



Research Article

Institution Type, Selectivity, and Financial Aid: An Examination of Institutional Factors Influencing First-Time Students Retention in Public Universities

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Abstract: First-time student retention has become of greatest priority to higher education administrators seeking to increase revenue from tuition and completion rates. The statistics show that only 40% of first-time students persist from the start of institution to graduation. While decades of research have been conducted to investigate the factors influencing student retention, most of these researches have focused on students' attributes, pre-college characteristics, and socioeconomic. There is significantly limited information on how institutional characteristics contribute to first-time students' retention, yet institutional behavior and environment are key determinants of students' retention and success. Also, institutional administrators and students are increasingly becoming interested in knowing how their institutional characteristics influence student retention. This study examines the effects of institutional type, selectivity and institutional financial aid on retention rates at 4-year public research universities. Using a two-way analysis of variance (ANOVA), the study also examines the interaction effect of institutional selectivity and the percentage of students with financial aid on retention across institution types. The study found institution type to significantly associate with the retention rates in both low and high-selective institutions. High-selective institutions have high retention rates on average. The results of the analysis also showed that the effect of the percentage level of students with financial aid on retention rate does not depend on the institution selectivity level. The study presents significant practical implications for institution leaders, policymakers and students in enhancing student retention and in decision-making process.

Keywords: retention, first-time students, four-year public higher education, institutional characteristics, institution selectivity, ANOVA

1. Introduction

Student retention, also known as persistence, has become of greatest priority to higher education administrators in the US seeking to increase revenue from tuition and completion rates. While retention has been defined in various ways, in this study, retention is the permanence of a student in an institution until she/he completes her/his study program. As Gansemer-Topf and Scguh (2006) noted, first-year student retention is one of the important measures of the institutional effectiveness. It assesses one of the outcomes that is valued most by students and the general public. Student retention has become of priority because of the rising costs of higher education and the increasing close public scrutiny of the

financial decisions of institutional leaders (Gansemer-Topf & Scguh, 2006), to ensure that institutions are using public resources effectively and efficiently.

Data on student retention currently forms a critical component for much institutional budgeting and capital planning. Therefore, generating reliable information regarding student retention and persistence to completion is crucial, as many institutions rely on enrollment data and revenue from tuition for operations (Barr & McClellan, 2010; Pan et al., 2008). However, despite the reported increase in enrollment, the overall students' retention, and persistence to completion had slightly increased until the outbreak of the COVID-19 pandemic when it dropped (National Student Clearinghouse Research Center, 2022; Tinto, 2012). The COVID-19 pandemic exacerbated the decline in first-time student retention and most institutions are yet to recover to the retention rate pre-COVID-19 pandemic (National Student Clearinghouse Research Center, 2022). Approximately, only 66.4% of first-time students persist at the starting institution, and the rest transfer out to other institutions (National Student Clearinghouse Research Center, 2022). The high attrition rates raise a concern about the quality of programs and services institutions offer, as well as the effectiveness and efficient use of government resources.

Although several reasons have been cited for attrition, students opt to drop out for either personal reasons, job demands or dissatisfaction with the institution environment that includes institutional values (Kuh et al., 2005) and financial support (National Student Clearinghouse Research Center, 2022). Low retention and completion rates cost institutions and the nation's scarce resources, weaken the ability of an individual and institution to meet educational goals, and reflect negatively on the institution's ability to meet the student's educational, social, and emotional needs (Creighton, 2007; Hanushek et al., 2008; Tang, 2014; Wekullo, 2020). Given the consequences of low retention and completion rate to individuals, communities and the nation at large, it is imperative that institutional leaders, policymakers and educators understand the institutional factors contributing to first-time students' retention and persistence to completion.

Decades of research have been conducted investigating factors influencing student retention. A majority of this research focused on students' attributes, pre-college characteristics, and socioeconomic issues (Chen, 2012; Voigt & Hundrieser, 2008). Significantly, limited studies have examined how institutional characteristics, specifically the institution type, selectivity, and institutional financial support (scholarship aid) influence retention rates (Marsh, 2014). Yet, retention-related activities focus more on the institutional behavior and an environment where students successfully complete their goals, academic diploma or graduate (Voigt & Hundrieser, 2008). Consequently, institutional leaders are interested in knowing how their institutional characteristics can predict student retention. Also, students are interested in institutions that can support their persistence through higher education, especially in this era, where institutions are largely experiencing the impact of volatile state funding. In a nutshell, this study aims to address the question that many stakeholders (students, parents, and policymakers) are pressing institutions to answer: How can public research universities effectively and efficiently use the scarce resources at their disposal to increase students' retention to completion?

