Graduate Student Labor Unions in U.S. Higher Education:

A Comparative Analysis of R1 Universities

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Introduction

Graduate student labor unions are on the rise. By January 1, 2024, nearly 40% of graduate student employees in the United States were unionized (Herbert et al., 2024). The following comparative statistical analysis of the characteristics of universities with and without universities is motivated by this steady growth of graduate student labor power nationwide.

Existing research on graduate student unions in the U.S. higher education system can largely be categorized into two groups: origins and impacts. With respect to the former, quantitative studies have concluded that the students' perceptions of unions play the largest role in their propensity to unionize (Chanvisanuruk et al., 2007; Rubin & Rubin, 2007). Meanwhile qualitative studies have sought to uncover the origins of graduate student labor unions as responses to the "corporatization" of the research university (Rhoads & Rhoades, 2005, p. 243) and as acts of socioeconomic class struggle (Walker, 2019).

Research on the impact and implications of graduate student labor unions is widespread. Scholars have explored how unionization (and labor strikes) have directly benefited graduate students through pay increases, employee benefits, and improved working conditions for graduate student employees (Maclean & Tomasi, 2023; Schenk, 2007). Scholars have also considered how unions impact universities as a whole through the lens of departmental autonomy (Julius, 2023; Julius & Gumport, 2003) and rising labor militancy across campus (Wickens, 2008). Finally, a third subset of the research has looked at how graduate student labor unions impact the wider labor landscape through the role of organizers (Julius, 2023; Julius & Gumport, 2003), the building of union coalitions, (Lafer, 2003; Walker, 2019), off-campus organizing (Whitford, 2014), and legislation (Clemons, 2024).

Ultimately, much of the existing research has focused on specific schools or university

systems, and few studies have sought to compare unionized and non-unionized institutions. However, one statistical analysis conducted by Rogers et al. (2013) did seek to compare schools with and without graduate student unions. In their comparison of eight schools, they found that "student employees in unionized universities reported more positive student–teacher relationships, more academic freedom, and greater economic well-being than did student employees in nonunionized universities; however, most of these differences were not statistically significant" (Rogers et al., 2013, p. 500).

Initially, I sought to contribute this body of comparative work on graduate student unions by analyzing how graduate student *outcomes* (e.g. retention rates, completion rates, and measures of postgraduate mental and financial wellbeing) differ between institutions with and without graduate student unions. Unfortunately, institution-level aggregated data is not publicly available or easily accessible, and government committees and working groups have recognized this as a critical issue in recent years (National Association of Student Financial Aid Administrators [NASFAA], 2016; Okahana, 2018). As a result of this lack of data availability, the following study seeks to shed light on other institutional differences between unionized and non-unionized universities — differences relating to graduate students, instructional faculty and staff, university resources, and undergraduate students.

Statement of Study

In this study, I seek to answer the following question: How do the institutional characteristics of R1 universities differ based on the presence or absence of graduate student labor unions? In the research question,"R1" refers to the "Very high research activity" designation for doctoral universities in the 2021 Carnegie Classifications of Higher Education Institutions (American Council on Education [ACE], n.d.). The specific focus on R1 universities

ensures a unifying factor across the universities studied in their orientation toward research and scholarship. Importantly, these are areas in which graduate students apprentice.

In order to analyze the differences between R1 universities with and without graduate student labor unions, I opted to conduct a series of independent samples t-tests using a binary "union" variable as the grouping variable, and various indicators from the Integrated Postsecondary Education Data System (IPEDS) as the dependent variables. These dependent variables fall under one of four categories: (1) Graduate Student Indicators, (2) Instructional Faculty and Staff Indicators, (3) University Resources Indicators, and (4) Undergraduate Indicators. Ultimately, I strongly anticipated that the characteristics of R1 universities would differ across the Graduate Student Indicators based on the presence or absence of a graduate labor union. To a lesser extent, I anticipated union vs. non-union differences across the other three indicator categories as well.

Methodology

The dataset utilized to conduct this comparative analysis was constructed using data from three different sources:

- College Scorecard (U.S. Department of Education, 2025): From the most recent institution-level College Scorecard dataset, I extracted out a subset of universities with the value of "Doctoral Universities: High Research Activity" for the variable of Carnegie Classification – Basic Classification (CCBASIC). Appendix A features a list of the 146 universities with this classification.
- 2024 Directory of Bargaining Agents and Contracts in Institutions of Higher Education (Herbert et al., 2024): From the directory's Table A5: Graduate Student Employee Collective Bargaining Units, I created a nominal union variable indicating if a university

did or did not have a graduate student union by Fall 2023.

- Integrated Postsecondary Education Data System (IPEDS) (National Center for Education Statistics [NCES], 2023): I built a custom dataset using 2022–2023 and 2023–2024 data, which included all the dependent variables utilized in the independent samples t-tests. A list of all the IPEDS variables in their original names is included in Appendix B.

The three datasets were combined using IBM SPSS Statistics (version 29.0.2.0). SPSS was also utilized to calculate descriptive statistics and conduct independent samples t-tests. Meanwhile, all graphical visualizations were developed using the R (version 4.5.0) package ggplot2.

Measurement

This study utilized one independent variable and ten dependent variables across the four indicator categories mentioned in the statement of study, all of which are included in Table 1.

Table 1

List of Independent and Dependent Variables Utilized in the Comparative Analysis of R1 Universities

Category	Variable Name
Independent Variables	
Grouping Variable	graduate student union present? (2023-24)
Dependent Variables	
Graduate Student Indicators	graduate application fee in USD (2023-24) in-state average tuition full-time graduates in USD (2023-24) out-of-state average tuition full-time graduates in USD (2023-24) total graduate degrees conferred (2022-23)
Instructional Faculty and Staff Indicators	full-time instructional staff total (2023-24) average salary for instructional staff equated to a 9-month contract in USD (2023-24) student-to-faculty ratio (2023-24)
University Resource Indicators	number of branch and independent libraries (2023-24)
Undergraduate Indicators	undergraduate admissions rate as a percentage (2023-24) four-year undergraduate graduation rate as a percentage (2023-24)

The remainder of this section examines the distributions and descriptive statistics of these selected variables.

Grouping Variable

The grouping variable for this comparative analysis is the existence of a graduate student labor union by the start of the 2023–2024 academic year. A collective bargaining agreement need not have been established for the union by this time. Among the 146 universities studied, 52 had graduate student labor unions established by the start of the 2023–2024 academic year and 94 universities did not have graduate student labor unions established by this time.

Dependent Variables

The dependent variables in this study are distributed across four categories of indicators: (1) Graduate Student Indicators, (2) Instructional Faculty and Staff Indicators, (3) University Resources Indicators, and (4) Undergraduate Indicators. Descriptive statistics for each variable are provided in the sections below.

Graduate Student Indicators

Four graduate student indicators were selected for this analysis, as shown in Table 2, and link to different "stages" of being a graduate student. The first variable in this category is the fee paid to submit a graduate application for the 2023–2024 academic year (N = 146, M = 71.68, SD = 24.320). This variable corresponds to the pre-admission stage of being a graduate student. The second variable is the average in-state tuition paid by full-time graduate students during the 2023–2024 academic year (N = 146, M = 22,785.61, SD = 19,145.702). The third variable is the average out-of-state tuition paid by full-time graduate students during the 2023–2024 academic year (N = 146, M = 33,881.69, SD = 13,916.709). Both of these variables are included, because there is a mix of private and public universities among the 146 universities included in the study sample. These variables correspond to the stage of actively attending a university as a graduate student. The fourth and final variable in this category is the total number of graduate students

conferred by a university during the 2022–2023 academic year (N = 146, M = 3222.58, SD = 2354.388). This variable corresponds to graduation and the completion of a graduate program.

Table 2

Descriptive Statistics of Dependent Variables — Graduate Student Indicators

	N	Range	Minimum	Maximum	Mean	Std. Deviation
graduate application fee in USD (2023-24)	146	135	0	135	71.68	24.320
in-state average tuition full-time graduates in USD (2023-24)	146	61189	5451	66640	22785.61	19145.702
out-of-state average tuition full-time graduates in USD (2023-24)	146	57508	9132	66640	33881.69	13916.709
total graduate degrees conferred (2022-23)	146	14090	383	14473	3222.58	2354.388

Note: The variable named total graduate degrees conferred (2022-23) is a computed variable consisting of the sum of the following four variables: total master's degrees conferred (2022-23); total doctoral degree conferred - research/scholarship (2022-23); total doctoral degrees conferred - professional practice (2022-23); total doctoral degrees conferred - other (2022-23).

