

## **Academic First-Year Seminar: Four-Year Retention and Graduation for All First-Time Students and Students at Additional Risk**

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*Abstract.* The purpose of this study was to assess differences in four-year persistence and graduation rates between students who participated in a research-based academic first-year seminar ( $n = 385$ ) and a matched quasi-control group who did not ( $n = 385$ ). Although research has consistently identified positive outcomes for students who participate in these seminars, the research is often based on short-term outcomes or the analysis is less rigorous or reliable. Propensity score matching was used to determine the two groups, and Mantel-Haenszel tests were used to determine any significant differences in the outcomes. Results showed statistically significant differences in persistence and graduation rates for first-generation students and students of color compared to nonparticipating students. Some of these differences were greater than 20%. Although the difference was not statistically significant, conditionally admitted students also showed higher rates of persistence and graduation.

Attrition continues to be a major issue at colleges and universities nationwide (Alzen et al., 2021; Claybrooks & Taylor, 2016; Stewart et al., 2015; Walsh & Robinson Kurpius, 2016). *Attrition* is the term used to describe students who leave (drop out of) college or university in the middle of the year or who do not return the following year. The contrasting term is *persistence*, which is used to describe a student's decision to stay in college for the current year, return the following year, and eventually graduate from the institution to earn a degree. These terms are key foci for administrators because large financial ramifications revolve around developing educational programming that promotes degree completion for students. Only 60% of first-time, full-time students enrolled in 4-year institutions graduate in 6 years (NCES, 2017). When reviewing 4-year graduation rates, this statistic decreased to 43% (NCES, 2020). According to Millea et al. (2018), there is a reciprocal detriment when students leave a university prior to completing their degree. For the university, thousands of dollars in unrealized tuition are lost, and more money has to be invested in recruiting new students. For students, a loss in unrealized potential and lower financial earnings throughout a working career can be experienced.

Persisting through an educational plan to degree completion holds numerous benefits for students. According to Miller et al. (2018), students who graduate have refined transferable skills that aid in obtaining employment positions that can lead to upward career mobility. The

experience of completing a degree is vital for creating these pathways for students to obtain career opportunities. When students graduate, their chances of acquiring greater lifetime earnings significantly improve (Mitchell et al., 2019). However, if students do not persist to graduation, they have an elevated chance of struggling to live with student loan debt that can adversely affect an individual's ability to obtain financial security (Baker et al., 2017).

According to Mitchell et al. (2019), the cost of college tuition has continued to rise over the last two decades. Moreover, this rise highlights the need for identifying avenues for developing educational programming that is effective and efficient in promoting persistence and increased graduation rates while also mitigating potential financial burdens for both universities and students.

The study presented here was designed to look for rigorous, statistical evidence of increased 4-year persistence and graduation when students, particularly student groups who are at a high risk for attrition, enroll in a first-year seminar (FYS) course. The following literature review provides an overview of factors leading to attrition, student populations who are potentially at higher risk for attrition (e.g., first-generation, students of color, conditional admit), FYS courses designed to affect student outcomes, and the gaps in effectively assessing FYS programs and their outcomes.

## **Factors Leading to Attrition**

Attrition is costly (Permazdian & Credé, 2016) and has been studied extensively within an array of student populations (Claybrooks & Taylor, 2016; Herbert et al., 2014; Ishitani, 2016; Padgett et al., 2012; Salim & Luo, 2019). Many researchers have explored the factors that contribute to attrition and have identified factors such as financial aid status (Herbert et al., 2014; Reynolds & Cruise, 2020; Stewart et al., 2015), residential status/housing (Herbert et al., 2014; Walsh & Robinson Kurpius, 2016), demographic and family characteristics of students (Herbert et al., 2014; Ishitani, 2016; Stewart et al., 2015), precollege academic performance factors (Stewart et al., 2015; Yue & Fu, 2017), and choice of major (Harris et al., 2013; Rask, 2010; Yue & Fu, 2017). Furthermore, the level of self-efficacy a student possesses regarding their ability to achieve in college is an important predictor of first-year persistence (Walsh & Robinson Kurpius, 2016). Students identifying as ethnic minorities report higher rates of persistence at their current university if formal cultural diversity programs are active and accessible (Stewart et al., 2015). Additionally, a student's original decision to attend a university may depend solely on whether they are awarded financial aid and the degree to which they feel that financial aid award will help them succeed (Stewart et al., 2015). Students who enjoy their major and those who feel secure in their major choice are likely to graduate earlier and with a higher GPA (Yue & Fu, 2017). While financial aid status and major choice provide a straightforward explanation of student attrition, research on demographic characteristics as