This study examines the effect of institutional type and percentage of students with financial aid on retention rates at most selective and least selective 4-year public universities. The study addressed four major research questions. The research questions and the hypotheses related to main and interaction effects are presented as follows:

- (a) Is there an overall difference between low and high institution selectivity on retention rate?

$$H_0: \mu_{L\text{-selectivity}} = \mu_{H\text{-Selectivity}}$$

- (b) Is there an overall difference between the low and high percentage of students with financial aid on the retention rate?

$$H_0: \mu_{L\text{-percentage of students with Financial Aid}} = \mu_{H\text{-percentage of students with Financial Aid}}$$

- (c) Does the effect of institution selectivity on retention rate depend on the institution type?

$$\begin{aligned}
HO : \mu_{D-Inst\text{itution type}_L-selectivity} &= \mu_{M-Inst\text{itution type}_L-selectivity} - \mu_{B-Inst\text{itution type}_L-selectivity} \\
&= \mu_{D-Inst\text{itution type}_H-selectivity} - \mu_{M-Inst\text{itution type}_H-selectivity} \\
&\quad - \mu_{B-Inst\text{itution type}_H-selectivity}
\end{aligned}$$

(d) Does the effect of the percentage of students with financial aid on retention rate depend on institution selectivity?

$$\begin{aligned}
HO : \mu_{L-\text{percentage of student with Financial Aid}} - \mu_{L-selectivity} \\
&\quad - \mu_{L-\text{percentage of student with Financial Aid}} - \mu_{H-selectivity} \\
&= \mu_{H-\text{percentage of student with Financial Aid}} - \mu_{L-selectivity} \\
&\quad - \mu_{H-\text{percentage of student with Financial Aid}} - \mu_{H-selectivity}
\end{aligned}$$

Where the first hypothesis tests the main effect of institutional selectivity on student retention. The second hypothesis tests the main effect of the percentage of the student with financial aid on student retention. The third hypothesis tests the interaction effect of the institutional type and institutional selectivity, and the fourth hypothesis tests the interaction effect of institutional selectivity and the percentage of students with financial aid on retention.

The study focuses on public research universities. While other institutions may contribute to the mission of producing research and scholarship that drive innovation and development, public research universities hold a unique social contract to meet and address this mission (American Academy of Arts and Sciences, 2015a; Wekullo, 2019). Also, public research institutions provide high-quality, affordable education to a wide population of students, some of whom are from lower socioeconomic classes (American Academy of Arts and Sciences, 2015b; 2016). At a minimal cost, public research institutions provide academic expertise, technical help, and critical education and workforce development through the regular engagement with the state governments (Leslie et al., 2012). Hence, this needs for a study that focuses on first-time student retention at public research institutions.

Unlike private institutions, public research institutions rely heavily on public funding from taxpayers. As a result, the public and key higher education stakeholders have a keen interest in the retention and persistence to the graduation of students who enroll in public research institutions. As this is the only way institutions can verify that they are using public resources effectively and efficiently. Also, the focus on public research universities alone allows a comparison of institutions with similar characteristics.

The study is significant in various ways: first, the study contributes to the literature in higher education by providing information to help scholars and the public understand how the three independent variables: (a) institutions type, (b) institution's selectivity, and (c) percentage of students with financial aid, and in combination affect the dependent variable; student retention rate. The information is crucial for future planning and strategizing ways to increase the retention rate of first-time students in public research institutions. Second, the information on student retention rates affects both students and institutions. To the institution, low retention could imply low quality of education that does not confirm to students' expectations. So, the results would help institutions of higher learning understand trends and patterns in this important early success indicator (National Student Clearinghouse Research Center, 2022), and identify disparities by institution type, selectivity and the demographic characteristics of students they enroll. The results would help institution administrators to come up with an effective policy or retention plan to increase student involvement in learning and the services it offers to increase students' retention and completion. Also, the findings will help institutional leaders to improve the effectiveness of institution programs and products in line with the accreditation agency

requirements as a way to justify the government funds and economic aid they receive. Lastly, this study has implications for policymakers, institutional leaders, students, as well as higher education stakeholders interested in understanding how institutional factors influence the persistence of first-time students.

2. Literature review

The purpose of this study is to examine the existing literature pertinent to explaining and understanding the institutional factors related to first-time students dropping out before graduating. The literature is presented under subsections namely: student retention and financial aid, institutional selectivity and student retention, and an interaction between the three focus variables; financial aid and retention, and institutional type.