Figure 1 features a histogram of the graduate application fee for R1 universities for the 2023–2024 academic year. The distribution is unimodal without any evident skew.

Figure 1

Histogram of Graduate Application Fees at R1 Universities

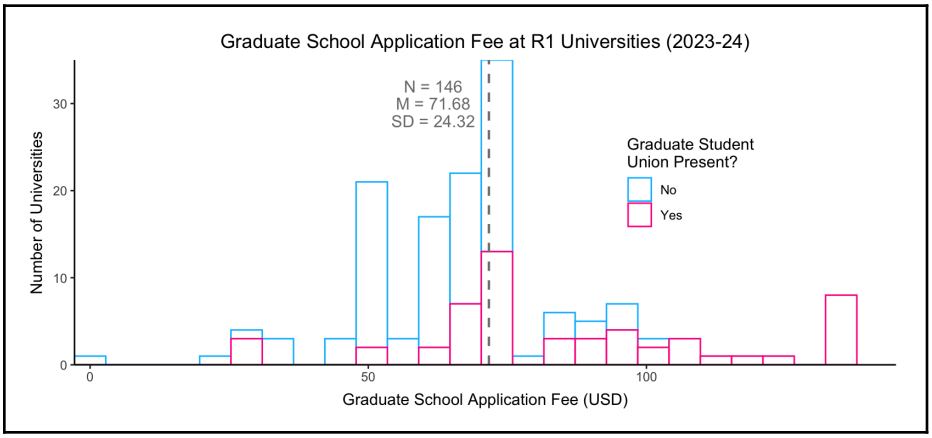


Figure 2 features a histogram of the average in-state tuition for R1 universities for the

2023–2024 academic year. Figure 3 features a histogram of the average out-of-state tuition for R1 universities for the 2023–2024 academic year. The distribution of both variables is unimodal and skewed to the right.

Figure 2

Histogram of In-State Average Tuition at R1 Universities

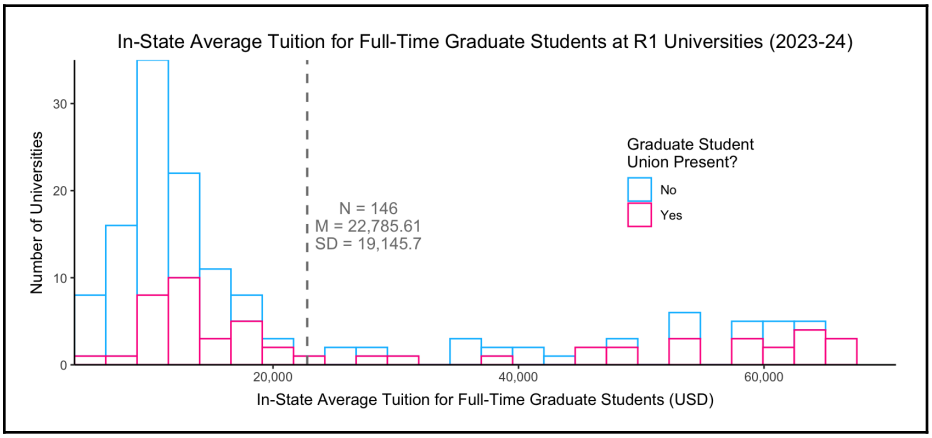


Figure 3

Histogram of Out-of-State Average Tuition at R1 Universities

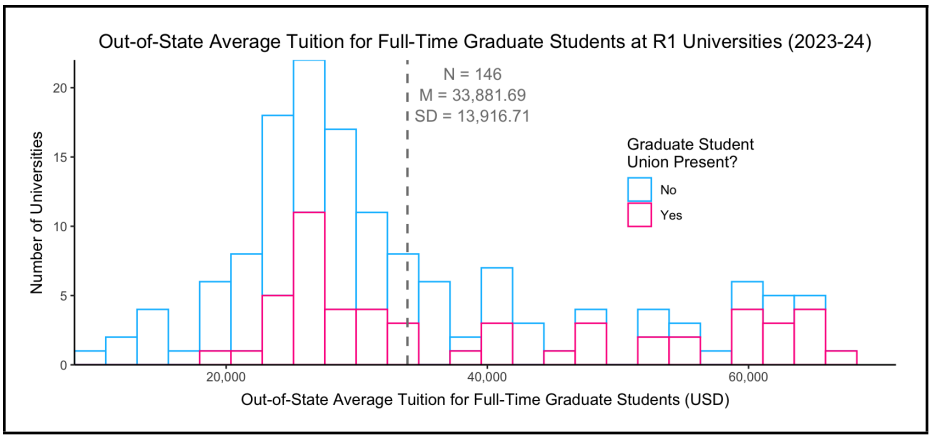
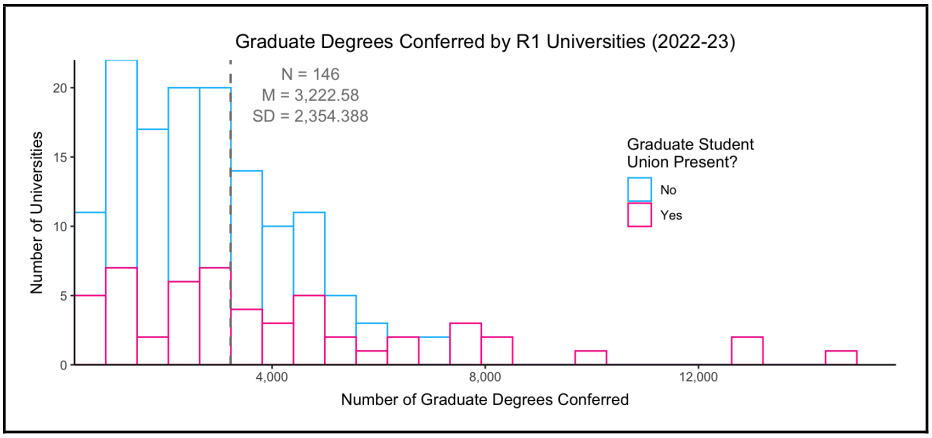


Figure 4 features a histogram of the total number of graduate degrees conferred by R1 universities during the 2022–2023 academic year. The distribution of the variables is unimodal and skewed to the right.

Figure 4

Histogram of Total Graduate Degrees Conferred by R1 Universities



Instructional Faculty and Staff Indicators

Three instructional faculty and staff indicators were selected for this analysis, as shown in Table 3. The first variable in this category is the total number of full-time instructional staff for the 2023–2024 academic year (N = 146, M = 1,384.88, SD = 641.778). The second variable is the average salary for instructional staff equated to a nine-month contract (N = 146, M = 124,654.9, SD = 31,255.754). The final variable in this category is the student-to-faculty ratio (N = 146, M = 15.29, SD = 5.114).

Table 3

Descriptive Statistics of Dependent Variables — Instructional Faculty and Staff Indicators

	N	Range	Minimum	Maximum	Mean	Std. Deviation
full-time instructional staff total (2023-24)	146	3844	245	4089	1384.88	641.778
average salary for instructional staff equated to a 9-month contract in USD (2023-24)	146	142934	74980	217914	124654.9	31255.754
student-to-faculty ratio (2023-24)	146	26	3	29	15.29	5.114

Figures 5 and 6 feature histograms of the 2023–2024 total full-time instructional staff and average salary equated to a nine-month salary respectively. Both variables are unimodal and

skewed to the right.

