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Investigation of the Effect of First-Year Seminars

The FYS is one of the most widely researched first-year initiatives in higher education, and a large body of literature indicates that FYS participation bridges a student's successful transition from high school to college and promotes academic performance and the likelihood of persistence into the second year (e.g., Barton & Donahue, 2009; Fidler, 1991; Jenkins-Guarnieri, et al., 2014-2015; Pascarella & Terenzini, 2005). However, a significant portion of the literature on FYS programs calls into question their impact on retention and academic performance (Clark & Cundiff, 2011; Permzadian & Crede, 2016). Some studies have identified large positive effects on GPA and retention (e.g., Blacke, 2008; Swanson et al., 2017; Woolfork-Barnes, 2017), while others have reported very small effects or even negative effects of FYS on students' GPA and retention rate (e.g., Cavote & Kopera-Frye, 2004; Wolf-Wendel et al., 1999). Recently, a meta-analysis revealed a small average FYS effect on both first-year grades and the 1-year retention rate (Permzadian & Crede, 2016). However, it also suggested the impacts of FYS on 1-year retention and first-year grades are substantially moderated by FYS characteristics, institutional and instructional characteristics, population studied, and study characteristics. The inconsistent findings of the FYS impact call for a close examination of FYS using sophisticated methodologies.

However, methodologically, identifying and estimating average treatment effects of an educational intervention, such as FYS courses, from nonexperimental data collected in

(b) What are the predictive powers of FYS participation and FYS grades on the likelihood of retaining to the second Fall and graduating within 6 years, and first-Fall term GPAs (without FYS performance) when controlling for other variables?

It is our hope to provide empirical evidence of FYS participation and its impacts on student success metrics at large public research universities, specifically, and higher education institutions in general, and contribute to a broad knowledge base by inspiring college leadership and policymakers to examine FYS and student outcomes at their home campuses more closely such that students may benefit more from FYS.

In this article, “FYS participants” are students who enrolled in at least one FYS course section (either in the first Fall or Spring term), regardless of whether they completed the course; otherwise, students are classified as FYS nonparticipants. FYS grade is a letter grade that a student earned from the FYS course(s). If the student took an FYS section in both Fall and Spring term, the Fall record was counted.

Theoretical Framework

Permazadian & Crede, 2016). The majority of the studies compared outcomes in 1-year retention and first-year GPA between students who enrolled in or completed an FYS course and those who did not. Some studies extended 1-year retention to 2-year retention (e.g., Jamelske, 2009; Lang, 2007; Schnell & Doetko, 2002-2003) and other outcomes (e.g., Al-Sheeb et al., 2018; Zerr & Bjerke, 2016). Rarer still, some examined longitudinal outcomes of FYS beyond the second year (Fidler, 1991; Miller & Lesik, 2014-2015; Schnell et al., 2003; Shanley & Wi en 1990; Woolfork-Barnes, 2017). Studies also found that FYS grades are predictors of student outcomes measured by retention, cumulative GPA, and graduation (Hyers & Joslin, 1998; Starke et al., 2001; Zimmerman, 2000).

Method

FYS at This Institution

The institution in which this study took place is a 4-year public R1 university located in the Southwestern region of the United States (we use “this Institution” hereafter). This Institution is a Hispanic-serving institution (HSI) (HSI-2018-2023) (8 (i) .2 (e) 25 a) -2

the participants in the total sample, the Fall 2010–Fall 2011 cohorts, and the Fall 2012–Fall 2014 cohorts.