well as precollege performance factors (Stewart et al., 2015) demonstrates unique influences on student attrition that need to be further studied. Researchers have particularly noted that attrition is highest among first-generation students, students of color, and conditionally admitted students.

### ***First-Generation Status***

First-generation college students are more disadvantaged in terms of cultural capital than their peers whose parents possessed some postsecondary education (Glaessgen et al., 2018). The findings in Glaessgen et al. echoed previous research that mentioned that first-generation college students experienced a decrease in attitude toward academic literacy (Padgett et al., 2012). First-generation students may not have other people in their immediate social circles to help them gain understandings about academic and social expectations within higher education. Typically, the lack of role models puts these same students at a higher risk for attrition. According to Glaessgen et al. (2018), the lack of role models may also affect first-generation students' ability to identify the importance and role of university staff members such as academic advisors. Ishitani (2016) found that while parental educational attainment did not have an effect on first-year persistence, it did lead to more first-generation students dropping out during their second year of college. Living off campus with parents, receiving financial aid assistance, and lower first-year GPA also contributed to first-generation students' attrition rates, specifically within second-year persistence (Ishitani, 2016). However, evidence suggests that increased academic and social integration into the college environment may lessen the attrition rates for first-generation students (Ishitani, 2016; Vaughan et al., 2014b).

### ***Race and Ethnicity***

Racial and ethnic disparities in college persistence also exist as students of color experience higher rates of attrition and lower rates of graduation than their nonminority peers (Banks & Dohy, 2019; Kuh et al., 2008; McClain & Perry, 2017; Yue & Fu, 2017). Kuh et al. (2008) found student engagement had a large effect on students' persistence in higher education. Specifically, engaging students of color in highly effective learning strategies within the classroom benefitted them more than it benefitted their White peers. However, effects on students of color may not be fully conceptualized by previous student development theories, resulting in additional barriers that may further increase attrition rates (Tillis, 2018). Tillis suggested students of color, specifically Black students, are dehumanized when pedagogy does not seek to understand the cultural factors present in their lives. In such, McClain and Perry (2017) identified factors associated with persistence for students of color and concluded structural enhancements within university communities (e.g., cultural spaces, faculty and staff of color, intentional cultural programming) can have

a major impact on whether the student decides to persist. Some evidence indicates that programs during the first year can have a positive impact for these students (Swanson et al., 2017), similar to the findings for first-generation students.

### ***Previous Academic Performance***

Another factor affecting student attrition is previous poor academic performance. While some researchers claim high school performance (GPA) is not predictive of college performance because of variation in grading standards, Hurford and colleagues (2017) found, in a sample of two first-year cohorts of 2,136 students combined, that high school GPA was a strong predictor of both academic success and persistence in college students. Additionally, Yue and Fu (2017) found students with poor academic performance in high school were not as likely to complete the degrees at the institution in which they began as university students. Poor academic performance led these students to take additional remedial classes, which may be a contributing factor to higher attrition rates.

Considering these previous findings, many universities have tried to increase their enrollments by accepting more students who fall into the category of “conditional admission” (Nemelka et al., 2018). These students typically do not have the high school GPAs or college entrance exam scores that would lead them to satisfying standard admission requirements. However, many institutions believe these students, who may be academically underprepared, can still be successful (Nemelka et al., 2018; Zilvinskis et al., 2020). These studies help build the case that these individuals may need assistance acclimating to college, especially if they do not possess the skills needed to thrive in the collegiate academic environment.

