement with the library's physical spaces. ANOVA and post-hoc analyses revealed that transfer students with 60+ credits ($M=1.5$, $SD=.75$) reserved significantly more library study rooms in their first year than FTIC freshmen ($M=1.2$, $SD=6.26$), with a negligible effect size. No significant differences between the transfer subgroups were noted. (Welch's $F_{(3,10449)}=2.5$, $p < .001$, $\eta_p^2 = .001$). Findings are illustrated in Figure IV-6.

Figure IV-6. Library study room reservations in first year



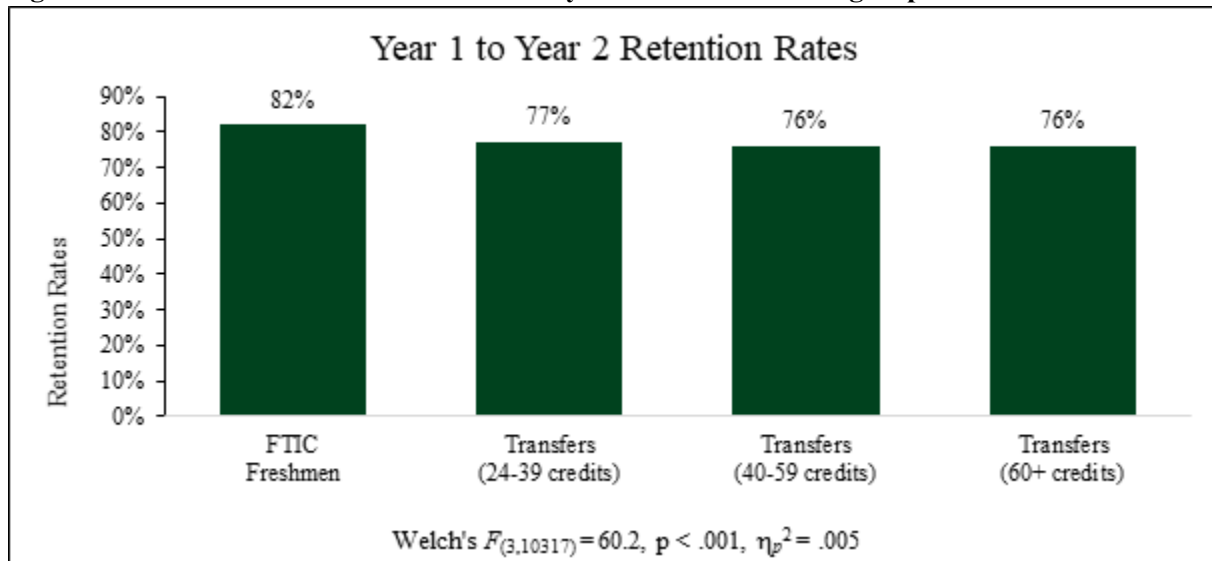
IV.2 RQ2: There were significant differences between first-time-in-college and transfer students across all three measures of success.

To answer Research Question 2, Year 1 to Year 2 retention rates, 4-Year cumulative GPA, and 6-Year graduation rates were compared across the four admission status subgroups using Welch's ANOVAs and Games-Howell post-hoc analyses. All ANOVA analyses for RQ2 revealed significant differences between groups for all measures of success, while post-hoc analyses highlighted nuanced variations across the admission status subgroups. These findings are outlined in [Appendix C](#) and further discussed below.

IV.2.A Yr 1 to Yr 2 Retention Rates

Findings revealed that FTIC freshmen ($M=.82, SD=.38$) had significantly higher Year 1 to Year 2 retention rates than all transfer subgroups, though with negligible effect (TRANS 24-39 $M=.77, SD=.41$; TRANS 40-59 $M=.76, SD=.43$; TRANS 60+ $M=.76, SD=.43$). There were no significant differences for Year 1 to Year 2 retention between the transfer student subgroups. (Welch's $F_{(3,10317)} = 60.2, p < .001, \eta_p^2 = .005$). Findings are illustrated in Figure IV-7.

