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Factors Influencing Retention of Online Adult Learners: A Case Study of a Private Institution

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The Factors Influencing Retention of Online Adult Learners: A Case Study of a Private Institution

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Abstract

A quasi-experimental investigation assessed the impact of multiple factors, including financial aid and proactive advising, on retention of undergraduate students at a small, private university that primarily serves online learners. In-house proactive advising over three academic years was positively associated with increased retention semester-to-semester and fall-to-fall. In addition, students who received Pell Grants plus at least one other form of financial aid, completed math remediation, and transferred 30 or more credit hours persisted at higher rates semester-to-semester. Individuals identifying with historically underrepresented groups tended to persist at rates lower than their White peers' semester-to-semester retention. These findings support the efficacy of proactive advising and financial aid, even with a population that exhibits lower retention for persons from historically underrepresented groups. Findings also suggest that students who transfer more than two full-time semesters of credit have a strong motivation to complete their course of study.

Introduction

Concern about factors that influence student retention and degree completion has existed in higher education for decades, and universities have developed numerous strategies to increase persistence and completion among traditional, campus-based students (Tinto, 1975; Lau, 2003; Bettinger & Baker, 2014; Van Duser et al., 2020) and nontraditional adult learners (Cochran et al., 2014; Greenland & Moore, 2021; Rovai, 2003; Stone & O'Shea, 2019). This has resulted in entire volumes dedicated to the topic (Banihashem et al., 2021; Barefoot & Gardner, 2018; Bertiz & Hebebcı, 2021; Felten et al., 2016; Hu, 2021; Taghizadeh Kerman et al., 2022; Upcraft, et al., 2004) but few extensive empirical investigations. Randomized trials or large quasi-experimental investigations in higher education settings are often limited by practical concerns and institutional policy. Thus, Bettinger and Baker's (2014) randomized coaching study with 13,555 participants at 17 different institutions is noteworthy and serves as a foundation for the current study.

Bettinger and Baker (2014) focused on coaching offered through a third-party provider rather than in-house academic advisors. They reported positive results for new undergraduate students from two separate academic years: 2003-2004 and 2007-2008. However, they did not explore retention beyond the first year for either cohort. In addition, they did not account for other factors that affect student retention, such as racial identity (Patterson,

2021; Rodriguez & Mallinckrodt, 2021; Strayhorn, 2013; and Toven-Lindsey et al., 2015), age (Ahn & Davis, 2020), gender (Kelly et al., 2021; and Patterson, 2021), first-generation status (Radunzel, 2021; Manyanga et al., 2017; and Donaldson et al., 2016), time to degree (Yue & Fu, 2017), math or English remediation (Boatman, 2021), transfer credits (Boston et al., 2011), or financial issues (Ellis, 2017; Manyanga et al., 2017; and Braxton et al., 2007).

Given that Bettinger and Baker demonstrated effects from one year of proactive advising by contractors but that the impact of some other factors affecting retention were not considered, an examination of the long-term relationship among in-house proactive advising, gender, racial identity, first-generation status, and financial need is warranted. Using a quasi-experimental approach, this study draws from quantitative data from in-house proactive advising over three years and its relationship to other factors that influence retention.

Conceptual Framework and Literature

Retention

Student retention, generally defined as continued enrollment from fall to fall (Braxton et al., 2007), is an institutional measure that affects institutional financial well-being, reputation, rankings, and other indicators of success. Retention is a topic of great importance, not only to colleges and universities, but to society as a whole, given the contribution college graduates make to their communities in terms of increased tax revenue and economic growth, among other benefits (Burkholder & Holland, 2014). As such, undergraduate student retention models have existed for decades, from the Student Integration Model (Tinto, 1975) with its focus on the student-institution fit, to the Student Attrition Model (Bean, 1980) with its emphasis on student intentions, motivation, and external institutional factors. Other models account for informal interactions among students and faculty (Pascarella, 1980) and student-student and student-campus interactions (Spady, 1970).

To reduce unnecessary attrition and improve retention rates, Ellis (2017) calls for universities to develop a culture of retention that involves shared responsibility among administrators, faculty, and student affairs staff (Braxton et al., 2007). Thomas et al. (2021) acknowledge that student demographics, experiences, and needs have changed and may be best served by a “whole-institution approach” based on transformation and student diversity (p. 7). Manyanga et al. (2017) note the prevalence of strategies that integrate advising, counseling, financial aid, and other institutionally driven issues that are part of the retention agenda. That approach allows stakeholders throughout the institution to modify and refine their retention efforts in response to changing student demographics and diversity.