Tinto and Pusser (2006) identified a model of institutional action that colleges and universities can use to promote positive and encouraging environments that help shape student success and ultimately persistence to graduation. The authors detailed a five-pronged model that includes commitment, setting high expectations, support, feedback, and involvement. While this model can be difficult to achieve using an institutional approach, one way universities have incorporated it is through the establishment of an introductory class traditionally taken during the students’ first year of college or university. These types of courses have been called first courses, first-year experiences, or more commonly, first-year seminars (FYS).

### ***First-Year Seminars (FYS)***

FYS programs have been promoted and used in various capacities across colleges and universities; however, their purpose is similar: to minimize attrition by helping students adapt to college life and to improve student success outcomes (Young, 2020). FYS programs attempt to provide realistic information about college life and academic expectations and to raise awareness about resources available, with a goal to help students cope in a new

environment (Permazadian & Credé, 2016; Young, 2020). FYS courses are intentionally distinct from typical college classes because they are designed to enhance students' experiences, both academically and socially, with an array of instructional practices (Culver & Bowman, 2020; Permazadian & Credé, 2016). A small class size is notably preferred for a FYS as a way to increase interaction among students and the instructor, positively affecting student persistence (Pickenpaugh et al., 2021; Reid et al., 2014).

Many studies have attempted to measure the effectiveness of FYS programs and have shared positive outcomes for students (Claybrooks & Taylor, 2016; Glazer & Murphy, 2015; Permazadian & Credé, 2016; Vaughan et al., 2019; Ward et al., 2020). Regarding the effects of FYS programs on specific populations, Swanson et al. (2017) found that male students who participated in FYS had significantly greater academic achievement and higher persistence rates (25%) than their peers after 1 and 3 years. Persistence rates increased to 34% for male minority students, suggesting that students of color benefitted even more from participating in a FYS. Likewise, a study by Vaughan et al. (2019) showed that participation in a 1-, 2- or 3-credit FYS benefitted students similarly. However, students who were typically at additional risk (e.g., first-generation students, conditionally admitted students) benefitted more from the 3-credit model. Yet these results should be interpreted with caution, as models of FYS can vary greatly across institutions and even within institutions (Reid et al., 2014; Young & Skidmore, 2019).

Although the research showing positive effects of FYS courses is promising, few studies have examined the longitudinal impacts of FYS on student success (Culver & Bowman, 2020; Miller & Lesik, 2014), and still fewer have used rigorous methodologies to strengthen the validity of the findings (Vaughan et al., 2014a). As most FYS programs do not require participation and students often self-select into the course, rigorous statistical analysis is needed to offset any potential selection bias (Clark & Cundiff, 2011). Additionally, as first-year outcomes and success are important, long-term retention and graduation rates are still the fundamental goals for students and universities.

### ***Purpose of the Current Study***

Students enter college with a variety of attributes (e.g., gender, ethnicity, first-generation status) as well as varying skills, abilities, motivation, and prior academic preparation. While these attributes may be difficult to influence directly and can have implications for student persistence, universities can assist students. FYS efforts can provide support and commitment, set high expectations, create positive social spaces, and provide feedback to students, all of which can ultimately help minimize attrition rates (Vaughan et al., 2019). The purpose of this study was to look for evidence of increased four-year persistence and graduation when students, particularly student groups at higher risk for attrition, enroll in an FYS course. As

attrition is costly for universities in time, money, and effort, a rigorous, longitudinal research study is necessary to understand the long-term impacts of FYS programs.

All the students in this study attended the same university, which enhanced the comparisons within this longitudinal design. During the research period, all participants experienced the same campus climate, curriculum fidelity, syllabi, and FYS instructor trainings. Comparing student populations across campuses in this design could potentially create unintended variance, as the “process of student retention differs in different institutional settings” (Tinto, 2006, p. 4). Using a quasi-experimental design with a propensity score matching methodology to minimize self-selection bias, the following research questions were investigated: (a) Does self-selection into a FYS course increase student persistence and graduation after 4 years compared to students (with similar/matched demographics) who did not take the course; and (b) For students who have characteristics that make them at risk for attrition, does the FYS course help to reduce attrition?