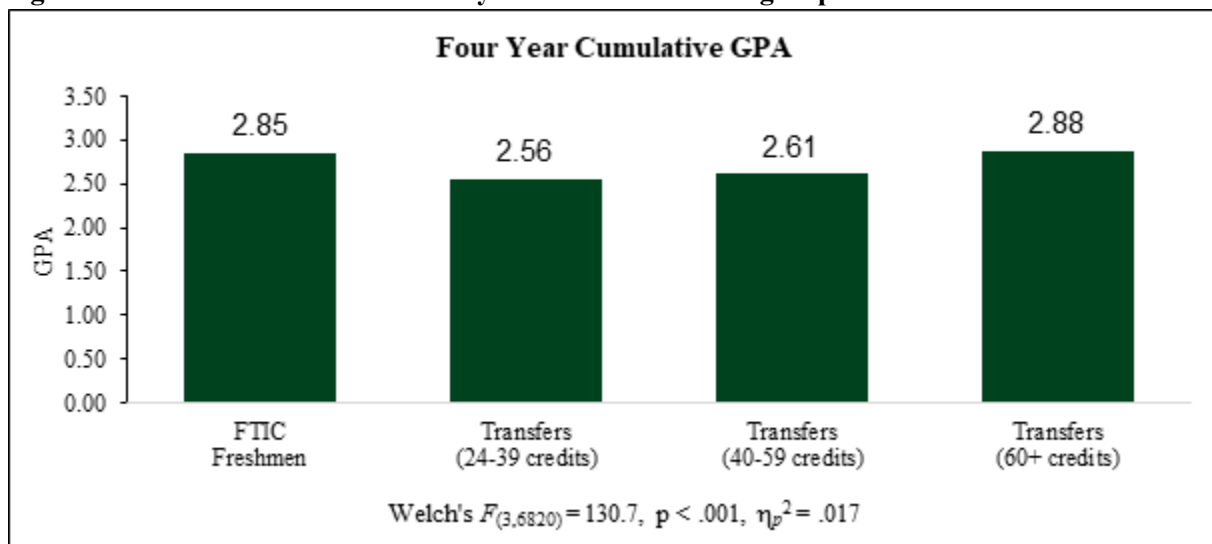
Figure IV-7 Year 1 to Year 2 retention rates by admission status subgroup



IV.2.B 4 Year Cumulative GPA

Both the FTIC freshmen ($M=2.85, SD=.83$) and transfer students with 60+ credits ($M=2.88, SD=.98$) had significantly higher 4-year cumulative GPAs than transfer students with 24-39 credits ($M=2.56, SD=.91$) and transfer students with 40-59 credits ($M=2.61, SD=.93$), with a small effect. (Welch's $F_{(3,6820)} = 130.7, p < .001, \eta_p^2 = .017$). Findings are illustrated in Figure IV-8.