Table 1
Characteristics of the Participants

| Variable | | Fall 2010-2014 (N = 15,882) | | Fall 2010-2011 (N = 5,620) | | Fall 2012-2014 (N = 10,262) | |
|-----------------------|----------------------------------|--|------|---------------------------------------|------|--|------|
| | | <i>n</i> | % | <i>n</i> | % | <i>n</i> | % |
| Sex | Female | 9,024 | 56.8 | 3,121 | 55.5 | 5,903 | 57.5 |
| | Male | 6,858 | 43.2 | 2,499 | 44.5 | 4,359 | 42.5 |
| Pell recipient status | Pell recipient | 5,613 | 35.3 | 1,966 | 35.0 | 3,647 | 35.5 |
| | Non-Pell recipient | 10,269 | 64.7 | 3,654 | 65.0 | 6,615 | 65.5 |
| Race and Ethnicity | American Indian or Alaska Native | 39 | 0.25 | 17 | 0.3 | 22 | 0.2 |
| | Asian | 2,561 | 16.1 | 872 | 15.5 | 1,689 | 16.5 |
| | Black or African American | 1,281 | | | | | |

Variable

Fall 2010-2014

Fall 2010 and Fall 2011 data before FYS implementation with Fall 2012, Fall 2013, and Fall 2014 data to compare outcomes of FYS participants with FYS nonparticipants in terms of retention, performance, and completion, controlling for variables that have been found associated with student outcomes in the existing literature.

To address the first research question of this study, we compared FYS participants and nonparticipants regarding retention and graduation rates using descriptive statistics

Table 2
Descriptive Results of Student Outcomes by Fall FYS Enrollment

| Student outcomes | | Not retained/ Not graduated (#/%) | Retained/ graduated (#/%) | Total | ² | <i>p</i> |
|-------------------------|---------------------|--|--------------------------------------|---------------|--------------|----------------|
| Retained to second fall | Not enrolled in FYS | 2,359 (25.8) | 6,785 (74.2) | 9,144 | | |
| | Enrolled in FYS | 1,437 (21.3) | 5,301 (78.7) | 6,738 | | |
| | Total | 3,796 | 12,086 | 15,882 | 42.65 | 0.001** |
| Retained to third fall | Not enrolled in FYS | 3,284 (35.9) | 5,860 (64.1) | 9,144 | | |
| | Enrolled in FYS | 2,023 (30.0) | 4,715 (70.0) | 6,738 | | |
| | Total | 5,307 | 10,575 | 15,882 | 60.50 | 0.001** |
| Retained to fourth fall | Not enrolled in FYS | 3,965 (43.4) | 5,179 (56.6) | 9,144 | | |
| | Enrolled in FYS | 2,399 (35.6) | 4,339 (64.4) | 6,738 | | |
| | Total | 6,364 | 9,518 | 15,882 | 97.22 | 0.001** |
| Four-year graduation | Not enrolled in FYS | 8,031 (87.8) | 1,113 (12.2) | 9,144 | | |
| | Enrolled in FYS | 5,526 (82.0) | 1,212 (18.0) | 6,738 | | |

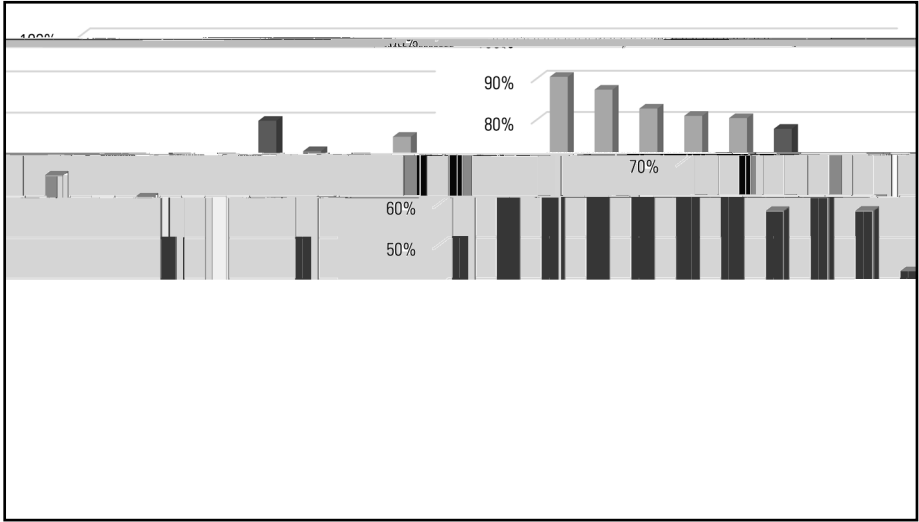


Figure 1. Retention rate by FYS grade.