## Method

### *Participants*

The sample for this study was based on data obtained from university census data. Participants were first-year, full-time students ( $N = 1,965$ ) at a public university in the Rocky Mountain region in Fall 2013. The cohort was 64.2% female, and 38.6% of participants identified as students of color. Students of color were identified through self-report when entering the university; they could select from the following ethnicities/races: African American, Asian, Pacific Islander, Native American, Hispanic, or White. If a student selected any ethnicities or races other than White, they were classified as a student of color for the purposes of this study. Within the students of color, the largest percentage of students (74%) identified as either African American or Hispanic. The cohort also consisted of 47.9% first-generation students, defined as students for whom neither of their parents or guardians had earned a 4-year degree. First-generation status was also identified through student self-report in the admissions process. The average index score (calculated by the state, combining high school GPA and college entrance exam scores) for the group was  $104.51 \pm 15.78$  (range was 79 to 144, and a score of 94 is the minimum required for standard admissions).

### *First-Year Seminar*

The FYS at this university is an optional three-credit academically rigorous course available only in the fall semester; it counts as a general education requirement. It is an academic course designed to help students successfully navigate the challenges and meet the expectations of being an undergraduate student scholar at a research university. Although some students are required to take the FYS course (e.g., TRIO, undeclared), many students

self-select into the course. Students learn about the opportunity during the summer in new student orientation and/or from their advisor. The course has a limited number of seats, and approximately 20% to 25% of the entering class enrolls.

Built on prior literature including the findings of Tinto and Pusser (2006), the course sets high student expectations and provides a challenging and supportive environment to help students reach their full potential (Walsh & Robinson Kurpius, 2016). This FYS course is devised to be small in size (15–25 students) to give more personal attention to its students. The purpose of small class sizes is intended to enhance students' comfort in a new environment and to enhance meaningful connections between instructors and other students. The course instructs first-year students on multiple topics, including time management, motivation (Stewart et al., 2015), goal setting, study skills and test-taking strategies, comprehension monitoring, metacognition, majors, and careers (Harris et al., 2013; Young & Skidmore, 2019), diversity (Stewart et al., 2015), and research writing and presentation.

One of the significant highlights of the course is the research project. The purpose of this project is to help students understand the research process as well as to navigate the resources available at this particular university. In partnership with library faculty, instructors guide students through the research process from selection of topic to searching for and choosing appropriate peer-reviewed sources to synthesizing, organizing, and writing their papers. Feedback is provided at each step of the process, and class time is made available so that students can work and readily ask questions of their instructor. The culmination of their efforts is to present a research poster to the university community.

The FYS course is taught by doctoral students who undergo a 45-hour training program in the summer and weekly 2-hour meetings during the semester to ensure consistent delivery among instructors. Extensive effort is made throughout the semester to confirm that instructors employ similar teaching methods, teach the same course content, and use similar grading techniques to provide students with comparable course experiences. These efforts are made through group lesson planning, classroom observations, and continuous conversation among instructors regarding their classes.

### **Data Collection**

Each participant had data recorded in the university's data management system during each semester's census dates. For purposes of the current study, student records were collected from the cohort from Fall 2013 and from Spring 2017 (what would be the students' fourth year). Reported data contained participants' full-time/part-time status, gender, ethnicity/race, first-generation status, FYS participation, index score, credits enrolled, and applied date of graduation (if applicable). All data were deidentified before generation of the report. Access to this information was granted through the university registrar and the office of first-year curriculum and instruction. All protocols were approved by the Institutional Review Board.

## **Data Analysis**

The first step to examine the effect of the FYS on 4-year academic persistence and success was to create two comparison groups, the FYS participants and a quasi-experimental control group using propensity score matching. Propensity score matching helps to account for the self-selection bias, which can create internal validity threats, and decreases the sample size of the comparison group, which can lead to an inflation of the Type 1 error rate (Rosenbaum & Rubin, 1983). Propensity scores were created from predictive probabilities in a logistic regression model that included the following student-level variables: (a) gender, (b) first-generation status, (c) race (White or non-White binary variable), (d) index score, and (e) Fall 2013 credit load. Participants were then paired with the nearest single-level propensity score in the opposing group, also called *nearest neighbor matching*. Rubin's (2001) criteria (difference in propensity means and ratio of propensity variances) were used to assess the success of the propensity score matching, and comparisons were made between the FYS and the comparison group to ensure that no significant differences were found within each covariate. All comparisons for continuous variables were made using independent-samples t-tests, and all categorical variables were assessed using Pearson's chi-square test of independence.