A major focus of the current study is advising, one of the retention tools that is continuously refined to reflect student needs. Students themselves have cited their inability to balance work and study as the main reason for dropping out of higher education and called for personal and motivational advising support to help them overcome their challenges as online learners (Greenland & Moore, 2021). One type of advising, intrusive or proactive advising, is a strategy that was enacted in the current study based on positive outcomes described in the literature (Bettinger & Baker, 2014; Donaldson et al., 2016; Earl, 1988; Thomas, 2020; and Varney, 2013).

Proactive Advising

Proactive advising combines aspects of developmental, prescriptive, and collaborative advising in purposefully engaging students to improve academic outcomes (Donaldson et al., 2016; Thomas, 2020; Varney, 2013). In his foundational study, Earl (1988) called for advising to be offered intrusively based on student needs. Advocates of proactive advising have suggested it as a retention tool for at-risk and first-generation students (Donaldson et al., 2016; Schwebel et al., 2008; and Thomas, 2020). Bettinger and Baker (2014) found that first-year students who were regularly and proactively coached in goal-setting, time management, self-advocacy, and study skills were more likely to be retained during a one-year treatment period and more likely to be attending the university one year after the coaching had ended. Thomas (2020) found that adding proactive advising to tutoring, supplemental instruction, and learning labs increased the odds of passing developmental math by 1.9 times. Schwebel et al. (2008) also found positive outcomes for at-risk students. They later reported on a longitudinal randomized trial to evaluate the effect of proactive advising on retention, academic performance, and frequency of advising contacts and found a minimal improvement in retention (Schwebel et al., 2012).

In addition to exploring the effect of proactive advising, the current study explored other factors shown to affect retention of at-risk undergraduates. These include age, gender, race, number of transfer credits, number of terms since last enrollment, type of financial aid, remediation in math and/or English, and first-generation status. The primary research question was, What is the effect of proactive advising on retention of at-risk undergraduate students? The secondary research question was, What factors affect retention of at-risk undergraduate students?

Method

The current study used professional, full-time undergraduate academic advisors to facilitate proactive advising/coaching of students. This was a centralized approach with assigned advisors based on the student's major or college and support services offered from the point of first-term registration to graduation. Coaching meetings were defined as conversations of at least five minutes that required follow-up by the student, and notation of these meetings was recorded by the advisor/coach. Proactive advising contact for the treatment group was determined by retention risk markers identified using a subscription software package. To address the effect of the number of proactive advising sessions on undergraduate student retention, the researchers used a quasi-experimental design consisting of intact groups of students assigned to the experimental or control group based on degree programs and/or college. This ensured balance among the advisors' caseloads.

This study includes 5,553 distinct individuals over three continuous academic years at one small, primarily online private institution: 2017-2018, 2018-2019, and 2019-2020. Control group counts by term ranged from 2,710 to 3,602 with a median value of 3,131 in fall and spring and from 2,078 to 2,202 with a median value of 2,160 in summers. Treatment groups increased in size over the three years ranging from 224 to 611 (median of 363) in fall and spring and 272 to 594 for summers (median 333). Data from the fall-to-fall comparisons were used to generate demographics. In this process it was discovered that ethnicity, Hispanic and non-Hispanic, and racial identity were collinear; therefore, the more granular of the two, racial identity, is reported in Table 1.

Table 1. Student Racial Identity by Percentage of Annual Enrollment

	2017–2018	2018–2019	2020–2021
Asian	2.9	2.5	2.2
Black/African American	17.2	17.0	16.5
Hawaiian/Pacific Islander	0.1	0.1	0.1
Hispanic/Latino	2.6	2.1	2.8
Native American/ Alaska Native	0.7	1.2	1.1
White	61.9	59.0	57.0
Two or more selections	4.4	3.8	3.5
No response	11.2	14.2	16.9

In this study, the average undergraduate student age of 34 is higher than the traditional range for college students, as many are degree completers who stopped out of higher education at some point in their past. Additional student demographics are shown in Table 2.