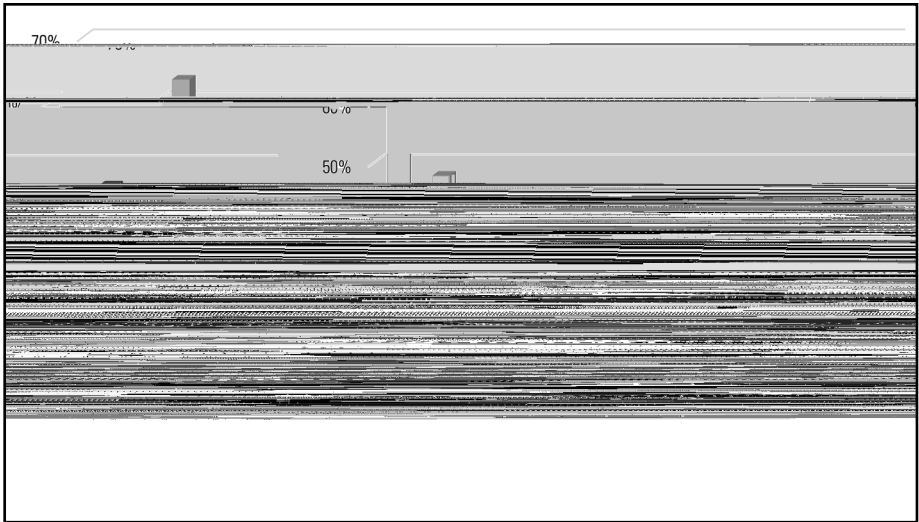


Figure 2. Six-year graduation rate by FYS grade.

~~See also Likelihood Ratio Odds Ratio for Association~~

Table 3.1
Model Coefficients for Retention to the Second Fall (FYS Grade Effects)

| | Estimate | Std. error | z value | Pr (> z) |
|--------------------|-----------------|-------------------|----------------|---------------------|
| FYS final grade A | 1.6595 | 0.2423 | 6.8495 | 0.0001** |
| FYS final grade A- | 1.5950 | 0.2467 | 6.4646 | 0.0001** |
| FYS final grade B+ | 1.3950 | 0.2475 | 5.6367 | 0.0001** |
| FYS final grade B | 1.3061 | 0.2453 | 5.3252 | 0.0001** |
| FYS final grade B- | 1.3208 | 0.2511 | 5.2610 | 0.0001** |
| FYS final grade C+ | 1.1124 | 0.2559 | 4.3473 | 0.0001** |
| FYS final grade C | 0.9659 | 0.2493 | 3.8751 | 0.0001** |
| FYS final grade C- | 0.7346 | 0.2651 | 2.7706 | 0.0056** |
| FYS final grade D+ | 0.7647 | 0.2882 | 2.6531 | 0.0080** |
| FYS final grade D | 0.6581 | 0.2611 | 2.5206 | 0.0117* |
| FYS final grade D- | 0.3185 | 0.3043 | 1.0467 | 0.2952 |
| FYS final grade F | -0.0897 | 0.2472 | -0.3630 | 0.7166 |
| FYS final grade AD | 0.7318 | 0.6204 | 1.1796 | 0.2382 |
| FYS final grade I | 0.7992 | 0.3258 | 2.4535 | 0.0141* |
| FYS final grade S | 1.0998 | 0.5631 | 1.9531 | 0.0508 |
| FYS final grade W | 0.0354 | 0.2557 | 0.1385 | 0.8899 |
| Subject BUS | -0.0854 | 0.1001 | -0.8531 | |