Figure 5

Histogram of Total Full-Time Instructional Staff at R1 Universities

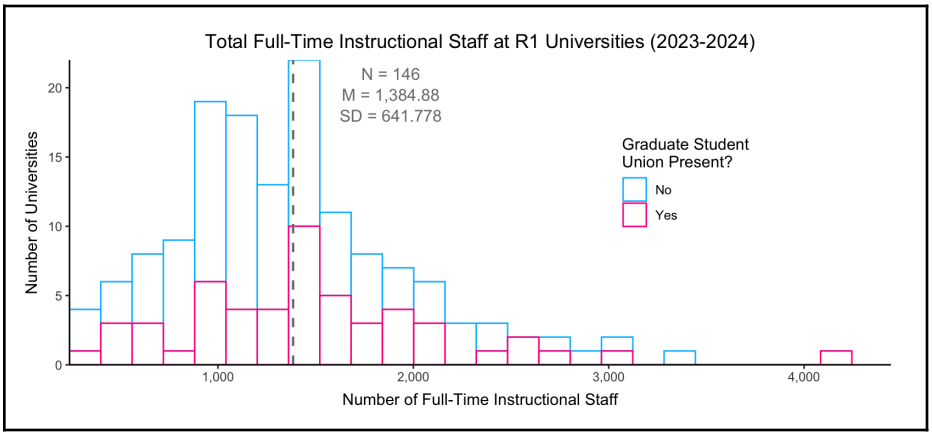


Figure 6

Histogram of Average Salary for Full-Time Instructional Staff at R1 Universities (Equated to a 9-Month Contract)

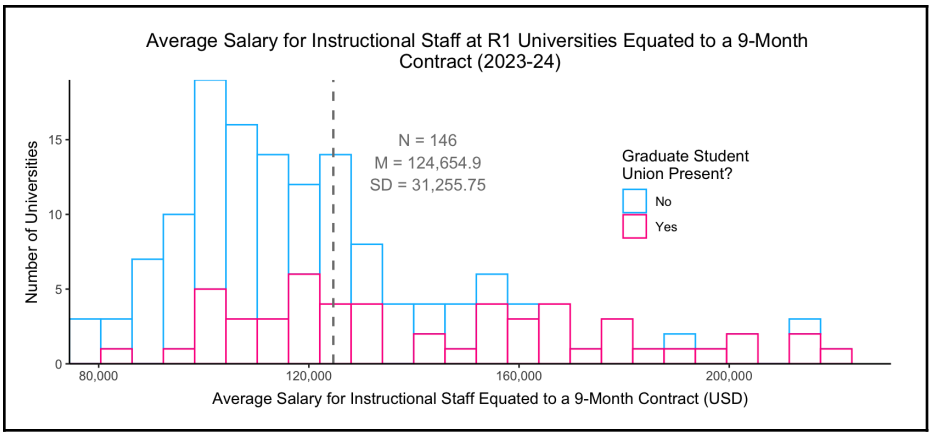
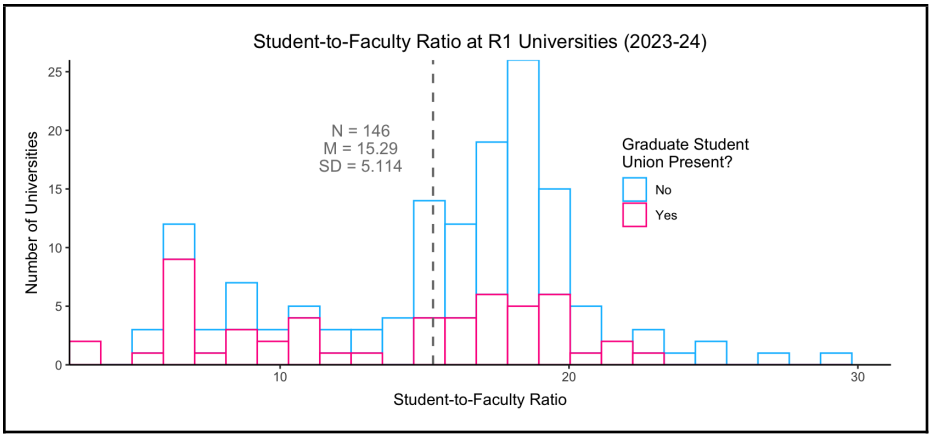


Figure 7 features a histogram of the final variable in this category of the indicators — the student-to-faculty ratio for the 2023–2024 academic year. This variable is unimodal and skewed to the left. Looking at the range, the universities with the lowest student-to-faculty ratios have graduate student labor unions while the universities with the highest student-to-faculty ratios do not have graduate student labor unions.

Figure 7

Histogram of Student-to-Faculty Ratio at R1 Universities



University Resources Indicators

One variable was included to serve as an indicator quantifying the resources a university has to support research and scholarship. As shown in Table 4, the variable selected to serve as this indicator was the number of branch and independent libraries at a university *excluding* the main/central library (N = 146, M = 5.82, SD = 5.167).

Table 4

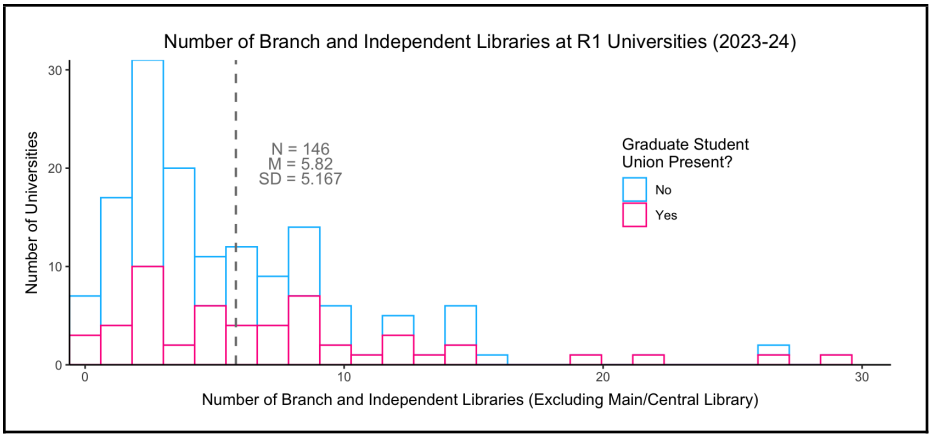
Descriptive Statistics of Dependent Variables — University Resources Indicators

	N	Range	Minimum	Maximum	Mean	Std. Deviation
number of branch and independent libraries (2023-24)	146	29	0	29	5.82	5.167

Figure 8 features a histogram of this variable's distribution. The distribution is unimodal and skewed to the right.

Figure 8

Histogram of Number of Branch and Independent Libraries at R1 Universities



Undergraduate Indicators

Finally, two variables were selected to serve as undergraduate indicators, as depicted in Table 5. The first variable is the undergraduate admissions rate for the 2023–2024 academic year (M = 146, M = 53.77, SD = 31.361). The second variable is the four-year undergraduate graduation rate (M = 144, M = 59.98, SD = 19.787). Ideally, this analysis would have included the graduate admissions rate and the graduate school completion rates, but this data is not aggregated through IPEDS. As a result, these undergraduate indicators have been included as an imperfect replacement.

Table 5

Descriptive Statistics of Dependent Variables — Undergraduate Indicators

	N	Range	Minimum	Maximum	Mean	Std. Deviation
undergraduate admissions rate as a percentage (2023-24)	146	97	3	100	53.77	31.361
four-year undergraduate graduation rate as a percentage (2023-24)	144	73	18	91	59.98	19.787

Figure 9 features a histogram of the undergraduate admissions rate for the 2023–2024 academic year. The distribution appears bimodal at the aggregate level, but when visualized as

two groups as in the case in Figure 8, there seems to be one mode for universities with unions and and a lower mode for universities without them.

Figure 9

Histogram of Undergraduate Admissions Rate at R1 Universities

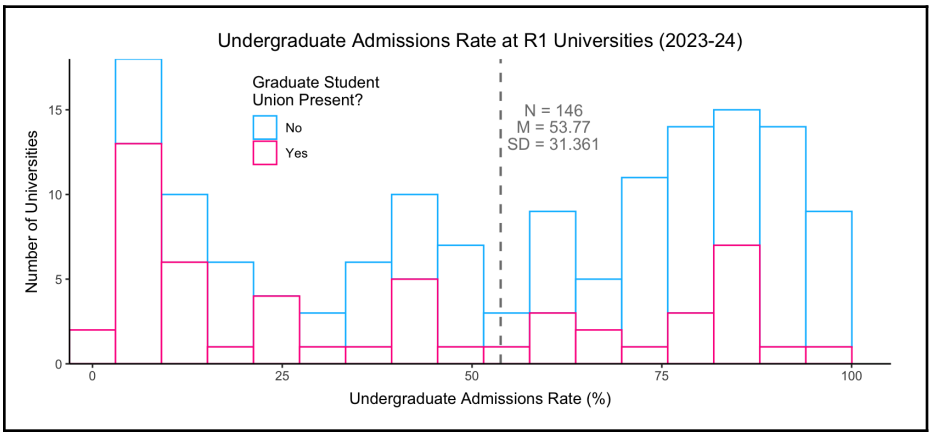
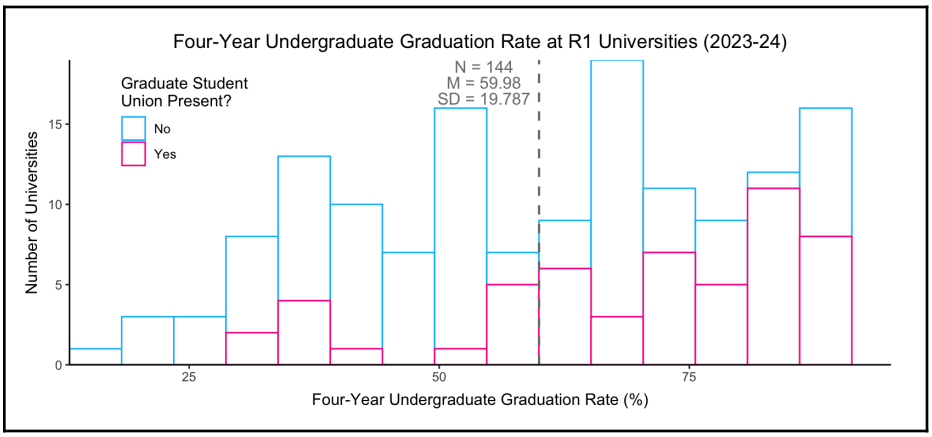


Figure 10 features a histogram of the undergraduate four-year graduation rate for the 2023–2024 academic year. The distribution appears unimodal and skewed to the right.