Figure IV-8. 4 Year cumulative GPA by admission status subgroup

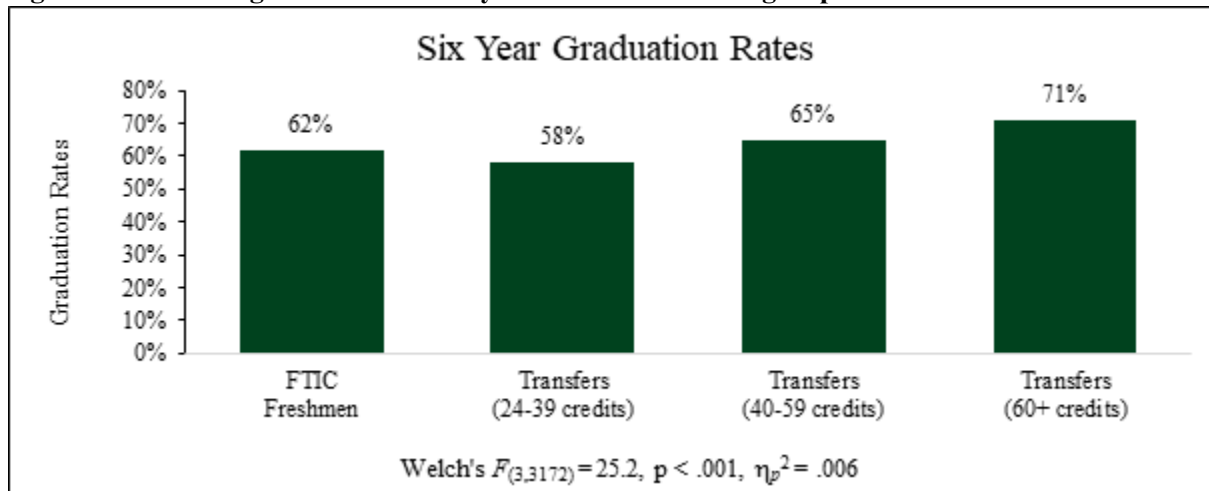


IV.2.C 6 Year Graduation Rates

Transfer students who entered the university with 60+ credits ($M=.71, SD=.46$) had significantly higher 6-year graduation rates than all other admission subgroups examined in this study, with a small effect (FTIC $M=.62, SD=.48$; TRNAS 24-39, $M=.58, SD=.49$; TRANS 40-59 credits $M=.65, SD=.48$). Conversely, transfers with 24-39 incoming credits had significantly lower 6-year graduation rates than all

other admission subgroups examined in the study. (Welch's $F_{(3,3172)} = 25.2$, $p < .001$, $\eta_p^2 = .006$). Findings are illustrated in Figure IV-9.

Figure IV-9. 6 Year graduation rates by admission status subgroup



IV.3 RQ3 Findings: Specific undergraduate co-curricular and extracurricular engagement activities increase the odds of student success.

To answer Research Question 3, binary logistic regression analysis with propensity score matching was conducted. Propensity score matching was a particularly valuable technique that allowed the researchers to isolate the effects of the confounding variables identified for the study related to high school performance, socioeconomic status, underrepresented minority status, college of enrollment, and participation in High Impact Practices, thus enabling the identification of key engagement pathways for student success for each of the study's four population subgroups across the three measures of student success. Findings indicate that participation in every type of engagement explored in this study significantly increased a student's odds for success across all three measures. However, the degree to which these engagement factors contribute to success is nuanced based upon admission status type and success measure. These findings are outlined in Tables IV-1, IV-2, and IV-3 and in [Appendices D-F](#).

IV.3.A Yr 1 to Yr 2 Retention

The results from the binary logistic regression analysis related to Year 1 to Year 2 retention indicate that overall, if a student in any of the four admission status subgroups engaged in at least one co-curricular activity in their first year, their odds of enrolling for a second year of study were significantly improved over those who did not engage at all, particularly for FTIC freshmen ($e^B = 4.904$, $p < .001$) and transfer students with 60+ incoming credits ($e^B = 3.464$, $p < .001$). Similar trends were noted for students who engaged with the library at least one time in their first year, with more noteworthy findings for FTIC freshmen ($e^B = 2.633$, $p < .001$) and transfer students with 60+ credits ($e^B = 2.945$, $p < .01$).

Across all admission status subgroups, students who had at least one engagement with either the Career Center or the University Center for Academic Excellence (UCAE) were significantly more likely to return for a second year of study over non-engagers. Use of the Writing Center in the first year was significantly and positively related to retention for transfer students with 60+ incoming credits ($e^B = 1.954$, $p < .001$), though was not significant for the other groups. Interestingly, FTIC freshmen ($e^B = 1.656$, $p < .001$) and transfer students with 24-39 credits ($e^B = 1.576$, $p < .05$) with at least one extracurricular membership in

the first year were significantly more likely to return for a second year of study, though extracurricular membership did not impact transfer students with 40 or more incoming credit hours.

With respect to engagement with specific types of library activities, accessing library resources via EZProxy authentication at least one time in a student's first year significantly increased odds for retention over those who did not engage, with particularly noteworthy increases in odds for transfer students with 40-59 incoming credits ($e^{\beta} = 4.103$, $p < .001$) and 60+ incoming credits ($e^{\beta} = 3.668$, $p < .001$). Also of note, odds of returning for a second year of study were significantly higher for students who checked out at least one book from the library or logged into a library desktop computer at least once in their first year than those who did not, particularly for transfer students with 60+ incoming credits (book checkouts $e^{\beta} = 2.381$, $p < .001$; desktop computer logins $e^{\beta} = 2.242$, $p < .001$). These findings are further outlined in Table IV-1 and [Appendix D](#).