| Retention to the second fall | | First-fall GPA | | Six-Year Graduation | |
|-------------------------------------|-------------------|------------------------------------|-------------------|------------------------------------|-------------------|
| Variable | Importance | Variable | Importance | Variable | Importance |
| SAT combined score | 302.71 | SAT combined score | 2216.45 | SAT combined score | 225.98 |
| FYS grade | 168.24 | FYS grade | 2048.50 | First-fall career semester credits | 87.80 |
| First-fall career semester credits | 113.20 | First-fall career semester credits | 756.39 | FYS grade | 52.10 |
| Age | 73.45 | Age | 506.09 | Age | 50.60 |
| First generation status | 46.66 | Pell recipient status | 299.65 | First generation status | 33.60 |
| Pell recipient status | 44.48 | First generation status | 293.81 | Sex (Female) | 33.02 |
| Sex (Female) | 43.98 | Sex (Female) | 293.38 | Pell recipient status | 32.47 |
| Underrepresented minority (URM) | 42.80 | URM | 287.89 | URM | 31.39 |
| FYS no grade | 26.99 | FYS no grade | 261.02 | Fall FYS | 14.55 |
| Subject COLA | 20.42 | Fall FYS | 212.35 | Instructor GA | 11.81 |
| Fall FYS | 20.10 | Subject SCI | 147.27 | FYS no grade | 11.64 |
| Instructor GA | 19.47 | Spring FYS | 126.49 | Instructor ADM | 10.74 |
| Instructor temporary | 17.33 | Instructor GA | 118.00 | Instructor ADM | 10.74 |

| Retention to the second fall | | First-fall GPA | | Six-Year Graduation | |
|------------------------------|------------|----------------------|------------|----------------------|------------|
| Variable | Importance | Variable | Importance | Variable | Importance |
| Instructor LOA | 15.57 | Instructor temporary | 85.52 | Instructor permanent | 8.39 |
| Instructor permanent | 15.41 | Subject HON | 85.22 | Subject HSC | 8.33 |
| Subject HSC | 14.30 | Subject HSC | 84.13 | Subject TCA | 7.879/86.0 |
| Instructor ADMLOA | | | | | |

Table 5
Retention Odds Ratios by FYS Enrollment

| Description | Odds Ratio |
|---|------------|
| Pr(RET 2nd Fall Grade=F)/Pr(RET 2nd Fall No FYS) | 0.629 |
| Pr(RET 2nd Fall Grade=D-)/Pr(RET 2nd Fall No FYS) | 0.921 |
| Pr(RET 2nd Fall Grade=D)/Pr(RET 2nd Fall No FYS) | 1.166 |
| Pr(RET 2nd Fall Grade=D+)/Pr(RET 2nd Fall No FYS) | 1.238 |
| Pr(RET 2nd Fall Grade=C-)/Pr(RET 2nd Fall No FYS) | 1.218 |
| Pr(RET 2nd Fall Grade=C)/Pr(RET 2nd Fall No FYS) | 1.366 |
| Pr(RET 2nd Fall Grade=C+)/Pr(RET 2nd Fall No FYS) | 1.448 |
| Pr(RET 2nd Fall Grade=B-)/Pr(RET 2nd Fall No FYS) | 1.551 |
| Pr(RET 2nd Fall Grade=B)/Pr(RET 2nd Fall No FYS) | 1.544 |
| Pr(RET 2nd Fall Grade=B+)/Pr(RET 2nd Fall No FYS) | 1.582 |
| Pr(RET 2nd Fall Grade=A-)/Pr(RET 2nd Fall No FYS) | 1.656 |
| Pr(RET 2nd Fall Grade=A)/Pr(RET 2nd Fall No FYS) | 1.676 |

Table 6
Retention Odds Ratios by FYS Grade

| Description | Odds Ratio |
|--|------------|
| Pr(RET 2nd Fall Grade=A)/Pr(RET 2nd Fall Grade=F) | 2.663 |
| Pr(RET 2nd Fall Grade=A)/Pr(RET 2nd Fall Grade=D/3u2 T1834edaaaa693aa693aa011(a4 (e)66)-63. 017261c823 (| |

retention to the second Fall, performance in the FYS is indicative of this retention. Again, intuitively, as student performance fell further below the “A” level, the likelihood of retention fell as well. Also, lower grades in the “A-” to “C” range may not imply significantly lower rates of retention; the model suggested systemic underperformance for non-“A” grade earners.