Figure 10

Histogram of Undergraduate Graduation Rate at R1 Universities



Results

The aim of this analysis is to compare the characteristics of two distinct groups: R1 universities with and without graduate student labor unions. As a result, I opted to conduct a series of independent samples t-tests, a test designed to compare the means of two groups. For

this analysis, the categorial union variable served as the grouping variable for the analysis. A total of 10 t-tests were conducted for each of the 10 dependent variables described in the previous section.

Table 6 contains the descriptive statistics for each variable grouped by the union variable. Some differences in means are immediately noticeable, though the statistical significance of these differences can only be determined by the t-tests themselves.

Table 6

Group Statistics for Independent Samples T-Tests

	graduate student union present? (before fall 2023)	N	Mean	Std. Deviation	Std. Error Mean
Graduate Student Indicators					
graduate application fee (2023-24)	No	94	63.32	16.719	1.724
	Yes	52	86.79	28.465	3.947
in-state average tuition full-time graduates (2023-24)	No	94	18829.43	16576.794	1709.766
	Yes	52	29937.17	21449.736	2974.543
out-of-state average tuition full-time graduates (2023-24)	No	94	30787.65	12323.981	1271.122
	Yes	52	39474.77	14971.472	2076.17
total graduate degrees conferred (2022-23)	No	94	2690.24	1469.175	151.534
	Yes	52	4184.88	3218.288	446.296
Instructional Faculty and Staff Indicators					
full-time instructional staff total (2023-24)	No	94	1309.81	605.454	62.448
	Yes	52	1520.6	688.042	95.414
average salary for instructional staff equated to a 9-month contract (2023-24)	No	94	114897.32	24726.068	2550.299
	Yes	52	142293.62	34204.484	4743.308
student-to-faculty ratio (2023-24)	No	94	16.2	4.687	0.483
	Yes	52	13.65	5.48	0.76
University Resources Indicators					
number of branch and independent libraries (2023-24)	No	94	5.04	4.253	0.439
	Yes	52	7.23	6.308	0.875
Undergraduate Student Indicators					
undergraduate admissions rate (2023-24)	No	94	61.72	28.466	2.936
	Yes	52	39.38	31.481	4.366
four-year undergraduate graduation rate (2023-24)	No	92	54.61	19.197	2.001
	Yes	52	69.48	17.211	2.387

Before conducting the t-tests, it is important to test if the variances of the groups being compared are the same, as homogeneity of variance is a core assumption of t-tests. If the

variances of the two groups are not similar, we will opt to conduct a more conservative t-test. Table 7 features the results of a Levene's test for equality of variances. The null hypothesis for this test is that the variances of the two groups are equal.

Table 7

Results of a Levene's Test for Independent Variables Grouped by Categorical Union Variable

Variable	F	Sig.
graduate application fee (2023-24)	18.307	<.001***
in-state average tuition full-time graduates (2023-24)	16.278	<.001***
out-of-state average tuition full-time graduates (2023-24)	9.555	0.002**
total graduate degrees conferred (2022-23)	24.307	<.001***
full-time instructional staff total (2023-24)	0.218	0.641
average salary for instructional staff equated to a 9-month contract (2023-24)	14.841	<.001***
student-to-faculty ratio (2023-24)	8.235	0.005**
number of branch and independent libraries (2023-24)	6.29	0.013*
undergraduate admissions rate (2023-24)	2.547	0.113
four-year undergraduate graduation rate (2023-24)	1.748	0.188

Note: A single asterisk (*) indicates statistical significance at the p < .05 level. A double asterisk (**) indicates statistical significance at the p < .01 level. A triple asterisk (***) indicates statistical significance at the p < .001 level.

For seven out of the ten variables, the results of the Levene's test are statistically significant at the $p < 0.05$ level. For these variables, we reject the null hypothesis, and conclude that the variances of the two groups are different. A more conservative t-test is conducted for these variables. Meanwhile, for the three variables for which the Levene's test did not produce statistically significant results, we fail to reject the null hypothesis and assume the variances between the groups are equal. For these variables, a standard t-test is conducted. The results of all the t-tests conducted are included in Table 8.

Table 8

Independent Samples T-Tests Results Comparing R1 Universities With and Without Graduate Student Labor Unions

Variable	Equal Variances Assumed?	t	df	Significance (Two-Sided p)	Mean Difference	Std. Error Difference	95% Confidence Int. of the Difference	
							Lower	Upper
Graduate Student Indicators								
graduate application fee (2023-24)	No	-5.448	70.908	<.001***	-23.469	4.308	-32.059	-14.88
in-state average tuition full-time graduates (2023-24)	No	-3.238	85.169	0.002**	-11107.748	3430.919	-17929.139	-4286.356
out-of-state average tuition full-time graduates (2023-24)	No	-3.569	89.503	<.001***	-8687.12	2434.385	-13523.817	-3850.424
total graduate degrees conferred (2022-23)	No	-3.171	62.978	0.002**	-1494.64	471.32	-2436.505	-552.775
Instructional Faculty and Staff Indicators								
full-time instructional staff total (2023-24)	Yes	-1.918	144	0.057	-210.788	109.906	-428.025	6.45
average salary for instructional staff equated to a 9-month contract (2023-24)	No	-5.087	81.035	<.001***	-27396.296	5385.443	-38111.57	-16681.022
student-to-faculty ratio (2023-24)	No	2.829	92.333	0.006**	2.548	0.901	0.759	4.337
University Resources Indicators								
number of branch and independent libraries (2023-24)	No	-2.236	77.194	0.028*	-2.188	0.979	-4.137	-0.24
Undergraduate Student Indicators								
undergraduate admissions rate (2023-24)	Yes	4.371	144	<.001***	22.339	5.11	12.238	32.44
four-year undergraduate graduation rate (2023-24)	Yes	-4.631	142	<.001***	-14.872	3.211	-21.22	-8.524

Note: A single asterisk (*) indicates statistical significance at the p < .05 level. A double asterisk (**) indicates statistical significance at the p < .01 level. A triple asterisk (***) indicates statistical significance at the p < .001 level.

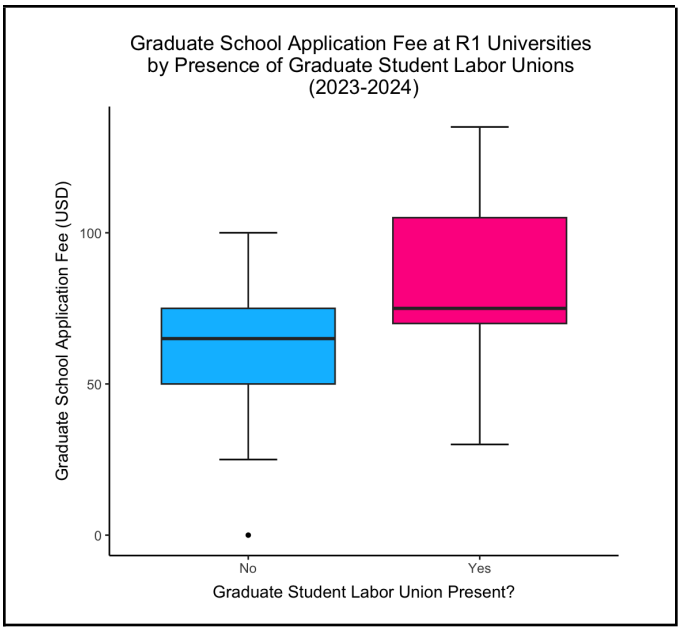
Graduate Student Indicators

The first variable among the graduate student indicators is the graduate school application

fee for the 2023–2024 academic year. From the t-test, t(70.908) = -5.448, p < .001, we find a statistically significant mean difference of -23.469. Therefore, we conclude that R1 universities with graduate student labor unions have statistically significantly higher graduate application fees than R1 universities without graduate student labor unions. Figure 11 contains a box plot comparing these groups.