Table IV-1. Binary logistic regression odds ratios (e^{β}) for year 1 to year 2 retention

<i>[Admission status subgroup] students who engaged in at least one [Engagement Type] activity in their first year were [Odds Ratio] times more likely to be retained for a second year than those who did not.</i>				
Engagement Type	Admission Status Subgroups Odds Ratios (e^{β})			
	FTIC Freshmen	Transfers with 24-39 credits	Transfers with 40-59 credits	Transfers with 60+ credits
Co-curricular	4.904	2.701	3.160	3.464
Library	2.633	2.156	2.473	2.945
Career Center	1.460	1.446	1.572	1.976
University Center for Academic Excellence	1.471	1.483	1.767	1.435
Writing Center	Not sig.	Not sig.	Not sig.	1.954
Extracurricular Membership	1.656	1.576	Not sig.	Not sig.
Specific Library Activities				
Info. Literacy Instruction	1.142	Not sig.	Not sig.	1.881
EZProxy Authentication	2.193	1.765	4.103	3.668
Book Checkout	1.295	Not sig.	1.875	2.381
Laptop Checkout	0.841	Not sig.	Not sig.	0.523
Desktop Computer Login	1.759	1.791	1.638	2.242
Study Room Reservation	1.054	1.020	1.018	1.021

NOTE: Darker shades indicate higher odds ratios.

IV.3.B 4-Year Cumulative GPA

Findings from binary logistic regression analysis related to 4-Year cumulative GPA indicate that overall, for each engagement activity a student participated in during the first four years of study, their odds of earning a GPA of 2.50 or higher significantly increased. This trend held true for all admission status subgroups. Of particular note, findings suggest that with each Career Center engagement, a student's odds of earning an above-average GPA increased significantly, particularly for transfer students with 40-59 incoming credits ($e^B = 2.607$, $p < .001$) and FTIC freshmen ($e^B = 2.271$, $p < .001$). For FTIC freshmen in particular, each engagement withUCAE significantly increased the odds of earning a GPA of 2.50 or higher ($e^B = 1.549$, $p < .001$) to a greater degree than for the other groups. For each Writing Center engagement, a student's odds of earning a GPA of 2.50 or higher increased significantly regardless of admission status subgroup. This trend also held true for extracurricular membership across all admission status subgroups. With respect to specific types of library engagements, each library information literacy session attended significantly increased the odds for earning an above average GPA to a greater degree than the other library variables, with particularly noteworthy findings for transfer students with 24-39 incoming credits ($e^B = 1.376$, $p < .001$). These findings are further outlined in Table IV-2 and [Appendix E](#).

Table IV-2. Binary logistic regression odds ratios (e^B) for 4-year cumulative GPA

<i>For each [Engagement Type] activity a [Admission Status Subgroup] participated in during their first 4 years, their odds of earning a cumulative GPA above 2.50 increased [Odds Ratio] times.</i>					
Engagement Type	Admission Status Subgroups Odds Ratios (e^B)				
	FTIC Freshmen	Transfers with 24-39 credits	Transfers with 40-59 credits	Transfers with 60+ credits	
Co-curricular	1.054	1.020	1.018	1.021	
Library	1.009	1.005	1.005	1.006	
Career Center	2.271	1.938	2.607	2.129	
University Center for Academic Excellence	1.549	1.260	1.343	Not sig.	
Writing Center	1.277	1.356	1.324	1.295	
Extracurricular Membership	1.126	1.166	1.028	1.175	
Specific Library Activities					
	Info. Literacy Instruction	1.158	1.376	1.064	1.207
	EZProxy Authentication	1.090	1.035	1.012	1.039
	Book Checkout	1.047	1.044	1.024	1.033
	Laptop Checkout	1.011	Not sig.	Not sig.	Not sig.
	Desktop Computer Login	1.009	1.004	1.005	1.006
	Study Room Reservation	1.030	1.023	1.033	1.019

NOTE: Darker shades indicate higher odds ratios.