Student retention and financial aid from the institution. Studies yield varying results regarding the effect of financial aid on student persistence. Most previous studies showed students are likely to enroll and stay in a college or university that offers an appealing financial package or support (Barr & McClellan, 2010; Britt et al., 2017; National Student Clearinghouse Research Center, 2022; Olbrecht et al., 2016). However, the reality is that the institutional financial package that attracts students is not large enough to retain the students, especially when they encounter the increasing and high cost of living (Barr & McClellan, 2010), financial stress, and debt (Britt et al., 2017). Other scholars have indicated that financial aid can be less influential in students' decision to persist as they also have to respond to economic conditions, such as inadequate financial aid and debt burden in their decision to persist with their education (Barr & McClellan, 2010; Britt et al., 2017; Tinto, 2006; 2012; Webster & Showers, 2011). Overall, a rise in the cost of higher education has made it difficult for students and their families to afford and has created an influx of part-time and working students. Little research has examined how institutional financial strategy, such as resource allocation to students in form of institutional grants may influence their retention and graduation rates. Surprisingly, it is the question stakeholders who are pressing institutions to answer. Thus, there is a need to examine how institutions can allocate resources effectively and efficiently in the form of institutional grants to support students from a low-income background and still maintain or improve their students' retention to completion rates. In the current study, it is hypothesized that students with greater institution financial support from the institution are more likely to continue with their college education.

Institutional selectivity. Institutional selectivity is a measure of admissions competitiveness (Barron's Educational Series Inc, 2000). As Gansemer-Topf and Schuh (2006) stated, selectivity scores provide information on the quality of students admitted into a specific institution. Institutions with high selective scores admit students with higher standardized test scores than those with lower selectivity ratings and as a result may have higher retention to completion regardless of how they allocate resources (Alverio, 2010; Ericksen, 2022; Gansemer-Topf & Schuh, 2006). Moreover, institutions' behavior, especially those directly linked to student's academic integration, has been found to significantly influence students' retention and graduation rates (Ericksen, 2022; Gansemer-Topf & Schuh, 2006). For instance, Kim (2007) and Titus (2006) found institution selectivity to be negatively associated with student retention. In particular, researchers have found the less selective institutions to have low retention and graduation rates. Expounding on the same note, a report by the National Center for Education Statistics (2018) reported the overall retention at 4-year public institutions as 81%. Whereas the retention at least selective institutions was 62%, at most selective universities, the retention was 96%. Researchers have associated low retention in less selective institutions with several reasons. First, low selective institutions are more likely to enroll less academically prepared students and have less funding to allocate to students' academic support compared to high-selective institutions (Ericksen, 2022; Gansemer-Topf & Schuh, 2006). Further, Ericksen (2022) stated that high-selective institutions have students support resources ranging from writing centers, accessibility to faculty and other support services that help improve student retention compared to less selective institutions. This study contributes to the existing research by examining how institutional selectivity in combination with other institutional factors may influence the retention of first-year students.

Institutional selectivity, financial aid from institutions and retention. Attending college is a significant financial decision for students together with their parents to make. No doubt, the cost of college affects student retention rates (Ericksen, 2022). Most students consider several alternative tuition pricing strategies to help ease their financial burden even after enrolling, thus affecting their retention. Expounding on this discussion, Lee (2012) used data from National Center on Education Statistics and Integrated Postsecondary Education Statistics Database to examine institutional

characteristics influencing student retention and completion at Historically Black Colleges and Universities and found that institutional selectivity and institutional support expenditures have a great influence on students' retention and completion rates. In different studies, researchers such as Perna (1998) and St. John et al. (2016) found that increasing financial aid was associated with high retention, later, Gansemer-Topf and Schuh (2006) found the effect of financial aid on retention to vary by institution selectivity. Increasing financial aid in less selective institutions was positively associated with retention, but the opposite occurred in high-selective institutions, where increasing financial aid was not significantly associated with retention. Gansemer-Topf and Schuh (2006) further explained that financial aid was related to retention in less selective institutions because high selective institutions cost more and enroll students from high-income families. Moreover, in different studies, Westrick et al. (2015) and Hearn (1991) noted that low-income students are more likely to attend less selective institutions despite their academic ability. The current study tests the interaction effect of the percentage of students with financial aid on retention depending on institutional selectivity. This study contributes to existing research by examining how institutional selectivity in combination with institutional financial support may influence the retention of first-year students to completion.

Type of institution and student retention. Earlier studies have noted that the patterns underlying student retention and persistence to completion vary by institution type (Alverio, 2010; National Center for Education Statistics (NCES), 2018; Tinto, 1987). Most of these studies have compared retention rates between public and private institutions (NCES, 2018; National Student Clearinghouse Research Center, 2022); two-year and four-year colleges and universities (Alverio, 2010). Given that within 4-year institutions, differences in retention rates could exist between Doctoral, Master's and Bachelor's degree-granting institutions, it is imperative to examine how these institution types differ in their retention rates.

Previous studies have pointed out that students are likely to persist in a learning environment that is committed to their success, has high expectations for their learning, provides academic and social support, provides feedback on their performance, and actively engages them with other students and faculty in learning (Ericksen, 2022; Tinto, 1999; 2012). In the same vein, the National Student Clearinghouse Research Center (2022) used secondary data from the National Center for Education Statistic to examine whether institution type affects student retention rates and found that institution type affected a school's ability to retain its students due to the availability of resources. Also, Chen (2012) noted that institutional characteristics can positively influence the retention rate of all students as opposed to retention strategies, which focus on a certain group of students. Thus, it is imperative to understand how institutional characteristics, such as institution type and institution selectivity, may influence student retention.