Figure 11

Box Plot for Graduate School Application Fee at R1 Universities (N = 146)



The second variable among these indicators is the average in-state graduate tuition for the 2023–2024 academic year. From the t-test, t(85.169) = -3.238, p < .01, we find a statistically significant mean difference of -11,107.748. Therefore, we conclude that R1 universities with graduate student labor unions have statistically significantly higher in-state graduate tuition rates than R1 universities without graduate student labor unions. Similarly, we consider the average out-of-state graduate tuition for the 2023–2024 academic year. From the t-test, t(89.503) = -3.569, p < .001, we find a statistically significant mean difference of --8687.12. Therefore, we conclude that R1 universities with graduate student labor unions have statistically significantly

higher out-of-state graduate tuition rates than R1 universities without graduate student labor unions. Figure 12 and 13 include box plots for the in-state and out-of-state tuition variables.

Figure 12

Box Plot for Average In-State Graduate Tuition at R1 Universities (N = 146)

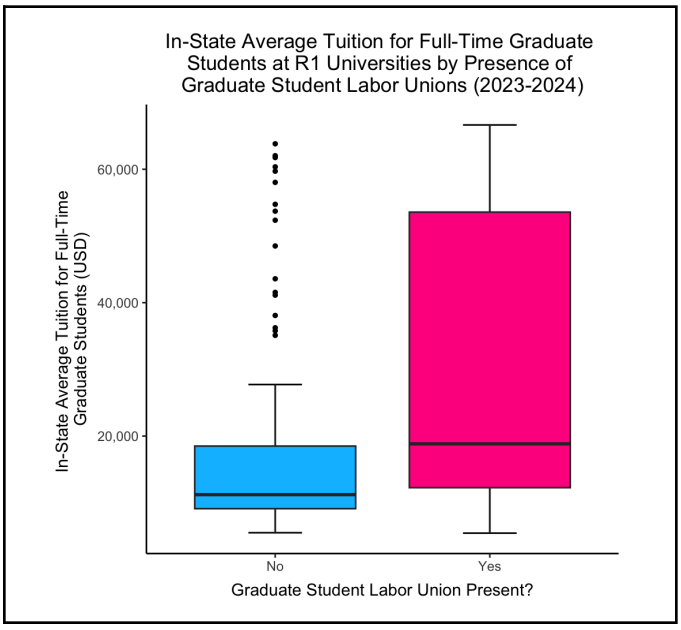
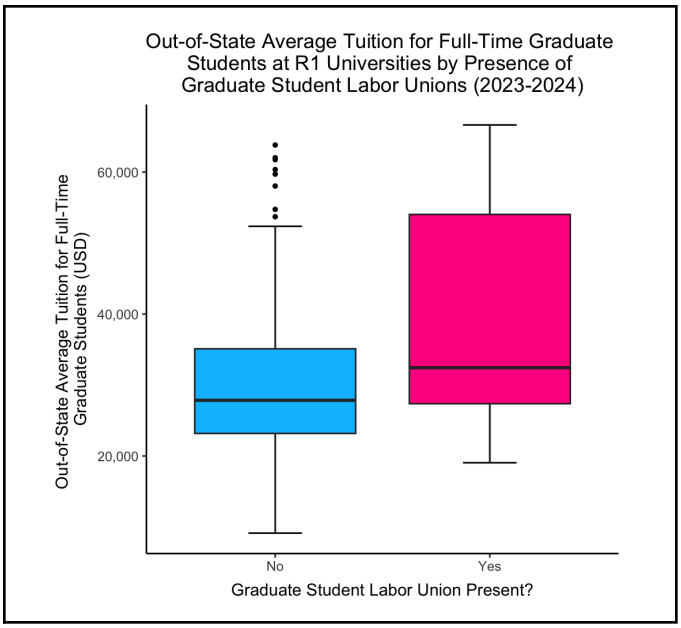


Figure 13

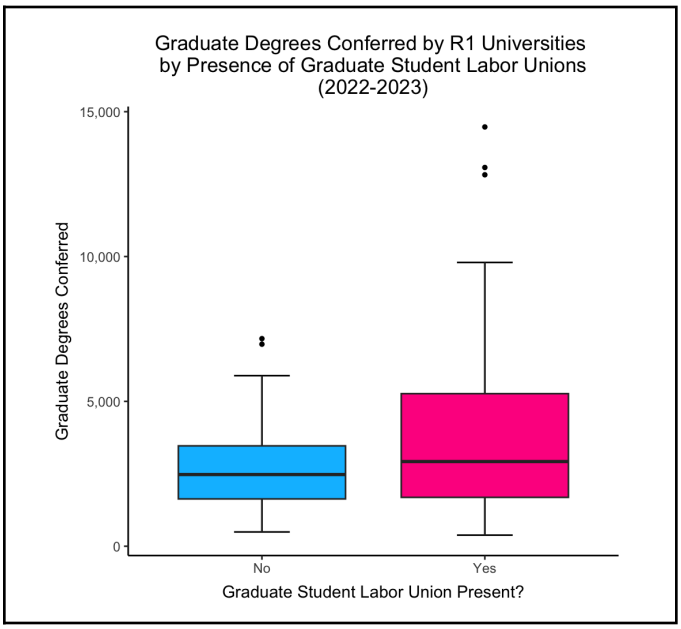
Box Plot for Average Out-of-State Graduate Tuition at R1 Universities (N = 146)



The final variable among the graduate student indicators is the total number of graduate degrees conferred during the 2022–2023 academic year. From the t-test, $t(62.978) = -3.171$, $p < .01$, we find a statistically significant mean difference of -1,494.640. Therefore, we conclude that R1 universities with graduate student labor unions confer statistically significantly more graduate degrees than R1 universities without graduate student labor unions. Figure 14 includes a box plot comparing these groups.

Figure 14

Box Plot for Total Graduate Degrees Conferred by R1 Universities (N = 146)

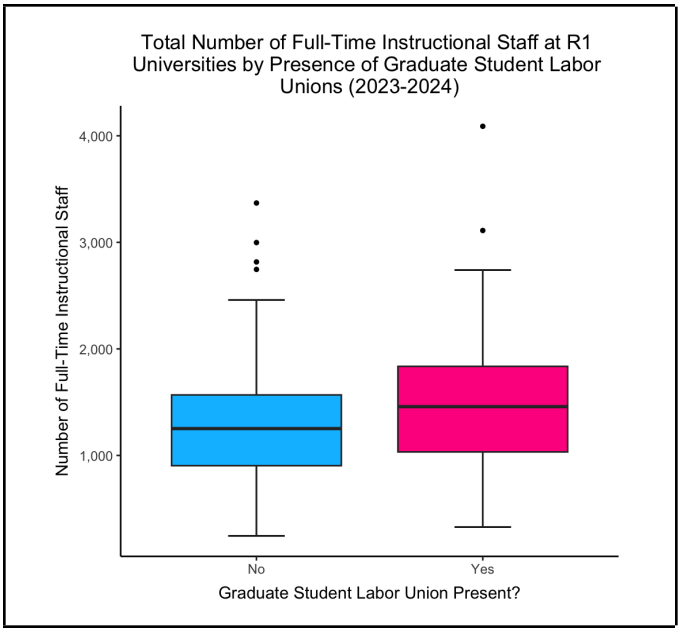


Instructional Faculty and Staff Indicators

The first variable among the instructional faculty and staff indicators is the total number of full-time instructional staff members durings the 2023–2024 academic year. From the t-test, $t(144) = -1.918$, $p = .057$, we do not find a statistically significant mean difference. Therefore, we cannot conclude that the total number of full-time instructional staff at R1 universities statistically significantly differs between universities with graduate student labor unions and those without unions. Figure 15 includes a box plot comparing these groups.

Figure 15

Box Plot for Total Full-Time Instructional Staff at R1 Universities (N = 146)



The second variable among the instructional faculty and staff indicators is the average salary for full-time instructional staff for the 2023–2024 academic year. From the t-test, $t(81.035) = -5.087$, $p < .001$, we find a statistically significant mean difference of -27,396.296. Therefore, we conclude that R1 universities with graduate student labor unions have statistically significantly higher salaries for full-time instructional staff than R1 universities without graduate student labor unions. Figure 16 includes a box plot comparing these groups.