IV.3.C 6-Year Graduation Rates

Results from the binary logistic regression analysis related to 6-Year graduation rates indicated that overall, for each engagement activity a student participated in during their first six years of study, the odds of graduating in six years or less increased significantly, with a few exceptions for particular admission status subgroups and engagement types. Of note, for each Writing Center engagement, a student's odds of graduating in six years or less increased significantly, particularly for transfer students with 24-39 incoming credits ($e^B = 3.207$, $p < .01$) and 40-59 incoming credits ($e^B = 6.310$, $p < .05$). Extracurricular membership also stood out as a factor that increased odds of graduating in six years or less for FTIC freshmen ($e^B = 2.475$, $p < .001$) and transfer students with 24-39 incoming credits ($e^B = 1.813$, $p < .001$); no significant findings were noted for the other transfer subgroups. Across the specific types of library engagement activities, library information literacy session attendance demonstrated the greatest potential, with the odds of graduation in 6 years or less significantly increased for each session attended, with consistent findings across all four admission status subgroups. These findings are further outlined in Table IV-3 and [Appendix F](#).

Table IV-3. Binary logistic regression odds ratios (e^B) for 6-year graduation rates

6-Year Graduation					
<i>For each [Engagement Type] activity a [Admission Status Subgroup] participated in during their first 6 years, their odds of graduating in 6 years or less increased [Odds Ratio] times.</i>					
Engagement Type	Admission Status Subgroups Odds Ratios (e^B)				
	FTIC Freshmen	Transfers with 24-39 credits	Transfers with 40-59 credits	Transfers with 60+ credits	
Co-curricular	1.750	1.631	1.343	1.567	
Library	1.016	1.103	1.011	1.009	
Career Center	1.750	1.631	1.343	1.567	
University Center for Academic Excellence	1.047	1.048	Not sig.	Not sig.	
Writing Center	2.948	3.207	6.310	2.668	
Extracurricular Membership	2.475	1.813	Not sig.	Not sig.	
Specific Library Activities					
	Info. Literacy Instruction	1.510	1.795	1.667	1.647
	EZProxy Authentication	1.054	Not sig.	Not sig.	Not sig.
	Book Checkout	1.114	1.146	Not sig.	1.065
	Laptop Checkout	1.037	Not sig.	Not sig.	Not sig.
	Desktop Computer Login	1.014	1.014	1.013	1.008
	Study Room Reservation	1.040	1.046	1.051	1.023

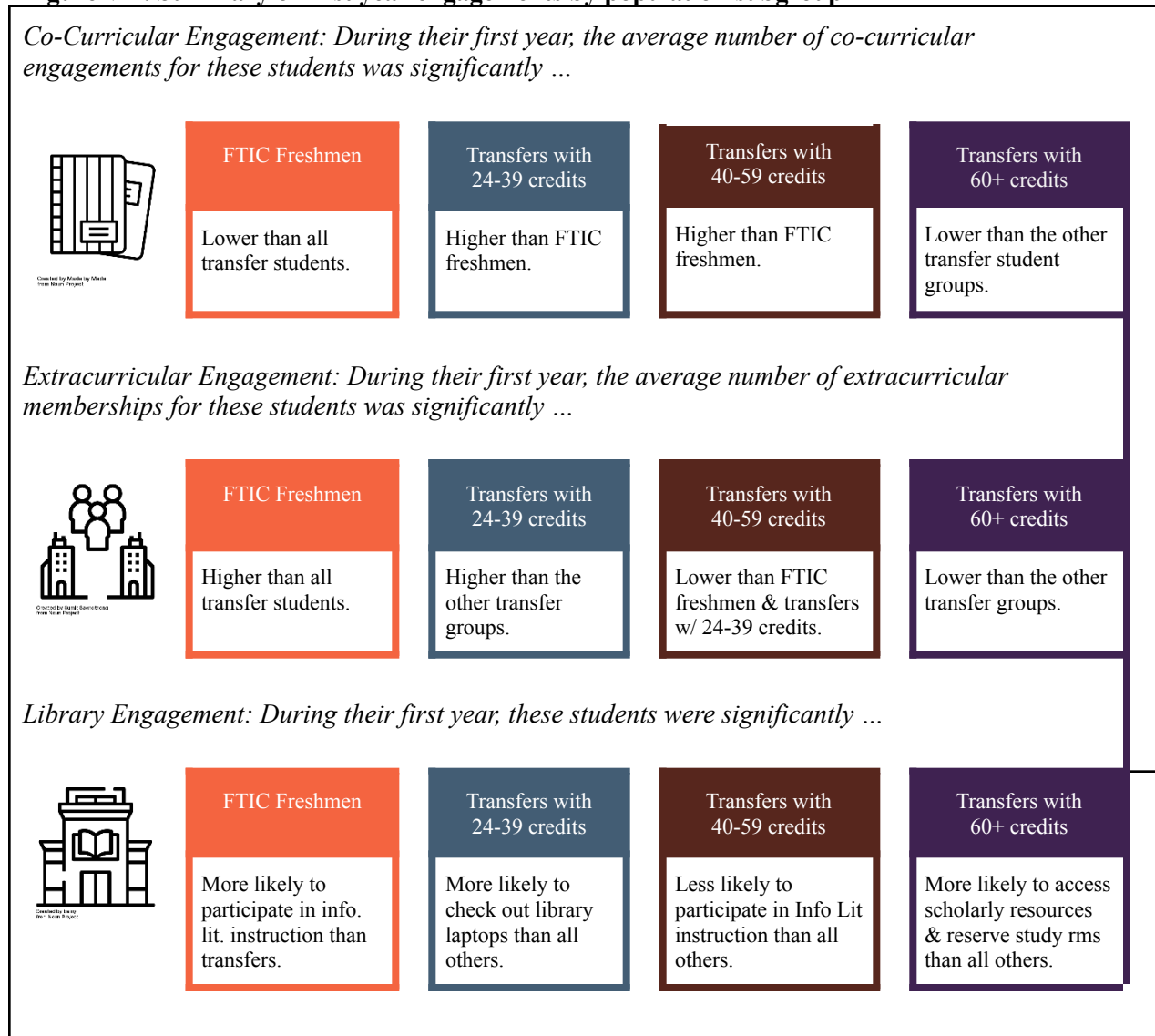
NOTE: Darker shades indicate higher odds ratios.