Institution selectivity and retention. Previous studies found the level of institution selectivity to relate to an institution's mission, high performance/preparedness of students it enrolls, and the ability of that institution to provide resources for students, to have an influence on access, retention and completion (Alon 2007; Chiyaka et al., 2016; Gansemer-Topf et al., 2006; Levitz et al., 1999; Pike et al., 2015). For instance, Alverio (2010) stated that very selective institutions can increase enrollment and reduce attrition by improving services such as student support and recreation and also by introducing additional occupational and technical programs. On the same note, Levitz et al. (1999) noted that there can be substantial variations when similar institutions are serving students with similar levels of academic ability. However, limited research on how 4-year public institutions with varying capacities may influence first-time students' retention exists. Of course, several other factors, such as institutional culture, faculty and student relationship, student socio-economic background, and availability of remediation programs have been found to influence student retention. Consequently, the impact of these factors on retention may vary depending on various institutional environments and students' personal and socioeconomic factors.

3. Methods

The study used the Delta Cost Project data, a publicly available dataset, to examine the effect of institutional type and percentage of students with financial aid on retention rates at very selective and less selective universities. A sample comprised of 489, four-year public research universities in the U.S. was classified into three groups according to Carnegie Classification 2010 as Doctoral, Master's, and Bachelor's. Of the sample, Doctoral institutions were 175, Master's, 163, and Bachelor's comprised of 142 institutions. Each institution was further classified according to the level of selectivity. That is high selectivity and low selectivity. The percentage of students with financial aid in each

institution was computed and categorized into two groups: those with a high percentage of students with financial aid and those with a low percentage of students with financial aid, as explained under variables and measures.

Private institutions were excluded from the sample as they are more traditional and have higher graduation rates (National Center for Education Statistics, 2018; National Student Clearinghouse Research Center, 2022). Also, students who enroll in private institutions remain full-time. In addition, some of the prestigious private universities do not accept transfer students, thus their persistence in graduation is less marred.

3.1 Variables and measures

Three independent variables were used: (a) institution type categorized as Doctoral, Masters, and Bachelors and (b) institution's selectivity measured using ACT scores. The ACT score scale ranges between 1-36, with the mean ranging between 22 and 24. In this study, institutions that admitted students with ACT scores of below 25 were considered to be less selective and above were very selective. The ACT scores were used to measure the level of institution selectivity by determining the type of students the institutions admitted. Because, besides other social characteristics, highly selective institutions are mainly determined by their unique and rigorous academic criteria for admission. In addition, they are known to serve highly academically talented students. (c) The percentage of students with financial aid (i.e., institutional grants) in each institution was computed. If the percentage was 50% and above, then that institution was considered to have a high percentage of students with financial aid (i.e., the institution was serving mostly students from low-income families) and if the percentage was below the average (50%) then the institution was having a low percentage of students with financial aid (i.e., majority of students are from the wealthy family household).

Retention rates for full-time degree-seeking freshmen who were enrolled continuously from the fall of 2014 through the fall of 2015 semester at 4-year public research universities were used as the dependent variable. From the fall of 2014 through the fall of 2015 captured the freshman-to-sophomore retention rate, which measures the percentage of first-time (Voigt & Hundrieser, 2008).

Since the study involved more than two groups, a two-way analysis of variance (ANOVA) was considered the most suitable method for this analysis. Besides testing the main effects of institution selectivity and the percentage of students with financial aid, the study examined the interaction effect to determine if the effect of the percentage of students with financial aid on student retention depended on institutional selectivity and whether the effect of institutional type on retention depended on institution selectivity. The test for interaction effect helped to establish if a third variable influenced the relationship between the independent and dependent variables. Basically, the interaction effects tested how the independent variables in combination affect the dependent variable, as well as estimated how the mean of independent and dependent variables changed according to the level of third independent categorical variables. The use of a two-way ANOVA test was considered suitable for reducing the error variance.

4. Results

4.1 Preliminary results

Descriptive statistics were first computed (Table 1). On average, Doctoral degree awarding institutions had the highest mean, with the least deviations in high-selective institutions ($M = 0.87$, $SD = 0.078$). The mean and standard deviation for Master's and Bachelor's degree awarding institutions were comparatively the same, with a minor difference of 0.01 in mean and standard deviation. For low selective institutions, Doctoral degree awarding institutions had the highest mean, with the fewest deviations on average ($M = 0.769$; $SD = -0.804$). While the mean for Master's degree awarding institutions was above 0.73, almost the same as that of high-selective institutions, that of bachelors' institutions was lower ($M = 0.660$, $SD = 0.78$). The results of the means, indicate that the overwhelming majority of highly selective institutions are the doctoral degree awarding institutions.