The final variable among the instructional faculty and staff indicators is the student-to-faculty ratio for the 2023–2024 academic year. From the t-test, $t(92.333) = 2.829$, $p < .01$, we find a statistically significant mean difference of 2.548. Therefore, we conclude that R1 universities with graduate student labor unions have statistically significantly lower student-to-faculty ratios than R1 universities without graduate student labor unions. Figure 17 includes a box plot comparing these groups.

Figure 16

Box Plot for Average Salary for Full-Time Instructional Staff at R1 Universities (N = 146)

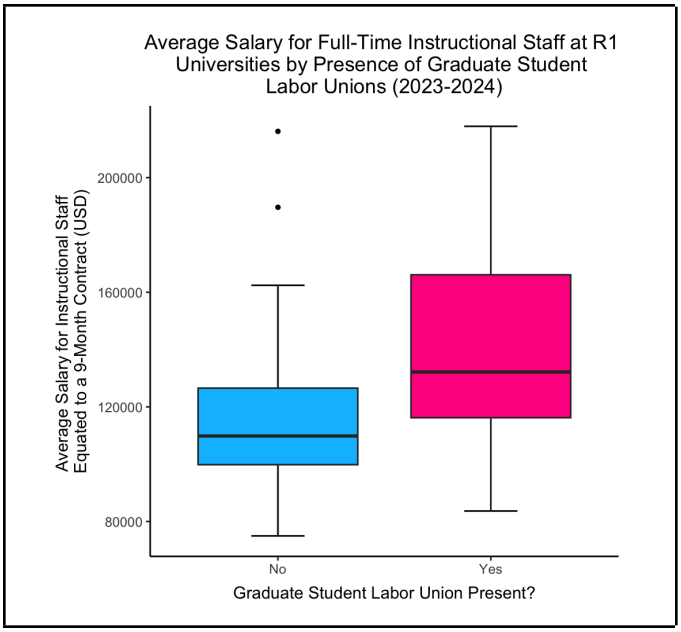
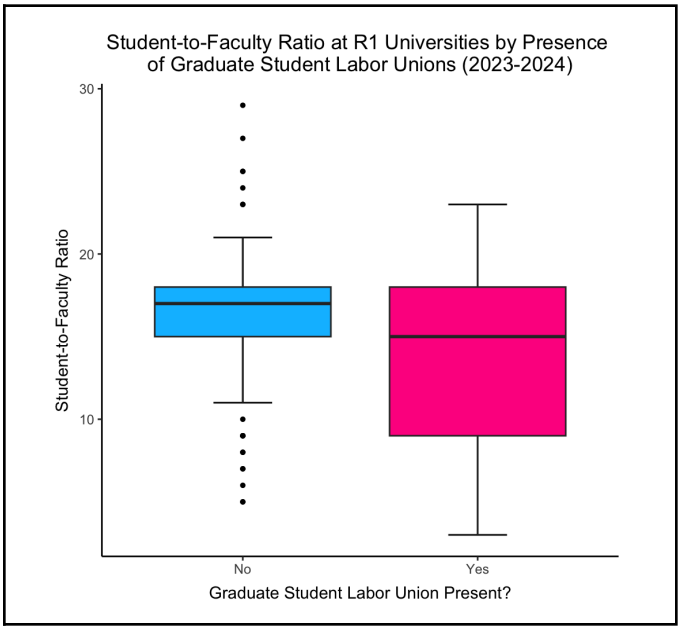


Figure 17

Box Plot for Student-to-Faculty Ratios R1 Universities (N = 146)



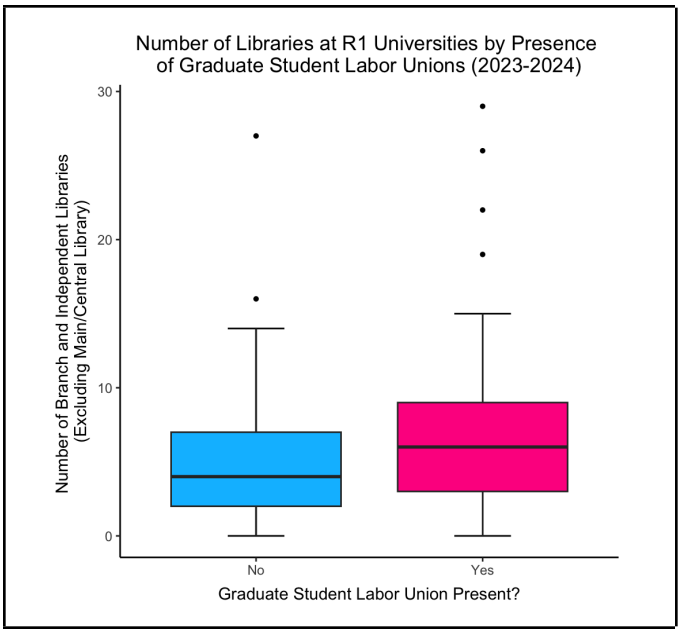
University Resources Indicators

The variable utilized to indicate the degree of scholarly resources a university has is the

number of branch and independent libraries present during the 2023–2024 academic year. From the t-test, t(77.194) = -2.236, p < .05, we find a statistically significant mean difference of -2.188. Therefore, we conclude that R1 universities with graduate student labor unions have statistically significantly more branch and independent libraries than R1 universities without graduate student labor unions. Figure 18 includes a box plot comparing these groups.

Figure 18

Box Plot for Number of Branch and Independent Libraries at R1 Universities (N = 146)



Undergraduate Student Indicators

The first variable among the undergraduate student indicators is the admissions rate for the 2023–2024 academic year. From the t-test, t(144) = 4.371, p < .001, we find a statistically significant mean difference of 22.339. Therefore, we conclude that R1 universities with graduate student labor unions have statistically significantly lower undergraduate admissions rates than R1 universities without such unions. Figure 19 includes a box plot with these groups.

The second variable among these indicators is the four-year undergraduate graduation rate for the 2023–2024 academic year. From the t-test, t(142) = -4.631, p <.001, we find a

statistically significant mean difference of -14.872. Therefore, we conclude that R1 universities with graduate student labor unions have statistically significantly higher undergraduate graduate rates than R1 universities without such unions. Figure 20 includes a box plot with these groups.

Figure 19

Box Plot for Undergraduate Admissions Rate at R1 Universities (N = 146)

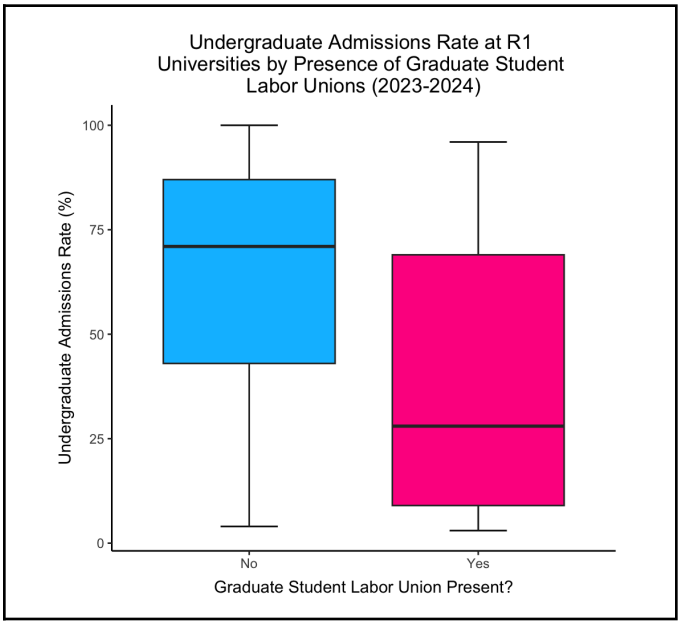
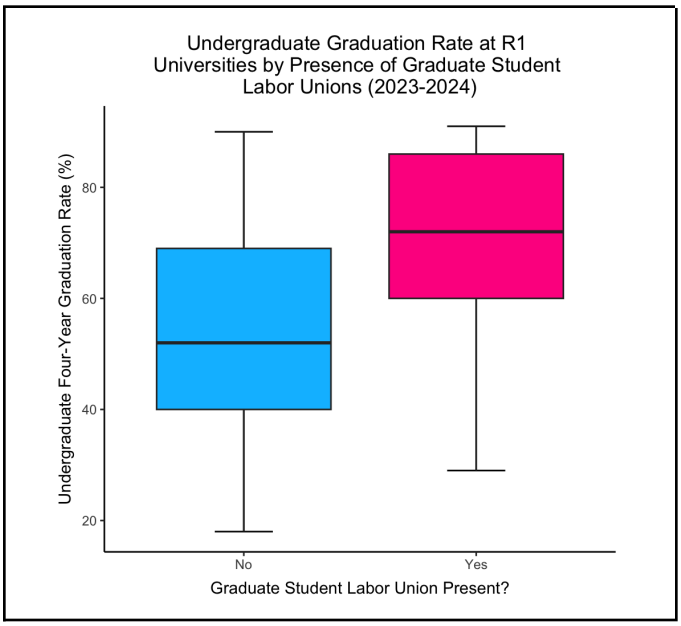


Figure 20

Box Plot for Undergraduate Four-Year Graduation Rate at R1 Universities (N = 144)



Discussion

Ultimately, these results indicate that the absence or presence of a graduate student labor union at an R1 university is associated with a number of other differences as well. R1 universities with graduate student labor unions, when compared to their non-unionized counterparts:

(a) are more expensive to apply to; are more expensive to attend; and confer more degrees.