Figure 3 also illustrates the probability of retention to the second Fall for the composite

Table continued from page 83

| | Estimate | Std. error | t value | Pr (> z) |
|-------------|-----------------|-------------------|----------------|---------------------|
| Subject HSC | -0.1815 | 0.0658 | -2.7593 | 0.0058** |
| Subject SCI | -0.4495 | 0.0593 | -7.5783 | 0.0001** |

Note. Subject prefix represents the FYS course offered by that college. BUS: College of Business; CFA: College of Fine Arts; COE: College of Education; COLA: College of Liberal Arts; EGG: College of Engineering; GSC: College of Urban Affairs; HON: Honors College; HSC: School of Integrated Health Sciences; SCI: College of Sciences. * $p < .05$. ** $p < .01$.

Table 7.2
Model Coefficients for First-Fall GPA (Instructor Effects)

| | Estimate | Std. error | t value | Pr (> z) |
|--------------------|-----------------|-------------------|----------------|---------------------|
| Administrative | -0.0201 | 0.0515 | -0.3898 | 0.6967 |
| Administrative LOA | 0.0227 | 0.0623 | 0.3651 | 0.7151 |
| Graduate assistant | 0.0620 | 0.0478 | 1.2974 | 0.1945 |
| LOA | -0.0196 | 0.0448 | -0.4366 | 0.6624 |
| Other | 0.3137 | 0.2156 | 1.4548 | 0.1457 |
| Permanent | 0.0998 | 0.0430 | 2.3237 | 0.0202* |

* $p < .05$.

Table 7.3
Model Coefficients for First-Fall GPA (Pre-College and Enrollment Effects)

| | Estimate | Std. error | t value | Pr (> z) |
|-------------------------------------|-----------------|-------------------|----------------|---------------------|
| Age | 0.0532 | 0.0100 | 5.3247 | 0.0001** |
| Fall FYS | -0.7191 | 0.3692 | -1.9475 | 0.0515 |
| Spring FYS | 0.5186 | 0.0370 | 14.0072 | 0.0001** |
| Last high school unweighted GPA | 0.6842 | 0.0226 | 30.3250 | 0.0001** |
| First fall career semester credits | 0.0279 | 0.0058 | 4.8376 | 0.0001** |
| SAT combined scores | 0.0010 | 0.0001 | 16.3704 | 0.0001** |
| Application submission advanced day | 0.0005 | 0.0001 | 3.8386 | 0.0001** |
| Sex male | -0.0832 | 0.0177 | -4.7020 | 0.0001** |
| Pell recipient Y | 0.0075 | 0.0183 | 0.4118 | 0.6805 |
| Term code_Fall 2011 | -0.5930 | 0.0294 | -20.1662 | 0.0001** |
| Term code_Fall 2012 | -0.4568 | 0.0409 | -11.1679 | 0.0001** |
| Term code_Fall 2013 | -0.5434 | 0.0400 | -13.6015 | 0.0001** |
| Term code_Fall 2014 | -0.5215 | 0.0395 | -13.1974 | 0.0001** |

* $p < .05$. ** $p < .01$.

Table 7.4

Model Coefficients for First-Fall GPA (Race and Ethnicity and Parents' Edu Effects)

| | Estimate | Std. error | t value | Pr (> z) |
|------------------------------------|-----------------|-------------------|----------------|---------------------|
| Asian | 0.2396 | 0.1718 | 1.3946 | 0.1632 |
| Black or African America | 0.0885 | 0.1730 | 0.5115 | 0.6090 |
| Hispanic | 0.1820 | 0.1712 | 1.0629 | 0.2878 |
| Native Hawaii or Pacific Islanders | 0.0132 | 0.1810 | 0.0731 | 0.9417 |
| Nonresident alien | 0.2085 | 0.1829 | 1.1400 | 0.2543 |
| Two or more | 0.1111 | 0.1726 | 0.6435 | 0.5199 |
| Unknown race | 0.2973 | 0.1899 | 1.5652 | 0.1176 |
| White | 0.1514 | 0.1711 | 0.8849 | 0.3762 |
| Mother ed less than HS | -0.0194 | 0.0420 | -0.4616 | 0.6444 |
| Mother ed HS graduate | -0.0367 | 0.0240 | -1.5298 | 0.1261 |
| Mother ed some college | -0.0192 | 0.0225 | -0.8504 | 0.3951 |
| Mother ed not indicated | -0.0728 | 0.0443 | -1. | en33US |