In high selective institutions, a low percentage of students with financial aid had the highest mean with the least deviation on average ($M = 0.822$, $SD = 0.111$). Similarly, in low selective institutions, the percentage of students with low financial aid had the highest mean, with the least deviation on average ($M = 0.751$, $SD = 0.074$).

Table 1. Mean differences in institution type, and percentage of student with financial aid by institutional selectivity level

Institution Type	High Selectivity					Low Selectivity				
	<i>n</i>	<i>M</i>	<i>SD</i>	<i>Sk</i>	<i>Ku</i>	<i>n</i>	<i>M</i>	<i>SD</i>	<i>Sk.</i>	<i>Ku</i>
Doctoral	175	0.870	0.078	-1.132	4.195	82	0.769	0.071	-0.804	4.170
Masters	163	0.738	0.126	-1.086	4.420	170	0.730	0.079	-0.062	2.805
Bachelors	142	0.73	0.137	0.022	2.043	43	0.660	0.078	-0.204	3.841
% of student with Financial Aid										
Low	125	0.822	0.111	-1.352	6.30	224	0.751	0.074	-0.166	2.689
High	55	0.706	0.140	0.049	2.007	71	0.668	0.082	-0.143	3.110

Note: N = 480

4.2 Diagnostic analysis

Before conducting the analysis, four diagnostic tests were performed. First, a box plot check was done to determine the distribution of data. The results showed the outliers were present in the Doctoral and Master’s institutional types at both levels of selectivity. The outliers were also present in the category of a low percentage of the student with financial aid (See Figure 1). A sensitivity analysis was run on the data with and without outliers and the results were then compared for the differences in test statistics. The results of the analysis showed no difference in test statistics, indicating that the presence of outliers had no significant effect on the outcome.

Second, a test of normality was conducted using Skewness and Kurtosis and Shapiro Wilk tests. The Skewness values were close to one (i.e., 1, -1), which is the acceptable range. However, some Kurtosis values were slightly above three, indicating that the sample violated the normality assumption. The result of the Shapiro-Wilk test showed that except for high-selective institutions and low percentage of students with financial aid ($p = 0.0038$), and high-selective Doctoral degree-granting institutions ($p = 0.003$) that were significant, the rest of the categories in the sample were nonsignificant. Fortunately, the sample size was large enough ($n = 489$) that even if no normality existed in some groups in the sample, it would not jeopardize the statistical test (Garson, 2012; Howell, 2012).

The homogeneity of variance test for each group was conducted. Levene’s test showed no statistical differences across the percentage of students with financial aid ($p = 0.07$). But the variance between selectivity level and institutional types was not equal [$p = 0.014$, $p = 0.001$, $p < 0.05$, respectively], indicating a significant difference exists between low and high selective institutions, as well as among the three categories of institutional type, which might have a substantial impact of the validity of the statistical tests. So, the two-way ANOVA test was run using the Welch F-test in addition to the regular F-test. Although the p value was larger than the regular F test, it was still less than 0.05. Therefore, the null hypothesis that the dependent variable is equal among the group was rejected. In sum, the two-way ANOVA analysis was run to test the two main effects of each independent variable in the study. Similarly, a test of two interaction effects was run, followed by a test of effect size for the overall model, that is the partial effect size represented as η^2 was done. Further follow-up tests were conducted.