Table 2. Student Demographics by Percentage of Annual Enrollment

	2017–2018	2018–2019	2020–2021
Male	44.6	43.9	46.6
Female	53.9	52.8	49.5
First Generation	19.5	20.2	20.8
Math Remediation	23.9	23.3	19.2
English Remediation	3.3	2.9	1.9

Analysis

Initial chi-square analysis of fall-to-fall retention for students participating in and those not active in proactive advising revealed no significant differences although retention rates were higher for the participant cohort in all three comparisons. These differences were 2.3, 2.1, and 4.8 percentage points, respectively, for 2017-2018, 2018-2019, and 2019-2020 school years (see Figure 1). Similar chi-square analysis was completed for semester-to-semester retention (Figure 2). As was the case for the fall-to-fall comparisons, the individuals who engaged in at least one proactive advising consultation were more likely to be retained in every semester with six of the nine semester-to-semester calculations returning statistically significant results. The statistically significant comparisons are marked with an asterisk in Figure 2.

The data gathered to complete these analyses came from institutional records. As that was the case, additional data points for each participant were available. Those gathered were: (1) age, (2) gender, (3) ethnicity, (4) racial identity, (5) first-generation student standing, (6) receipt of a Pell grant, (7) receipt of other forms of financial support, (8) standing as a transfer student, (9) transfer hours, and (10) need for remedial course work. These facilitated disaggregation of the combined proactive advising participant and non-participant cohorts. Logistic regression analysis was completed because chi-square calculations do not control for extraneous variables. The

resulting values provide “impact of each variable on the odds ratio of the...event of interest” (Sperandei, 2014, p. 12; Glen, 2021) while controlling for other variables, thus decreasing the risk of false positive outcomes.

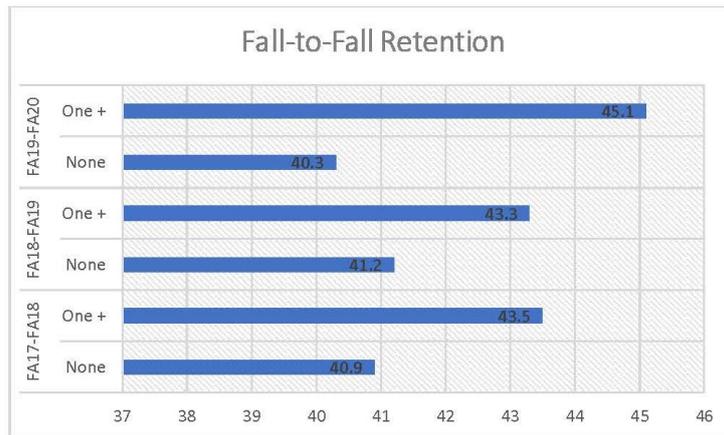


Figure 1. Three-year Retention Rates for Students Attending One or More Proactive Advising Sessions

Note. This figure shows that the retention rates for three academic years were higher for students participating in proactive advising compared with those students who did not participate in proactive advising.

When dichotomous variables are coded as 0 for the absence of a characteristic and 1 for its presence, an odds ratio above the value 1 “implies an increased likelihood; conversely, an odds ratio less than 1 implies a decreased likelihood” (Peng & So, 2002, p. 60; Glen, 2021). Odds ratios do not, though, include an indicator of statistical significance (Glen, 2021). Confidence intervals (Bettinger & Baker, 2011; Peng & So, 2002) and *p* values (Peng et al., 2002; Glen, 2021) are commonly reported for statistical significance. In this text, *p* values will be reported due to their widespread use in higher education literature; but a supplemental table of odds ratios, confidence intervals, and levels of statistical significance is available from the corresponding author.