Following the propensity score matching to create a comparison group with similar characteristics to those in the FYS group, group differences in persistence and graduation were examined using the Mantel-Haenszel test, an extension of the chi-square, which tests the association between the binary treatment variable (FYS or non-FYS participation) and the binary outcomes (persistence and graduation) while accounting for the propensity scores. Persistence was coded as a dichotomous variable indicating continued enrollment in the university as shown through credits enrolled as of the census date (end of add/drop period) during Spring 2017 (end of fourth year). The students who were enrolled and did not apply for graduation were coded as "1," and students who were not enrolled were coded as "0." Graduation was also coded as a dichotomous variable, with students who had applied for graduation as of Spring 2017 coded as "1" and students who had not coded as "0." Application for graduation in Spring 2017 indicated graduation in May 2017.

Additionally, three student groups who were at additional risk were separated from within the larger sample of FYS and matched non-FYS participants to further examine how enrollment affected persistence within these groups. The same analyses were conducted for these student groups, who were chosen from previous research findings and included (a) first-generation students, (b) students of color, and (c) students with previous poor academic performance and who were admitted under conditional status (index score < 94).

## Results

The propensity score matching resulted in 385 students in the FYS course who were matched with 385 of the 1,580 students who did not take the FYS. Using Rubin’s (2001) criteria to assess the success of the propensity score matching, propensity score means were found to be .22 ( $p = .991$ ) for both the FYS group and the comparison group. Using this information, Rubin’s criteria were met (difference in propensity means and ratio of propensity variances; see Table 1), suggesting successful matching.

To further evaluate the propensity score matching technique, comparisons were made between the FYS and comparison group to ensure that within each covariate, no significant differences were found. All comparisons for continuous variables were made using independent-samples t-tests, and all categorical variables were assessed using Pearson’s chi-square test of independence. There was no evidence for significant differences based on gender, first-generation status, race, index score, or Fall 2013 credits. See Table 1 for student characteristics within these groups. All subsequent analyses included the participants (FYS:  $n = 385$ ; non-FYS:  $n = 385$ ) from these two matched groups.

Table 1  
*Matching Results of FYS and Comparison Group on Single-Level Matching*

<b>Variable</b>	<b>FYS (<math>n = 385</math>)</b>	<b>Matched control group (<math>n = 385</math>)</b>	<b><math>\chi^2</math></b>	<b><math>p</math></b>
Students of color	180	181	.005	.942
Gender – male	127	121	.214	.644
First generation	209	197	.750	.427
			<i>t</i>	
Fall 2013 credits	14.43	14.41	.652	.895
Index score	103.36	103.16	.647	.807
Rubin’s criteria				
Propensity score means	.22	.22		.991
Difference in propensity means	0			
Ratio of propensity variances	1			

Analysis of persistence using the Mantel-Haenszel (MH) test showed  $\chi^2_{MH} = 14.785$ ,  $p < .001$ . Overall, students who took the FYS had a significantly higher college persistence rate than their peers who did not take the FYS course. Using the same MH test to examine differences in graduation rates resulted in  $\chi^2_{MH} = 4.470$ ,  $p = .035$  indicating that students

who took the FYS had a significantly higher number of graduates than their peers in the matched comparison group (see Table 2).

Table 2  
*Four-Year Persistence and Graduation Rates*

<b>Four-year persistence indicator</b>	<b>FYS (n = 385)</b>	<b>Matched control group (n = 385)</b>	<b>p (<math>\chi^2_{MH}</math>)</b>
Persistence	241 (63%)	188 (49%)	.001
Graduates	131 (34%)	103 (27%)	.035

Rates for persistence and graduation for student groups at additional risk are presented in Table 3. Compared to students who did not take the course, first-generation students and students of color showed significantly higher persistence rates and had higher graduation rates after 4 years when enrolled in the FYS course during their first year of college ( $p < .05$ ). This sample of FYS-enrolled students who arrived with low index scores ( $< 94$ , indicating previous poor academic performance) and were admitted conditionally also showed higher rates of persistence and graduation than those not enrolled, even though these differences were not statistically significant. A small sample size for this group could likely explain the lack of statistical significance.