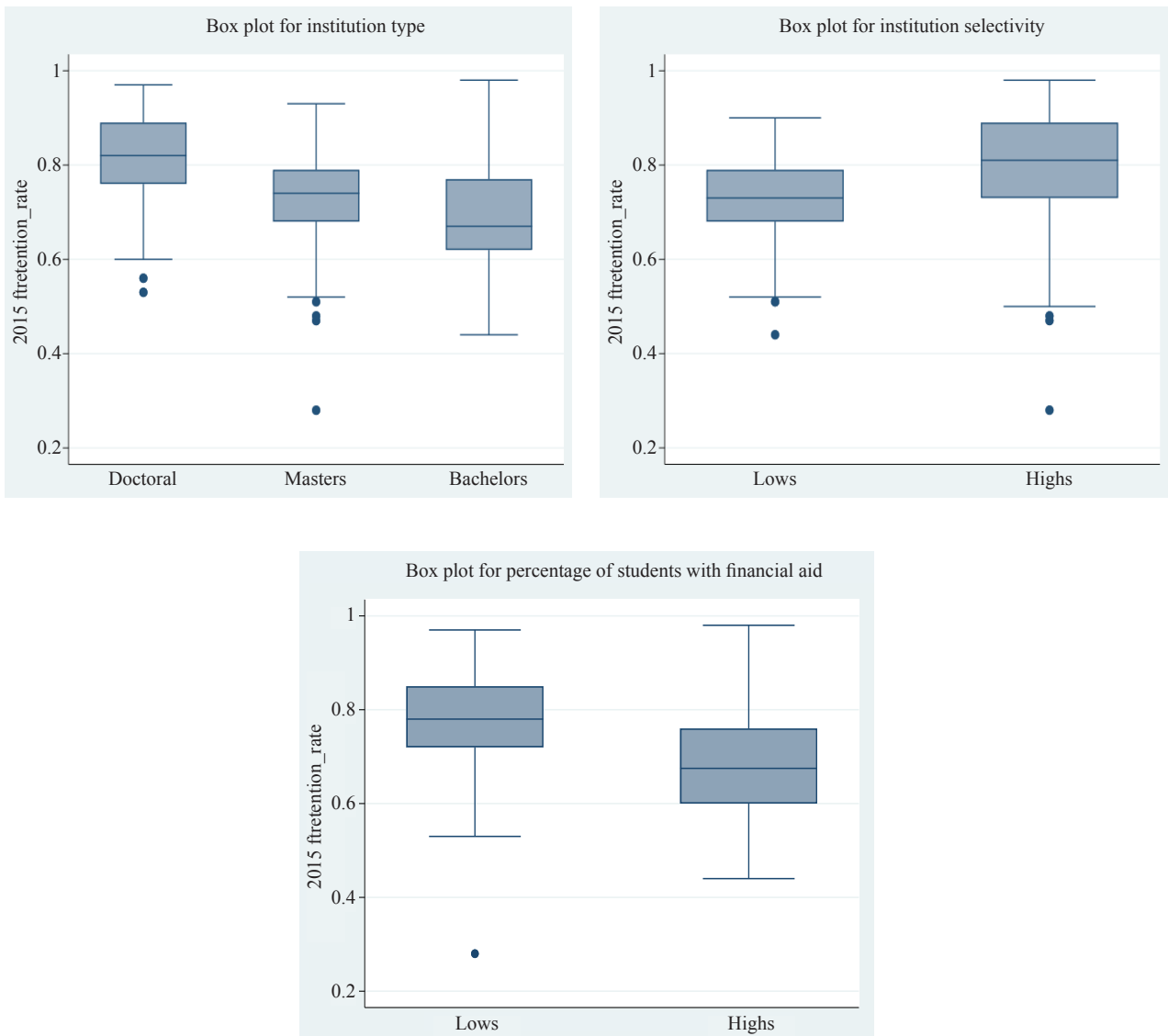


Figure 1. Box plots for institution type, institution selectivity, and percentage of students with financial aid

4.3 ANOVA results

The results of a two-way factorial ANOVA (Table 2) showed that the interaction between institution type and selectivity level was statistically significant [$F(2,475) = 11.61, p < 0.05$]. Similarly, the results of the main effects for institution type and selectivity level were statistically significant [$F(2,475) = 62.65, p < 0.05$, $F(1,475) = 40.86, p < 0.05$]. Thus, based on this sample, institution type appears to significantly associate with the retention rates in both low and high-selective institutions.

Since the interaction effect was significant, a simple effects test was conducted to determine if the effect of each institution type on retention was consistent at each level of institution selectivity. The results showed a statistically significant difference in the mean retention rate among the three types of institutions when the selectivity level is low [$F(2,475) = 19.98, P = 0.001$]. When the selectivity level is high, the retention rate also differs across the institution types by a statistically significant percent [$F(2,475) = 49.19, P = 0.001$]. The Bonferroni-adjusted p-values were less than 0.05, indicating that the differences between the institution types on retention rates were statistically significant.

Table 2. ANOVA summary table for institute type on retention by level of selectivity

Source	df	SS	MS	F
Institution type	2	1.063	0.531	62.65***
Selectivity	1	0.347	0.347	40.86***
Institution Type *Selectivity	2	0.197	0.099	11.61***
Within (error)	475	4.030	0.008	
Total	480	5.615	0.012	

Note: N = 489, * p < 0.05, **p < 0.01, ***p < 0.001

An interaction graph (Figure 2) shows the relative positions of the six-sample means. Relative to Bachelor's institutions, Master's institutions attained a retention rate of 0.08 percent higher and Doctoral institutions attained 0.10 percent higher retention rates than low selective institutions. In very high-selective institutions, there was a tiny difference of 0.01 percent in the retention rates between Bachelor's and Master's institutions. This finding demonstrates that, while the retention rates for Bachelor's increased in highly selective institutions that of Master's reduced. The difference in retention rates between Bachelor's and Doctoral institutions was estimated as 0.13 percent in high-selective institutions.