(b) have higher salaries for full-time instructional staff and lower student-to-faculty ratios.

(c) have more independent and branch libraries.

(d) admit a lower percentage of their undergraduate applicants and have higher four-year undergraduate graduation rates.

As unionization efforts grow at universities across the country, it will be increasingly important for students, faculty, staff, and administrators to understand how these unions exist in the context of the broader higher education landscape.

While this analysis is very preliminary, there are still some inferences we can draw from the results. First, the statistically significant Faculty and Staff Indicators and University Resources Indicators demonstrate that R1 universities with graduate student labor unions may be more equipped to take on scholarly research and mentorship of graduate students in the first place. Second, as evidenced by the Graduate Student Indicators, students attending universities with graduate student unions pay a premium to do so — through the application fee and through the tuition. Finally, the Undergraduate Student Indicators highlight that R1 universities with graduate student labor unions are more difficult to gain acceptance to as an undergraduate student, though students who are accepted may be more likely to graduate. This perhaps implies an investment in undergraduate students defined by depth (greater investment in a select number

of students) over breadth (lesser investment across a broader swath of students).

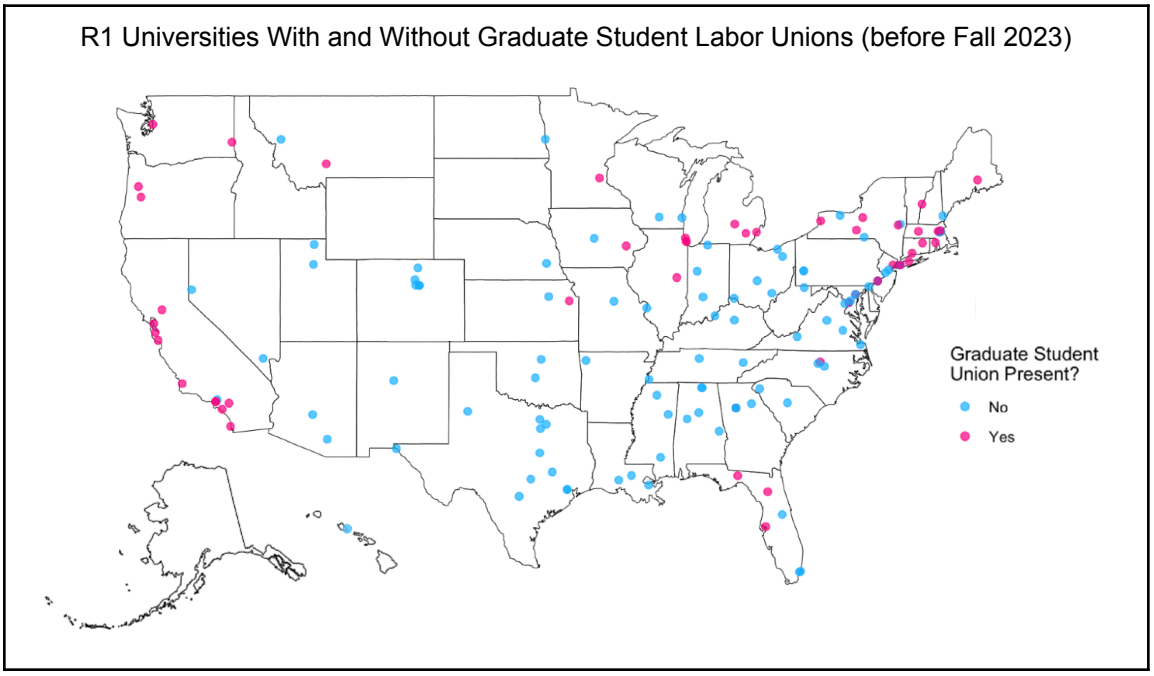
Limitations

As with any statistical analysis, this study comes with a number of key limitations. The first limitation, which was discussed previously, is the lack of data about graduate student outcomes. With variables like graduate student retention rates, PhD completion rates, and graduate student well-being indicators, it would be possible to conduct a more focused analysis on the graduate student experience itself.

The second key limitation is that this study did not account for the regions in which an R1 university was located. As a result, none of the financial indicators were adjusted for local cost of living. Figure 21 features a map-based display of the locations of the R1 universities with and without graduate student labor unions. This display reveals that many of the unionized universities are located on coats and in population centers with higher costs of living.

Figure 20

Map-Based Display of R1 Universities With and Without Graduate Student Labor Unions



Another key limitation is that the analysis did not separate out public and private universities. As a result, the group means of variables representing sums rather than proportions or percentages may have been impacted by the in-group presence of public universities, which typically have more students and confer more degrees than their private counterparts.

Future Directions

Along with limitations, this study also illuminates several possibilities for future research. Using the existing data, one might seek to conduct some predictive modeling using logistic regression models to gauge if, given 3–5 variables, it is possible to predict whether an R1 university has a graduate student labor union. Second, using data from previous years as well as current years, one might seek to conduct time series analyses focusing on a subset of colleges and universities. These analyses could involve interrupted time-series models to see if the introduction of a graduate student union is associated with any changes in a selected dependent variable over a period of time.

There are also opportunities to collect more data on graduate student labor unions to supplement this analysis. First, in response to the lack of institutional-level aggregated data about graduate student retention rates and completion rates, one might look to collect this type of data independently. Meanwhile, to better understand the union landscape qualitatively, one might seek to conduct surveys of unionized vs. non-unionized graduate students, as well as conduct ethnographies of specific universities' graduate student labor union(s). Ultimately, the graduate student union landscape is fertile for research inquiry.

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Appendix A

R1 Universities (2021 Carnegie Classifications of Higher Education Institutions)

Table A1

Universities Classified as "R1: Doctoral Universities – Very High Research Activity" in the 2021 Carnegie Classifications of Higher Education Institutions

UnitID	University Name	City	State
100663	University of Alabama at Birmingham	Birmingham	AL
100706	University of Alabama in Huntsville	Huntsville	AL
100751	The University of Alabama	Tuscaloosa	AL
100858	Auburn University	Auburn	AL
104151	Arizona State University Campus Immersion	Tempe	AZ
104179	University of Arizona	Tucson	AZ
106397	University of Arkansas	Fayetteville	AR
110404	California Institute of Technology	Pasadena	CA
110635	University of California-Berkeley	Berkeley	CA
110644	University of California-Davis	Davis	CA
110653	University of California-Irvine	Irvine	CA
110662	University of California-Los Angeles	Los Angeles	CA
110671	University of California-Riverside	Riverside	CA
110680	University of California-San Diego	La Jolla	CA
110705	University of California-Santa Barbara	Santa Barbara	CA
110714	University of California-Santa Cruz	Santa Cruz	CA
123961	University of Southern California	Los Angeles	CA
126562	University of Colorado Denver/Anschutz Medical Campus	Denver	CO
126614	University of Colorado Boulder	Boulder	CO
126775	Colorado School of Mines	Golden	CO
126818	Colorado State University-Fort Collins	Fort Collins	CO
127060	University of Denver	Denver	CO
129020	University of Connecticut	Storrs	CT
130794	Yale University	New Haven	CT
130943	University of Delaware	Newark	DE
131469	George Washington University	Washington	DC
131496	Georgetown University	Washington	DC
132903	University of Central Florida	Orlando	FL
133951	Florida International University	Miami	FL
134097	Florida State University	Tallahassee	FL
134130	University of Florida	Gainesville	FL
135726	University of Miami	Coral Gables	FL
137351	University of South Florida	Tampa	FL
139658	Emory University	Atlanta	GA
139755	Georgia Institute of Technology-Main Campus	Atlanta	GA
139940	Georgia State University	Atlanta	GA
139959	University of Georgia	Athens	GA
141574	University of Hawaii at Manoa	Honolulu	HI
144050	University of Chicago	Chicago	IL
145600	University of Illinois Chicago	Chicago	IL
145637	University of Illinois Urbana-Champaign	Champaign	IL
147767	Northwestern University	Evanston	IL
151351	Indiana University-Bloomington	Bloomington	IN