Table 3  
*Four-Year Persistence and Graduation Rates for Students at Additional Risk*

<b>Student groups</b>	<b>Persistence</b>					<b>Graduation</b>		
	<b>n</b>	<b>FYS</b>	<b>n</b>	<b>Matched control group</b>	<b>p</b>	<b>FYS</b>	<b>Matched control group</b>	<b>p</b>
First generation	209	61%	197	42%	< .001	32%	18%	< .001
Students of color	180	63%	181	42%	< .001	31%	21%	< .001
Conditionally admitted	89	55%	80	43%	.167	20%	16%	.690

## **Discussion**

Enrollment in this FYS had positive effects on various measures of 4-year student persistence, including a 14% increase in persistence at the university and a 7% increase in the graduation rate. Results aligned with previous research presenting benefits in other academic outcomes, including higher first-term GPAs (Kuh et al., 2008; Swanson et al., 2017), increased credit loads (Vaughan et al., 2019), and greater first-year retention rates (Permzadian & Credé, 2016). However, few studies have analyzed both persistence and graduation rates longitudinally, so these findings help to extend these positive results.

The current research study lands within a conflicted literature, depending on the result of interest. Swanson et al.'s (2017) study showed that FYS enrollment resulted in long-term persistence to the third year for students who are at additional risk (i.e., male students and students of color). Key to these findings is the similar FYS model as this study, which was also designed as a rigorous research-based academic FYS. These results also reinforce Miller and Lesik's (2014) findings, which indicated that students who took the FYS course were 1.5 times more likely to graduate in 4 years than their peers who did not take the course. Permzadian and Credé (2016) suggested FYS programs should provide realistic information about college life and academic expectations, enhancing students' ability to adapt both their expectations and reactions to collegiate challenges. They also proposed that programs academic in nature and not centered only on collegiate orientation would lead to more reliable results (Permzadian & Credé, 2016). The results in this present study represent a research-based academic FYS including social components that led to significant benefits for both longitudinal persistence and 4-year graduation.

Conversely, Culver and Bowman (2020) found no differences in persistence or graduation rates for students in FYS compared to those students not enrolled in a first-year seminar, across multiple universities. However, the types of FYS structure or curriculum were not presented by the authors, blurring the connection of FYS design to student persistence. Characteristics of FYS curriculum, including academic instruction in addition to social and orientation components, may moderate the effectiveness of a FYS (Permzadian & Credé, 2016).

Evidence linking enrollment in a FYS and persistence benefits for students experiencing additional risks continues to mount. First-generation students who participated in this FYS had a 19% higher persistence rate and 14% more graduates than their peers who did not take the course. Vaughan and colleagues (2014b) found increased GPA and persistence for first-generation students enrolled in a FYS, but these results were not longitudinal beyond the first academic year. The literature is lacking many studies analyzing first-generation students' long-term success particularly, and this study adds to the evidence of longitudinal benefits in persistence and graduation for first-generation students.

Additionally, students of color saw a 21% higher persistence rate and 10% more graduates than their peers who did not participate in FYS. These results replicate findings that particular student groups at additional risk can experience benefits in persistence from an FYS (Swanson et al., 2017; Vaughan et al., 2019), but graduation rates were not analyzed in these earlier studies. Research has suggested that students of color benefit more from an FYS if the curriculum includes specific learning strategies and academic content (Kuh et al., 2008; Swanson et al., 2017; Vaughan et al., 2019). The FYS in this study taught specific learning strategies within an academically based curriculum, leading to both long-term persistence and higher graduation rates for students of color.

While the previous mention of learning study skills and increasing collegiate navigation awareness in an FYS can greatly attribute to student success, Ishitani (2016) suggested that increased social integration into the college environment may also lessen attrition rates, especially for underrepresented groups, such as first-generation students and ethnic minorities. The purposeful design of the FYS course to have a small class size, an active student-centered learning environment, and group activities each day was intended to enhance student engagement and bring a sense of community to first-year students. While the feeling of belonging in a new environment at college can have a major influence on persistence for any college student, it can be of critical importance to help curtail attrition in first-generation students and students who are in ethnic minority groups (Ishitani, 2016; Kuh et al., 2008).