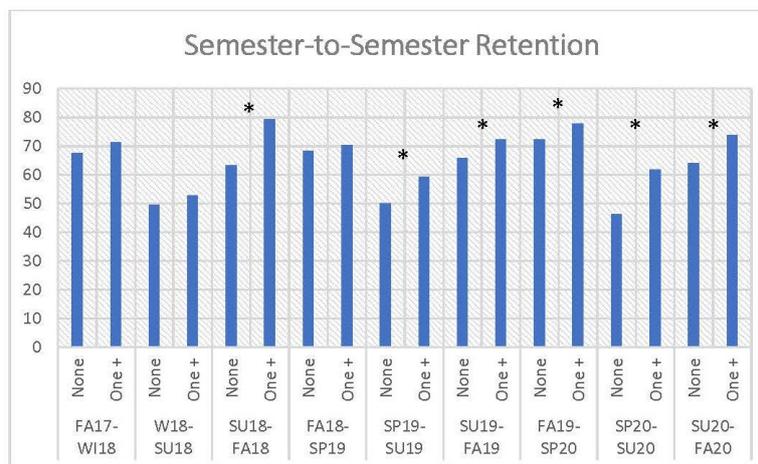


Figure 2. Retention Rates for Nine Semesters of Proactive Advising

Note. For nine semesters, students who engaged in at least one proactive advising session were more likely to be retained than those students who did not participate in proactive advising.

The logistic regression results were checked for multicollinearity. Variance inflation factor values were low and well within acceptable limits (Senaviratna & Cooray, 2019). Results were also checked for goodness of fit using McFadden’s R squared (Peng & So, 2002) for which values between .20 and .40 represent a very good fit (Lee,

2014; Domencich & McFadden, 1975; Reichenbach, 2014). Each of the McFadden's calculations for fall-to-fall and semester-to-semester considerations returned a value below 0.082 with all but three below 0.030.

Findings

As with the chi-square analysis, logistic regression analysis on fall-to-fall comparisons did not result in odds ratios that showed a pronounced impact on retention from exposure to one or more proactive advising sessions, and none of the *p* values showed significance (see Table 3).

Table 3. Logistic Regression: Fall-to-fall Retention Disaggregated

	2017-2018		2018-2019		2019-2020	
	Odds Ratio	<i>p</i> Value	Odds Ratio	<i>p</i> Value	Odds Ratio	<i>p</i> Value
Meetings						
Age						
Gender: Male			1.189	0.031		
Race: Asian	0.501	0.004				
Race: Black/ African American			0.787	0.022		
Race: Hispanic/ Latino						
Race: Native American/ Alaska Native						
Race: two or more						
First Generation						
Transfer 1-29			1.807	0.006	1.905	< .001
Transfer 30-59			2.225	< .001	1.712	< .001
Transfer 60-89			2.032	< .001	2.001	< .001
Transfer ≥ 90			1.777	0.002		
Math Remediation	1.793	< .001	1.608	< .001		
English Remediation			1.838	0.015		
Pell Grant						
Pell Plus Other	1.227	0.010				

Note: Odds ratios in bold and *p* values in bold, italic are statistically significant. The Pell Grant row considers retention of Pell recipients, and the Pell Plus Other row considers retention of students who received both Pell Grants and other forms of financial aid. Hawaiian/Pacific Islander is not included in the table as annual counts in the category were only two or three persons.

There were, though, categorical groupings in the disaggregation that had odds ratios that were statistically significant. From the fall of 2017 to the fall of 2018, Asian students were significantly less likely to persist than White students; and persons who received a Pell Grant and other financial aid, and those who had participated in math remediation were significantly more likely to persist than those who did not. For fall of 2018 to fall of 2019 retention, males were significantly more likely to be retained than females, Black/African American students were less likely to be retained than White students, individuals transferring in hours at any level were more likely to be retained than those who did not, and both math and English remediation participants were more likely to be

retained than non-participants. Statistically significant findings for fall-to-fall 2019 to 2020 were isolated to the three transfer hour categories that represent fewer than 90 credit hours. Logistic regression using the same categorical groupings was also completed regarding student retention semester-to-semester. Table 4 lists, by semester-to-semester transition, the *p* values for the categories in which the retention odds ratios were statistically significant.

Table 4. Logistic Regression: *p* Values for Significant Cells in Disaggregated Semester-to-Semester Retention