Table 8.1
Model Coefficients for Six-Year Graduation (FYS Grade Effects)

| | Estimate | Std. error | z value | Pr (> z) |
|--------------------|-----------------|-------------------|----------------|---------------------|
| FYS final grade A | 0.2220 | 0.1352 | 1.6418 | 0.1006 |
| FYS final grade A- | 0.0831 | 0.1575 | 0.5279 | 0.5976 |
| FYS final grade B+ | -0.0774 | 0.1672 | -0.4629 | 0.6434 |
| FYS final grade B | -0.0656 | 0.1552 | -0.4226 | 0.6726 |
| FYS final grade B- | -0.3794 | 0.1928 | -1.9676 | 0.0491* |
| FYS final grade C+ | -0.2756 | 0.2074 | -1.3286 | 0.1840 |
| FYS final grade C | -0.5281 | 0.1952 | -2.7056 | 0.0068** |
| FYS final grade C- | -1.2162 | 0.3466 | -3.5085 | 0.0005** |
| FYS final grade D+ | -0.7895 | 0.4531 | -1.7426 | 0.0814 |
| FYS final grade D | -0.7807 | 0.2543 | -3.0703 | 0.0021** |
| FYS final grade D- | -0.7756 | 0.4401 | -1.7624 | 0.0780 |
| FYS final grade F | -1.2160 | 0.2163 | -5.6224 | 0.0000** |
| FYS final grade I | -0.0653 | 0.3309 | -0.1975 | 0.8435 |
| FYS final grade S | -0.0323 | 0.9674 | -0.0333 | 0.9734 |
| FYS final grade W | -1.1149 | 0.2908 | -3.8342 | 0.0001** |
| Subject BUS | -0.2037 | 0.1762 | -1.1559 | 0.2477 |
| Subject CFA | -0.0597 | 0.1590 | -0.3755 | 0.7073 |
| Subject COE | 0.1879 | 0.2312 | 0.8129 | 0.4163 |
| Subject COLA | -0.0515 | 0.1390 | -0.3705 | 0.7110 |
| Subject EGG | -0.3153 | 0.1508 | -2.0907 | 0.0366* |
| Subject GSC | -0.1016 | 0.1760 | -0.5773 | 0.5637 |
| Subject HON | 0.4882 | 0.9412 | 0.5187 | 0.6039 |
| Subject HSC | -0.5108 | 0.1452 | -3.5179 | 0.0004* |
| Subject SCI | -0.4553 | 0.1771 | -2.5714 | 0.0101* |

Note. Subject prefix represents the FYS course offered by that college. BUS: College of Business; CFA: College of Fine Arts; COE: College of Education; COLA: College of Liberal Arts; EGG: College of Engineering; GSC: College of Urban Affairs; HON: Honors College; HSC: School of Integrated Health Sciences; SCI: College of Sciences. * $p < .05$. ** $p < .01$.

Table 8.2
Model Coefficients for Six-Year Graduation (Instructor Effects)

| Estimate | Std. error | z value |
|-----------------|-------------------|----------------|
|-----------------|-------------------|----------------|