V. Discussion

Taken together, the findings for this study indicate that these four undergraduate admission subgroups are uniquely different from each other with respect to their engagement in co-curricular and extracurricular activities, in their achievement of the measures of success, and in their engagement pathways for success.

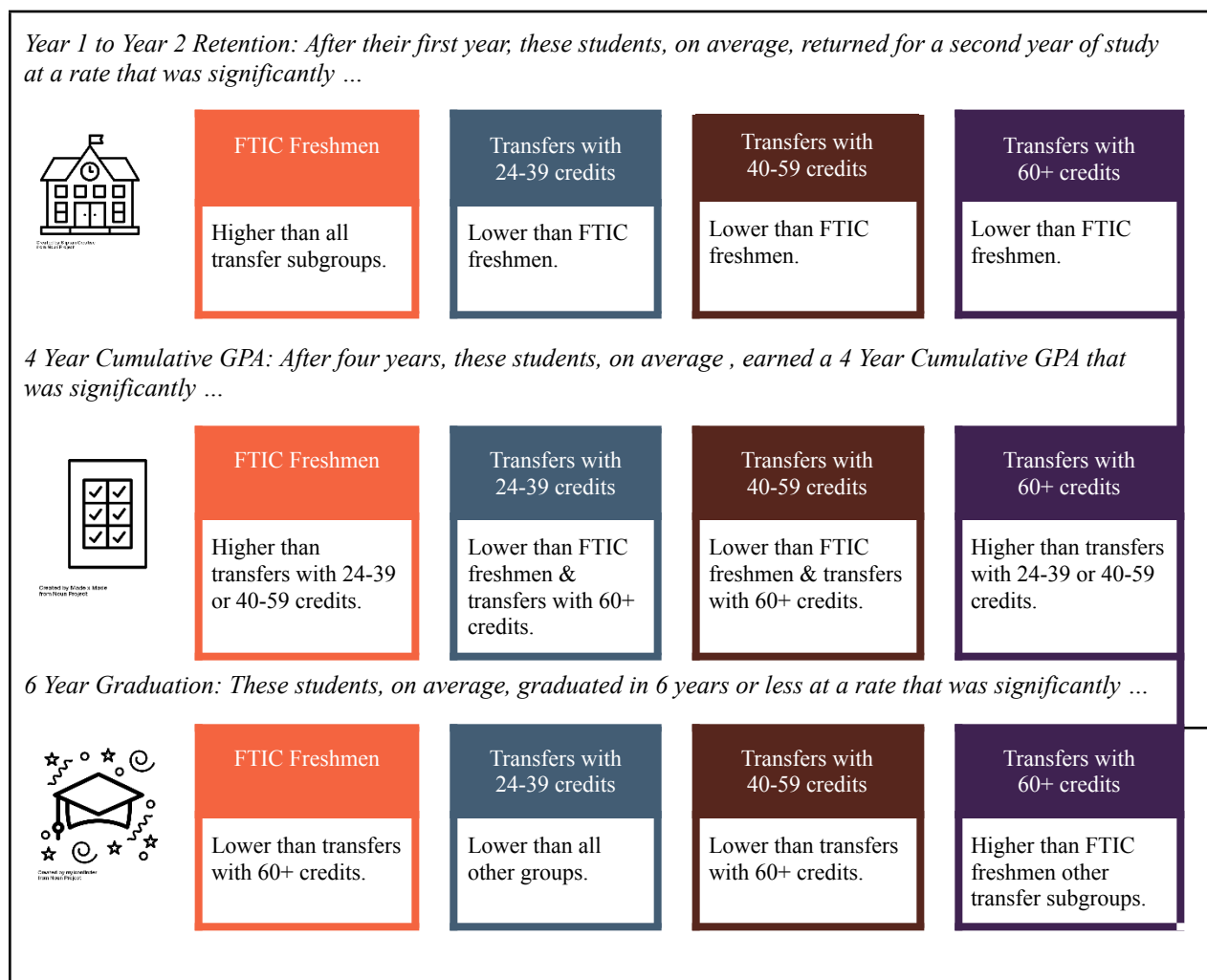
Overall, findings suggest that, in their first year, transfer students as a whole were significantly more engaged in their use of co-curricular services and resources and significantly less engaged extracurricularly than FTIC freshmen. Transfer students with 24-39 incoming credits were also significantly more engaged in extracurricular activities than the other transfer subgroups. With respect to specific types of library engagement, nuanced findings were noted across the four admission status subgroups. While FTIC freshmen had a significantly greater level of participation in information literacy instruction, transfer students with 60+ credits were the most engaged with the library's scholarly resources and spaces. Transfer students with 24-39 and 40-59 incoming credits were noted to be significantly more likely to use or borrow the library's computing equipment than FTIC freshmen and transfer students with 60+ credits. These findings are illustrated in Figure V-1.

Figure V-1. Summary of first year engagements by population subgroup