	FA17- SP18	SP18- SU18	SU 18- FA18	FA18- SP 19	SP 19- SU 19	SU 19 - FA19	FA19- SP 20	SP 20- SU 20	SU 20- FA20
Meetings			<.001		0.010		0.018	0.002	0.008
Age				[0.018]			[<.001]		
Gender: Male	0.016			0.005					
Race: Asian	0.044		[0.043]						
Race: Black/ African American	[0.002]		[0.017]	[<.001]			[<.001]		[<.001]
Race: Hispanic/ Latino					[0.035]				
Race: Native American/ Alaska Native	0.049		0.041						
Race: two or more First Gen- eration	[0.026]		[0.006]	[0.042]			[0.034]		
Transfer 1-29							[0.016]	<.001	
Transfer 30-59		0.026	0.010			0.001	[<.001]	<.001	0.043
Transfer 60-89	0.030	0.001	0.014			<.001	[0.003]	<.001	0.026
Transfer ≥ 90	0.038	0.001	0.002			<.001	[<.001]	<.001	
Math Remedia- tion English Remedia-tion	<.001	<.001	0.003	<.001	0.013	0.002		0.007	0.032
Pell Only	[0.001]	[0.033]	[0.050]					0.005	
Pell + Other	<.001	0.001	<.001	0.006		<.001	<.001	<.001	<.001

Note: values in [] are instances in which retention in the category was lower and statistically significant.

As was the case with the fall-to-fall regression, multicollinearity was checked and variance inflation factor and McFadden’s Pseudo R² values calculated. Variance inflation factor figures were low and acceptable in every case (Senaviratna & Cooray, 2019) and McFadden outcomes had a range of 0.014 to 0.081. Statistical significance for each of the semester-to-semester retention log odds was calculated. Table 4 lists the *p* values for significant findings. First-generation student standing returned no significant results. Hispanic/Latino racial identity and English remediation each had one significant finding. All of the other categories had two or more. Several, such

as participating in proactive advising, racial identity, and transferring credit hours, exhibited general patterns when viewed as a composite. When controlling for all other variables:

- Students participating in one or more proactive advising meetings had odds ratios for retention above 1 in all nine comparisons (range: 1.056 to 1.603; median: 1.16), indicating higher persistence than non-participants, and in five terms these were statistically significant. The odds ratios for the significant differences were 1.603, 1.208, 1.397, 1.273, and 1.215.
- Age: Older students were slightly less likely to persist in general (range: 0.994 to 1.004; median: 0.997) with two significant findings that had odds ratios of 0.984 and 0.990.
- Gender: Males were more likely to persist than females during the first six terms, with two significant findings but were slightly less likely to persist in the last three semester-to-semester considerations (range: 0.898 to 1.274; median: 1.20).
- There were 14 significant findings for individuals from traditionally underrepresented racial groups.
 - The majority ($n = 11$) were for lower retention than for White students, although the smallest category that could support analysis, Native Americans/Alaska Natives (never more than 1.2% of an annual cohort), was the only one with exclusively positive significant findings. Asian students had one incidence of significantly higher retention and another of significantly lower retention.
 - Odds ratios for persons identifying as Asian were below 1 for six of nine considerations (range: 0.605 to 1.621; median: 0.795) with one significant finding each for higher retention and lower retention, odds ratios of 1.621 and 0.605 respectively.
 - Black/African American students were significantly less likely to be retained in five of the nine cases and had only one of nine odds ratios above the value 1 (range: 0.568 to 1.006; median: 0.726).
 - Odds ratios for retention of individuals identifying as Hispanic/Latino were all lower than 1 (range: 0.587 to 0.907; median: 0.729) with the lowest returning a significant result.
 - Persons identifying as Native American/Alaska Native had five odds ratios above 1 (range: 0.536 to 3.378; median: 0.962) with two significant findings for the two highest odds ratios (2.779, 3.378) which were each more than 1.3 points above all other odds ratios in the category.
 - Persons identifying with two or more racial categories had six of nine odds ratios below 1, four of which denoted significant differences in retention (range: 0.534 to 1.195; median: 0.835).
- Odds ratios for first-generation college students showed little difference existed in retention between them and their peers (range: 0.90 to 1.197; median: 1.037).
- Transferring credit hours to the university had a strong and regular impact on retention with a threshold for strongest impact appearing at 30 hours of transfer credit.
 - One to 29 hours transferred – range of 0.653 to 5.338 with a median value of 1.314 and significant findings for the lowest and highest values.
 - Transfers of 30 to 59 hours – range of 0.53 to 6.978 with a median value of 1.263 and significant findings for six of nine considerations including the lowest and highest values.
 - Transfers of 60 to 89 hours – range of 0.671 to 5.993 with a median value of 1.537 and significant findings for seven comparisons including the lowest and highest.
 - Transfers of 90 hours of more – range of 0.571 to 7.184 with a median value of 1.50 and significant findings for six of nine considerations including the lowest and highest.