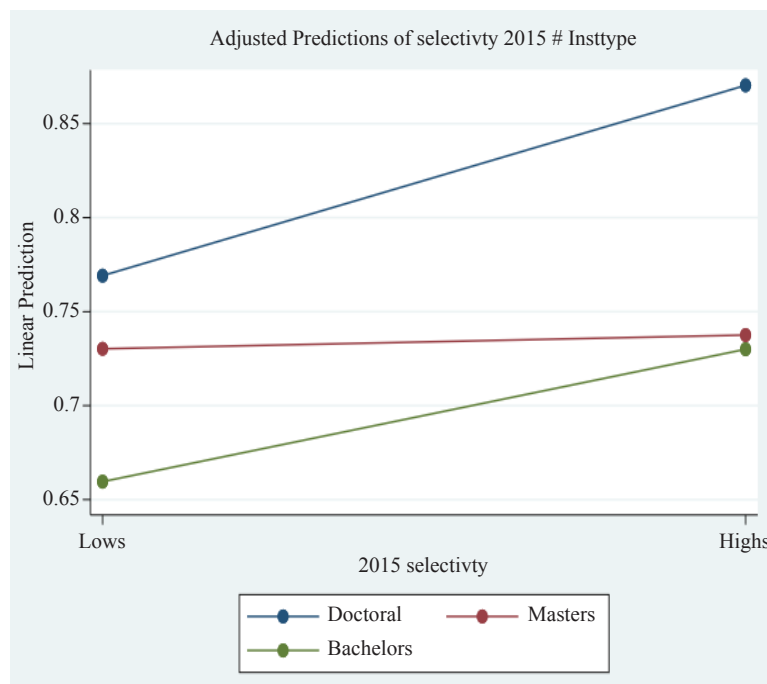


Figure 2. Line graph depicting two-way interaction effect between institution type and selectivity level

The size of the interaction effect was also examined using η^2 effect size. The η^2 value of 0.282 indicated that the observed interaction was medium in size and statistically significant. The partial η^2 value was 0.21, which is medium in

size and large in effect compared to that of the institution selectivity level.

The result of the two-way factorial ANOVA in Table 3 shows that the interaction between the percentage level of students with financial aid and institution selectivity level was not statistically significant [$F(1,477) = 2.66, p = 0.104$], indicating that the effect of the percentage level of students with financial aid on retention rate does not depend on institution selectivity level.

Table 3. ANOVA summary table for percentage of student with financial aid on retention by level of selectivity

Source	df	SS	MS	F
Percentage of students with financial aid	1	0.870	0.870	95.75***
Selectivity	1	0.268	0.268	29.55***
%student with Financial aid *Selectivity	1	0.024	0.024	2.66
Within (error)	477	4.334	0.009	
Total	480	5.615	0.012	

Note: N = 480, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

The main effect of selectivity level is statistically significant [$F(1,477) = 29.55, P = 0.001$]. High-selective institutions have high retention rates on average. The partial η^2 is 0.06, indicating a small effect. The main effect of the percentage level of students with financial aid was also statistically significant [$F(1,477) = 95.75, P = 0.001$]. Institutions with a low percentage level of students with financial aid have higher retention rates on average. The partial η^2 is 0.17, indicating a small effect.

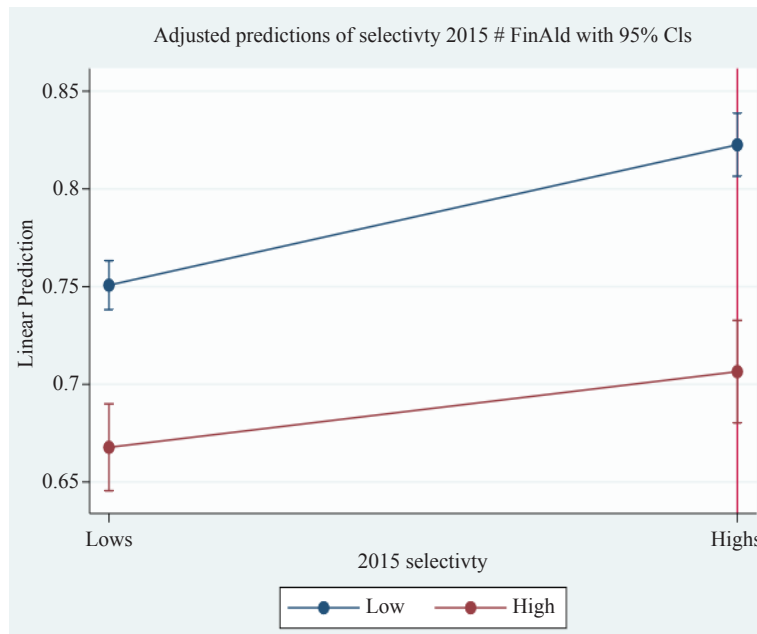


Figure 3. Line graph depicting two-way interaction effect between percentage of student with financial aid and selectivity level

An interaction graph in Figure 3 shows the relative positions of the four-sample means. Relative to a high percentage of students with financial aid, the low percentage of students with financial aid attained a mean retention rate that was 0.08 percent higher in low selective institutions and a 0.11 percent higher in high-selective institutions. Although the difference in the rate of retention was more pronounced in the sample of high-selective institutions, the difference was relatively small. The size of the interaction expressed in partial η^2 effect size was 0.003, indicating a small effect, thus the interaction was small in size and, therefore, not statistically significant.