There were also significant and noteworthy differences between the four admission status subgroups with respect to the three measures of success explored in this study. FTIC freshmen demonstrated significantly higher retention rates than all three transfer subgroups. Similarly, FTIC freshman and transfer students with 60+ incoming credits had significantly higher 4-year cumulative GPAs than the other transfer subgroups. Transfer students with 60+ incoming credits had the highest 6-year graduation rate overall while transfer students with 24-39 incoming credits had the lowest graduation rate across all groups. These findings are illustrated in Figure V-2.

Figure V-2. Summary of success measures by population subgroup



Lastly, the engagement pathways for student success are uniquely different for each of the three measures and across the four admission status subgroups, as summarized in Figures V-3, V-4, and V-5. Student engagement with the activities noted in the pathways increase the odds that they will return to the university for a second year of study, earn an above-average cumulative GPA, or graduate in six years or less with a few minor exceptions. Higher odds ratios indicate an increased likelihood for success if a student engages in the associated activity.

Figure V-3. Top 5 - Year 1 engagement activities that increase odds of Year 2 Retention








	 Co-curricular (any)	 UCAE (any)	 Extracurricular (any)	 Library (any)	 Library EZ Proxy	 Library Computer Login	 Library Book Checkout
FTIC Freshmen	X		X	X	X	X	
Transfers with 24-39 incoming credits	X		X	X	X	X	
Transfers with 40-59 incoming credits	X	X		X	X		X
Transfers with 60+ incoming credits	X			X	X	X	X

Figure V-4. Top 5 - Engagement activities that increase odds of earning above-average 4-Year GPA