Within the group of students at additional risk who had previous poor academic performance, results were positive although not significant in the persistence measures. These students experienced 12% higher persistence rates than their matched peers, and 4% more students who were enrolled in the FYS course graduated. More research with students who had poor previous academic performance is needed to explore the types of FYS programs that may reliably promote long-term college persistence for this particular group of students. They continue to have some of the lowest graduation rates of all students at additional risk (Yue & Fu, 2017), and knowing how an FYS may affect these students is of urgent concern. As Vaughan et al. (2019) stated, FYS design should aim to assist not only the students who are struggling but all students. However, if an FYS may improve persistence and graduation measures for students who have struggled before, it may also provide these same benefits for all students.

### ***Program Recommendations***

A research-based, academic FYS most likely provides increased longitudinal success for students because it focuses on developing critical college-level skills that are necessary in their concurrent and future courses. Three credits over the course of a 16-week semester provides the time necessary for students to delve deeply into the topics, provides students

the opportunities to apply the strategies, and allows students to receive ongoing feedback in their application.

Several other characteristics also likely contribute to this longitudinal success. The learning objectives of the FYS align with the priorities of the institution, including reading, writing, and research. First, every topic begins with an examination and understanding of the research and theories that provide the foundation for the recommendations and application of strategies to their experiences. The research project, although not as complex or comprehensive as the projects they may encounter in the future, requires a considerable amount of time during the semester and incorporates high levels of instructor scaffolding to ensure students understand the research process and the many resources available to complete similar academic tasks. Lastly, an intentional and coordinated curriculum coupled with a comprehensive and ongoing training program for the instructors ensures an equitable experience for all students and, as a result, allows for a potentially sizeable effect on the persistence and graduation rates for the institution.

### ***Limitations and Future Research***

Although propensity scoring was used in this design, self-selection remains a factor affecting which students were included in this study and ultimately included in the analyses. While this study had many positive features in its more rigorous methodological design and it contributes to the literature on FYS effects on 4-year persistence, it examined a single university. As the single-campus model helps with isolation of variables within the longitudinal design, generalizing the findings to other universities' FYS programs should be done with caution. Because other FYS designs were not included for a between-programs comparison, the generalizability may also be limited for these findings to other seminars not based on the specific 3-credit academic-based course design and instructor training model implemented in this particular FYS.

As 4-year graduation rates are typically low, future research looking at 5- and 6-year graduation rates may show even greater differences across all groups. Future research could also include analysis of student outcomes based on major choice or undeclared status, with the latter being another group at additional risk (Pickenpaugh et al., 2021; Tampke & Durodoye, 2013). Furthermore, future research could examine closely aligned FYS programs at multiple universities to see if the positive effects are similar and reliable. Alternatively, investigations could also compare persistence measures for students across different FYS designs, granting further possible distinctions between programs instead of simply comparing FYS groups to students who did not enroll in any sort of first-year course. Adding a qualitative component could provide more information from student perspectives that would (a) allow FYS programs to richly evaluate their success and be able to see if their course aligns with Tinto's (1993) pioneering work on what universities can do to curtail attrition, (b) allow

for continuous improvement of FYS programs in response to evolving student needs, and (c) allow for more in-depth understanding of which aspects of the program promote the most positive trajectory for student groups who are at additional risk.

## Conclusion

The results presented in this study are encouraging to help us understand and address longitudinal success for college students. First, a 3-credit, academically rigorous, FYS program shows evidence of increasing 4-year students' persistence and advancing higher graduation rates. Secondly, students who are considered at additional risk for higher attrition rates – including first-generation students, students of color, and students who are less academically prepared – can greatly benefit by choosing (or being advised) to enroll in a FYS course during their first year. An FYS course could serve as a protective factor against attrition for numerous students attending universities who are at higher risk for not continuing their education or who may not graduate otherwise. Meeting the needs of all students will help to minimize attrition rates at colleges and universities for each individual student, regardless of needs or background.

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