- Being required to complete math remediation had a consistent positive impact on retention (range: 1.075 to 1.815; median: 1.34) with only one semester-to-semester consideration not producing a positive result.
- English remediation resulted in odds ratios above 1 for seven of the nine considerations (range: 0.646 to 2.656; median: 1.237) with the highest odds ratio resulting in the only significant difference.
- Students who received only Pell grants as financial aid had odds ratios for retention below 1 for eight of the nine semester-to-semester transitions (range: 0.29 to 1.442; median: 0.51) with statistically significant findings for the first three transitions (odds ratios of 0.36, 0.458, and 0.465 respectively).
- Students who received Pell grants and at least one other form of financial aid had odds ratios for retention above 1 for all nine of the semester-to-semester transitions (range: 1.105 to 2.350; median: 1.48) with statistically significant findings in all but one case.
- The COVID pandemic may have influenced patterns as the four highest odds ratios, 5.338, 5.993, 6.978, and 7.184, occurred in the spring to summer transition of 2020 for students who had transferred hours at a time when individuals were more likely to be isolated, have limits on commitments outside the home, and, potentially, have a higher likelihood of committing time to studies.
- The presence of seven significant findings for lower retention for Fall 2019 to Spring 2020, the most in any period, cannot be explained by COVID-19 as the commitment to take classes would have been completed prior to the first week of January before the virus was identified and known to be a world-wide health risk.

Figure 3 displays the odds ratio values for each of the nine retention measures in all categories. Most of the categories have tightly clustered retention odds ratios for all nine semester-to-semester transitions. In some cases, these fall consistently or even uniformly below the value of 1 indicating lower retention; in others, like math remediation and Pell Grant plus other financial aid, all odds ratio values are above 1, indicating higher retention of students with the characteristic.

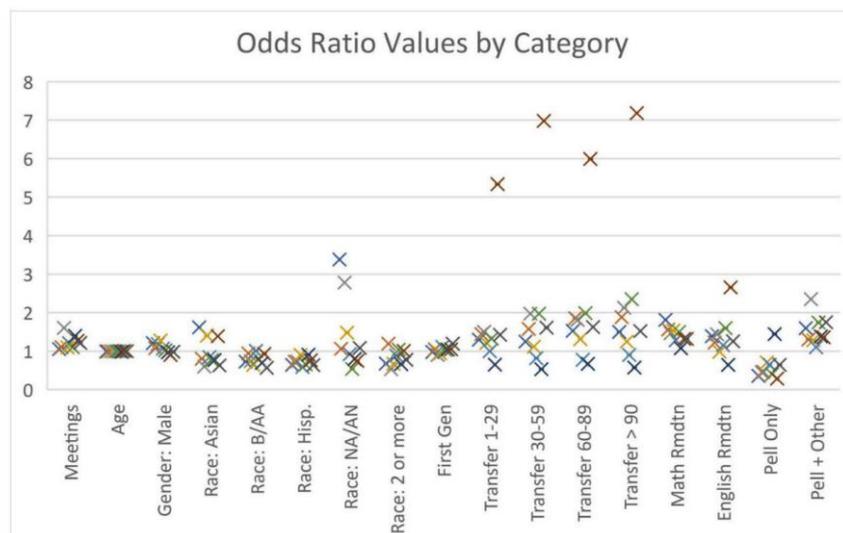


Figure 3. Odds Ratios for Factors Related to Retention

Note. The odds ratios for nine semester-to-semester transitions fall consistently above the value of 1 for students who completed math remediation and received a Pell Grant plus other financial aid, indicating higher retention of students with those characteristics.

Discussion

Unlike Bettinger and Baker (2014), the current study focused on one institution's student population, included continuous access to proactive advising over a three-year period, and relied on in-house personnel rather than a contracted service provider for the coaching interaction. Thus, the activity is much closer to patterns and analyses possible for most institutions of higher education.

Due to the marked similarities in age and gender distribution between the samples in both studies, the comparison of outcomes is valid. Many other institutions of higher education would not be able to match the older average age of participants in Bettinger and Baker's study, the near parity in gender distribution, and the breadth of participants embodied by 17 distinct colleges and universities. The primary differences were Bettinger and Baker's results came from a randomized investigation limited to two separate one-year periods while the current study employed a quasi-experimental methodology, continuous access to proactive advising across three years, and a focus on students identified as having one or more factors commonly related to attrition.