	 Career Center (any)	 UCAE (any)	 Writing Center (any)	 Extracurricular (any)	 Library Info Lit Instruct.	 Library Study Room
FTIC Freshmen	X	X	X	X	X	
Transfers with 24-39 incoming credits	X	X	X	X	X	
Transfers with 40-59 incoming credits	X	X	X		X	X
Transfers with 60+ incoming credits	X		X	X	X	X

Figure V-5. Top 5 - Engagement activities that increase odds of graduating in 6 years or less

	 Co-curricular (any)	 Career Center (any)	 Writing Center (any)	 Extracurricular (any)	 Library Info Lit Instruction	 Library Study Room	 Library Book Checkout
FTIC Freshmen	X	X	X	X	X		
Transfers with 24-39 incoming credits	X	X	X	X	X		
Transfers with 40-59 incoming credits	X	X	X		X	X	
Transfers with 60+ incoming credits	X	X	X		X		X

Together, comparison of levels and types of engagements as well as the measures of success across the four admission status subgroups suggests that disaggregating student engagement and success data into subgroups based not only a student's admission status (FTIC or transfer) to the university, but also their number of incoming credits is a worthwhile investigation. The study of transfer versus FTIC admission groups provides a more nuanced understanding of each of these populations in regards to not only how they engage with the university, but also how their engagement relates to retention, academic performance, and likelihood of graduation.

Examining the four admission status/incoming credit subgroups separately while using propensity scoring to isolate the effects of confounding variables enabled the researchers to identify key pathways for success for each of the study's subgroups. Of particular note, across all engagement pathways to success, certain activities were consistently significant, including engagement with the Library, especially information literacy instruction and EZProxy authentications, the Writing Center, and the Career Center. Engagement with the University Center for Academic Excellence was noted to play a more noteworthy role in student GPA than in retention and graduation rates. The role of extracurricular engagement varied such that it played a greater role in the retention and graduation of FTIC freshman and transfer students with 24-39 incoming credits than for the other transfer subgroups.

VI. Conclusion

The findings of the study provide a model of the engagements of transfer students in the library as well as in other co-curricular and extracurricular activities as opposed to first-time freshmen with various incoming characteristics, such as incoming credits, high school GPA, Pell grant eligibility, and under-represented minority status. As part of a longitudinal project that creates an institutional repository of student-level data that can be mined to understand the factors that contribute to student success, this study is the first of its kind to compare out-of-classroom engagement of transfers with various numbers of credits and FTIC students.

The results of this study confirm that the more credits transfer students have when they arrive at the four-year institution, the less likely they are to engage in extracurricular activities and the more likely they are to engage with co-curricular services, which supports the premise that they are more interested in academic-related activities and less in the social environment and friendships embraced by FTIC students. Results confirm previous studies that individual student characteristics are the most important factor in student success for transfer students.³⁸ Several results confirm the theory of “transfer shock”³⁹ as transfers are retained at a lower rate than FTIC from year 1 to year 2, students with fewer than 60 credits take longer to graduate, and transfers with 60+ credits had the highest 6-year graduation rates of the four groups (more than enough credits to overcome a one-semester adjustment period). Yet another confirmation of transfer shock is that those with 60+ credits and the FTIC had higher 4-year cumulative GPA than transfers with fewer than 60 credits at the point of transfer. Since transfers with more than 60 credits had the highest rate of graduation within 6 years, it appears that more courses/credits do not necessarily result in a protracted graduation rate. Transfers who came in with the lowest number of credits (24-39) relied more heavily on campus resources such as loaner library laptops. Transfers with 40-59 credits were less likely to participate in library instruction than the other groups, which indicates transfers at all numbers of credits need to have equivalent library instruction as FTIC freshmen.

The study results indicated that most library, co-curricular, and extracurricular engagements played a significant role in year 1 to year 2 retention, above-average 4-year GPA, and graduation within 6 years. Library engagements of any type were significant for all groups in retention and information literacy instruction was significant for all groups in 6-year graduation. While any co-curricular activity was significant in retention, extracurricular activity was significant in retention only for FTIC freshmen and transfers with 24-39 credits at transfer. Tutoring, writing center, extracurricular, and library information

literacy participation were significant for higher GPA for most groups. And for graduation within 6 years, co-curricular, career center, and library information literacy engagements were all significant indicators for all four study groups.

The findings from this study will help libraries and universities structure support systems and services to help this growing population of students succeed and graduate.

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