Table 8.4

Table 9
Six-Year Graduation Odds Ratios by FYS Enrollment

| Description | Odds Ratio |
|---|-------------------|
| Pr(Grad 6 Years Grade=F)/Pr(Grad 6 Years No FYS) | 0.552 |
| Pr(Grad 6 Years Grade=D-)/Pr(Grad 6 Years No FYS) | 1.019 |
| Pr(Grad 6 Years Grade=D)/Pr(Grad 6 Years No FYS) | 1.013 |
| Pr(Grad 6 Years Grade=D+)/Pr(Grad 6 Years No FYS) | 1.002 |
| Pr(Grad 6 Years Grade=C-)/Pr(Grad 6 Years No FYS) | 0.551 |
| Pr(Grad 6 Years Grade=C)/Pr(Grad 6 Years No FYS) | 1.349 |
| Pr(Grad 6 Years Grade=C+)/Pr(Grad 6 Years No FYS) | 1.717 |
| Pr(Grad 6 Years Grade=B-)/Pr(Grad 6 Years No FYS) | 1.563 |
| Pr(Grad 6 Years Grade=B)/Pr(Grad 6 Years No FYS) | 2.033 |
| Pr(Grad 6 Years Grade=B+)/Pr(Grad 6 Years No FYS) | 2.015 |
| Pr(Grad 6 Years Grade=A-)/Pr(Grad 6 Years No FYS) | 2.253 |
| Pr(Grad 6 Years Grade=A)/Pr(Grad 6 Years No FYS) | 2.452 |

Table 10
Six-Year Graduation and Odds Ratios for FYS Grade

| Description | Odds Ratio |
|--|-------------------|
| Pr(Grad 6 Years Grade=A)/Pr(Grad 6 Years Grade=F) | 4.445 |
| Pr(Grad 6 Years Grade=A)/Pr(Grad 6 Years Grade=D-) | 2.406 |
| Pr(Grad 6 Years Grade=A)/Pr(Grad 6 Years Grade=D) | 2.421 |
| Pr(Grad 6 Years Grade=A)/Pr(Grad 6 Years Grade=D+) | 2.448 |
| Pr(Grad 6 Years Grade=A)/Pr(Grad 6 Years Grade=C-) | 4.447 |
| Pr(Grad 6 Years Grade=A)/Pr(Grad 6 Years Grade=C) | 1.818 |
| Pr(Grad 6 Years Grade=A)/Pr(Grad 6 Years Grade=C+) | 1.428 |
| Pr(Grad 6 Years Grade=A)/Pr(Grad 6 Years Grade=B-) | 1.568 |
| Pr(Grad 6 Years Grade=A)/Pr(Grad 6 Years Grade=B) | 1.206 |
| Pr(Grad 6 Years Grade=A)/Pr(Grad 6 Years Grade=B+) | 1.217 |
| Pr(Grad 6 Years Grade=A)/Pr(Grad 6 Years Grade=A-) | 1.088 |

Discussion, Conclusion, and Implication

The purpose of this study was to explore how the FYS and FYS grades relate to student retention, academic performance, and graduation, in addition to other variables that have been widely examined in the student success literature. It was not intended to establish a causal relationship between FYS and FYS grades and these desirable student outcomes. Although participants of this study were drawn from several FTFT cohorts before and after FYS launched, the results of this study are limited to the FYS courses offered at one R1 institution, which is not representative of all types of FYS courses at different colleges and

FYS, is positively correlated to student success (Pascarella & Terenzini, 2005). From the institutional perspective, actively engaging and supporting students upon their embarking in higher education would encourage students to strive for their educational goals (Schnell & Doetko, 2002-2003). We argue not only that FYS should operate as a GE course, but it could also be a vehicle of student engagement. Therefore, it is essential for the institution to intentionally create curricula and other learning opportunities and provide resources and a variety of purposeful educational activities to engage students (Kuh, 2001, 2009).

Second, methodologically, we employed a probit model and a GLM to estimate the effects of FYS participation and FYS grades on the likelihood of retention to the second Fall and 6-year graduation, and we calculated odds ratios of retention and graduation likelihood by FYS participation and FYS grades. These methods have not commonly been used in the studies of the FYS effectiveness, and this may inspire researchers, IR professionals, and campus leaders to examine the FYS effect at their home campuses in a more rigorous fashion. To examine the FYS effect, future studies may use other robust analytic approaches, for example, difference-in-differences (e.g., Furquim et al., 2020), synthetic control methods (e.g., Crooker et al., 2021; Li, 2017), or propensity score matching (Clark & Cundiff, 2011; Lang, 2007; Schnell & Doetko, 2002-2003; Herzog, 2014). Using instrumental variables would also account for the confounding of the self-selection bias (Pike et al., 2011).

We also included the credits enrolled in the first FYS [(W)34.9u2-2] do -16.8 (-)83

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