5. Discussions

The findings that institution type was significantly related to retention rate despite the level of selectivity were expected. Doctoral degree-granting institutions had a higher retention rate followed by masters and fewer retention rates were experienced in Bachelor's institutions. Previous studies have found that retention rates are likely to be higher in a setting that is committed to supporting student success, providing academic and service support, as well as engaging students in active learning (National Student Clearinghouse Research Center, 2022; Tinto, 1999; 2012). Yet, limited research focusing on how institutional characteristics such as institution type and selectivity influence students' retention exists. The findings of this study contribute significantly to the existing literature, especially on how 4-year public institutions with varying capacities can influence students' retention and persistence. More importantly, the findings of this study suggest that regardless of the institution type, it is important to meet the student's needs by reducing tuition fees, and providing resources and opportunities for financial aid.

The findings that high-selective institutions have high retention rates on average were not a surprise. This finding is similar to that of previous studies such as Lee (2012), Kim (2007), Titus (2006), and the National Center for Education Statistics (2018), who found retention rates at high-selective institutions to be higher compared to less selective institutions. These studies explained that low retention rates at less selective institutions were because of the institution's inability to subsidize their students. Additionally, these studies noted that the majority of less selective institutions enrolled less academically prepared students and it was challenging to retain them up to graduation. This finding has significant implications for institutional administrators in the institutional decision-making process and in sourcing resources to support the students they admit to completion.

The results showed institutions that had a low percentage of students with financial aid had higher retention rates on average. This finding is similar to what Barr and McClellan (2010) observed that enrolling a high percentage of students who depends on financial aid and not being able to consistently provide financial support was a problem facing many institutions of higher learning. The high percentage of students with financial aid are mainly from low-income backgrounds and the rise in the cost of living coupled with inadequate financial aid, and debt burden can hinder these students from accessing and affording higher education. These findings are significant for institution leaders whose goal is to improve first-time student retention by increasing financial support for students.

While the study shows how three independent variables: a) Institutions type, b) Institution's selectivity, and c) Percentage of students with financial aid, (i.e., those who receive institutional grants), in combination to affect the dependent variable: student retention rate, this study also has limitations. First, the concept of student retention is a function influenced by several factors other than the ones listed in this study. This preliminary analysis only focused on four factors; therefore, a future study may consider including other influential factors in the model. Also, this preliminary analysis only used the freshmen sample for a short period, examining the effect of institutional characteristics over an extended time may provide more concrete findings. Finally, the use of two-way ANOVA may have some biased estimates, especially when there are missing values that cannot be ignored. Luckily enough, the data did not have missing values. Also, the number of treatment or groups were within the range and did not cause difficulties in maintaining the homogeneity of the groups.

6. Conclusion

An exploratory examination of whether the effects of institutional type and percentage of students with financial aid on retention rates at most selective and least selective 4-year public universities showed that institution type

was significantly related to retention rate despite the level of selectivity. The findings that Doctoral degree-granting institutions have a higher retention rate could imply that Doctoral degree institutions are committed to supporting student success, providing academic and service support, as well as engaging students in active learning. This finding has significant implications for institution leaders, policymakers and education stakeholders that regardless of the institution type, it is important to meet the student's needs by reducing tuition fees, and providing resources and opportunities for financial aid. The institution administrators need to come up with an effective policy or retention plan to increase student involvement in learning and improve the services they offer to increase students' retention to completion. Also, the finding has significant implications for institutional leaders to improve the effectiveness of their programs and products in line with the accreditation agency requirements as a way to justify the government funds and economic aid they receive.

The finding that less selective institutions experienced low student retention concurs with the findings of previous studies that found the majority of less-selective institutions enrolled less academically prepared students and this challenged their ability to retain these students up to graduation. The findings that institutions that had a low percentage of students with financial aid had higher retention rates on average explain the challenges institutions face when they enroll a high percentage of students who depend on institutional scholarships/financial aid when they are unable to financially support these students to completion. This finding has implications for policymakers and institutional leaders to strategize and secure more resources, including funds, to support the academic and other support services for students from low-income families to succeed.

In sum, student retention to completion is a complex and multifaceted concept that extends beyond a student's academic preparedness. Moreover, just as retention is a measure of student success as well as institutional success, it is imperative to consider the influence of institutional factors, such as institution type and institution selectivity on student retention rates. The study recommends institutions no matter the type establish systems to better assist students along their educational journey. Also, the study recommends more research to further examine institutional factors, in addition to personal and socioeconomic factors that influence students' retention to completion.

Conflict of interest

The author declares no competing financial interest.

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