UnitID	University Name	City	State
152080	University of Notre Dame	Notre Dame	IN
153603	Iowa State University	Ames	IA
153658	University of Iowa	Iowa City	IA
155317	University of Kansas	Lawrence	KS
155399	Kansas State University	Manhattan	KS
157085	University of Kentucky	Lexington	KY
157289	University of Louisville	Louisville	KY
159391	Louisiana State University and Agricultural & Mechanical College	Baton Rouge	LA
160658	University of Louisiana at Lafayette	Lafayette	LA
160755	Tulane University of Louisiana	New Orleans	LA
161253	University of Maine	Orono	ME
162928	Johns Hopkins University	Baltimore	MD
163268	University of Maryland-Baltimore County	Baltimore	MD
163286	University of Maryland-College Park	College Park	MD
164924	Boston College	Chestnut Hill	MA
164988	Boston University	Boston	MA
165015	Brandeis University	Waltham	MA
166027	Harvard University	Cambridge	MA
166629	University of Massachusetts-Amherst	Amherst	MA
166683	Massachusetts Institute of Technology	Cambridge	MA
167358	Northeastern University	Boston	MA
168148	Tufts University	Medford	MA
170976	University of Michigan-Ann Arbor	Ann Arbor	MI
171100	Michigan State University	East Lansing	MI
172644	Wayne State University	Detroit	MI
174066	University of Minnesota-Twin Cities	Minneapolis	MN
176017	University of Mississippi	University	MS
176080	Mississippi State University	Mississippi State	MS
176372	University of Southern Mississippi	Hattiesburg	MS
178396	University of Missouri-Columbia	Columbia	MO
179867	Washington University in St Louis	Saint Louis	MO
180461	Montana State University	Bozeman	MT
180489	The University of Montana	Missoula	MT
181464	University of Nebraska-Lincoln	Lincoln	NE
182281	University of Nevada-Las Vegas	Las Vegas	NV
182290	University of Nevada-Reno	Reno	NV
182670	Dartmouth College	Hanover	NH
183044	University of New Hampshire-Main Campus	Durham	NH
185828	New Jersey Institute of Technology	Newark	NJ
186131	Princeton University	Princeton	NJ
186380	Rutgers University-New Brunswick	New Brunswick	NJ
187985	University of New Mexico-Main Campus	Albuquerque	NM
190150	Columbia University in the City of New York	New York	NY
190415	Cornell University	Ithaca	NY
190576	CUNY Graduate School and University Center	New York	NY
193900	New York University	New York	NY
194824	Rensselaer Polytechnic Institute	Troy	NY
195030	University of Rochester	Rochester	NY
196060	University at Albany	Albany	NY
196079	Binghamton University	Vestal	NY
196088	University at Buffalo	Buffalo	NY
196097	Stony Brook University	Stony Brook	NY
196413	Syracuse University	Syracuse	NY
198419	Duke University	Durham	NC
199120	University of North Carolina at Chapel Hill	Chapel Hill	NC

UnitID	University Name	City	State
199193	North Carolina State University at Raleigh	Raleigh	NC
200332	North Dakota State University-Main Campus	Fargo	ND
201645	Case Western Reserve University	Cleveland	OH
201885	University of Cincinnati-Main Campus	Cincinnati	OH
203517	Kent State University at Kent	Kent	OH
204796	Ohio State University-Main Campus	Columbus	OH
204857	Ohio University-Main Campus	Athens	OH
207388	Oklahoma State University-Main Campus	Stillwater	OK
207500	University of Oklahoma-Norman Campus	Norman	OK
209542	Oregon State University	Corvallis	OR
209551	University of Oregon	Eugene	OR
211440	Carnegie Mellon University	Pittsburgh	PA
212054	Drexel University	Philadelphia	PA
214777	Pennsylvania State University-Main Campus	University Park	PA
215062	University of Pennsylvania	Philadelphia	PA
215293	University of Pittsburgh-Pittsburgh Campus	Pittsburgh	PA
216339	Temple University	Philadelphia	PA
217156	Brown University	Providence	RI
217882	Clemson University	Clemson	SC
218663	University of South Carolina-Columbia	Columbia	SC
220862	University of Memphis	Memphis	TN
221759	The University of Tennessee-Knoxville	Knoxville	TN
221999	Vanderbilt University	Nashville	TN
223232	Baylor University	Waco	TX
225511	University of Houston	Houston	TX
227216	University of North Texas	Denton	TX
227757	Rice University	Houston	TX
228723	Texas A & M University-College Station	College Station	TX
228769	The University of Texas at Arlington	Arlington	TX
228778	The University of Texas at Austin	Austin	TX
228787	The University of Texas at Dallas	Richardson	TX
228796	The University of Texas at El Paso	El Paso	TX
229027	The University of Texas at San Antonio	San Antonio	TX
229115	Texas Tech University	Lubbock	TX
230728	Utah State University	Logan	UT
230764	University of Utah	Salt Lake City	UT
232186	George Mason University	Fairfax	VA
232982	Old Dominion University	Norfolk	VA
233921	Virginia Polytechnic Institute and State University	Blacksburg	VA
234030	Virginia Commonwealth University	Richmond	VA
234076	University of Virginia-Main Campus	Charlottesville	VA
236939	Washington State University	Pullman	WA
236948	University of Washington-Seattle Campus	Seattle	WA
238032	West Virginia University	Morgantown	WV
240444	University of Wisconsin-Madison	Madison	WI
240453	University of Wisconsin-Milwaukee	Milwaukee	WI
243744	Stanford University	Stanford	CA
243780	Purdue University-Main Campus	West Lafayette	IN

Appendix B

Dependent Variables: IPEDS Data

Table B1

Original Variable Names of Dependent Variables from IPEDS Data: Graduate Student Indicators

Original Variable Name	Renamed Variable	Variable Label
IC2023.Graduate application fee	GradAppFee_2324	graduate application fee (2023-24)
IC2023_AY.In-state average tuition full-time graduates	InstateGradTuition_2324	in-state average tuition full-time graduates (2023-24)
IC2023_AY.Out-of-state average tuition full-time graduates	OOSGradTuition_2324	out-of-state average tuition full-time graduates (2023-24)
DRVC2023.Master's degree	MastersConferred_2223	total master's degrees conferred (2022-23)
DRVC2023.Doctor's degree - research/scholarship	DoctoralConferred_Research_2223	total doctoral degree conferred - research/scholarship (2022-23)
DRVC2023.Doctor's degree - professional practice	DoctoralConferred_Professional_2223	total doctoral degrees conferred - professional practice (2022-23)
DRVC2023.Doctor's degree - other	DoctoralConferred_Other_2223	total doctoral degrees conferred - other (2022-23)

Table B2

Original Variable Names of Dependent Variables from IPEDS Data: Instructional Faculty and Staff Indicators

Original Variable Name	Renamed Variable	Variable Label
SAL2023_IS.Instructional staff - total	InstructionalStaffTotal_2324	full-time instructional staff total (2023-24)
DRVHR2023.Average salary equated to 9 months of full-time instructional staff - all ranks	InstructionalStaff9MonthSal_2324	average salary for instructional staff equated to a 9-month contract (2023-24)
EF2023D.Student-to-faculty ratio	StudentFacultyRatio_2324	student-to-faculty ratio (2023-24)

Table B3

Original Variable Names of Dependent Variables from IPEDS Data: University Resource Indicators

Original Variable Name	Renamed Variable	Variable Label
AL2023.Number of branches and independent libraries	NumberOfLibrary_2324	number of branch and independent libraries (2023-24)

Table B4

Original Variable Names of Dependent Variables from IPEDS Data: Undergraduate Indicators

Original Variable Name	Renamed Variable	Variable Label
DRVADM2023.Percent admitted - total	PercentAdmitUG_2324	undergraduate admissions rate (2023-24)
GR200_23.4-year Graduation rate - bachelor's degree within 100% of normal time	FourYearGradRateUG_2324	four-year undergraduate graduation rate (2023-24)