Proactive advising was positively associated with increases in retention. Participants exhibited increased probability of fall-to-fall retention, without the increases being statistically significant (1.6, 3.1, and 4.8 percentage points 2017-2018, 2018-2019, and 2019-2020), and increased probability of semester-to-semester retention for all nine transitions, with six having statistical significance.

Males experienced higher retention than females in each of the fall-to-fall comparisons, with one significant finding (at the 95% confidence interval), and for the first six semester-to-semester considerations with two significant results (also at 95% confidence interval). The final three semester-to-semester analyses showed males with lower retention than females. Bettinger and Baker (2014) note that the impact of proactive advising, while positive for both genders, appears higher with males, yet the results from this study did not consistently support that assertion.

The age of the student did not result in significant variation in effect. While there were two significant findings for semester-to-semester retention with older students less likely to persist, the general trend was that age did not impact retention (no significant fall-to-fall findings and not in seven of nine semester-to-semester considerations). This was also the case for first-generation student standing, with no significant findings fall-to-fall or semester-to-semester. These are positive events for the university as they confirm effective programming regardless of student age and first-generation standing.

The current investigation extended beyond that of Bettinger and Baker (2014), who controlled for the merit scholarship, Pell Grant award, and math and English remediation co-variants but did not report outcomes in those areas. They also did not consider the impact of racial identity and transfer credit hours.

Consideration of the impact of financial aid, as receipt of a Pell Grant award but no other aid and as a Pell Grant combined with other aid, was possible. Persons who received only Pell Grants were less likely to be retained in

all fall-to-fall (Table 1) and semester-to-semester comparisons than persons who did not receive Pell Grants. Three of the semester-to-semester comparisons were significant at the 95% confidence interval. In contrast, for two of the three fall-to-fall and all nine of the semester-to-semester periods, persons receiving Pell Grants and additional financial aid were more likely to persist. One of the fall-to-fall and eight of nine semester-to-semester comparisons resulted in statistically significant events. These results suggest that low-income students, persons who are eligible for Pell Grants, require more support than only a Pell Grant for their likelihood of retention to increase.

Math and, to a lesser extent, English remediation, which extend a student's time in school, were associated with higher retention. In five of the six fall-to-fall and 15 of 18 semester-to-semester analyses, the odds ratios noted higher likelihood of retention for participants. Two of the math and one of the English fall-to-fall results were statistically significant as were one of the English and eight of nine math semester-to-semester outcomes. The simplest explanation for this is the need to extend an education process by one term to complete remediation although the generally low levels of persistence in higher education for students required to undergo remediation could be seen as arguing against that (Henry & Stahl, 2017; Higbee et al., 2005; Park et al., 2017).

Results for underrepresented groups in fall-to-fall considerations were mixed with five of 15 cells in fall-to-fall indicating higher likelihood of retention than Whites. Semester-to-semester comparisons had 14 significant findings with 11 of them being negative events. Outcomes for Blacks/African Americans and Hispanic/Latino individuals were notable as all but one of the combined sets of odds ratios indicated a likelihood of retention that was lower than for Whites. While this is not unique to the university under study (Han et al., 2017; Quaye et al., 2015), it is a cause for concern from a diversity, equity, and inclusion perspective as well as in respect to revenue generation, institutional reputation, and fulfilling institutional mission (Koch, 2017).

The final consideration in the data was credit hours transferred to the university. Analysis of these data resulted in a uniformly higher likelihood of retention for fall-to-fall comparisons and for 32 of 36 semester-to-semester results. The four exceptions, all of which were statistically significant, occurred for the fall of 2019 to spring of 2020 transition in which seven times the average number of statistically significant negative events occurred (median value of one negative significant finding per transition period). There were also 17 semester-to-semester cells with significantly higher likelihood of retention for persons transferring credit hours. Thirty hours was a threshold for the greatest impact with 16 of the 17 positive events occurring at or above that point. These outcomes point to a logical conclusion: individuals who are returning to school to complete degrees and who have a significant number of transfer hours are more likely to persist.

Limitations

Several limitations existed. The data set was limited to one private nonprofit higher education institution located in the Midwestern United States, although the university extends its mission by offering online programs across the U.S. and in many parts of the world. It was not possible to randomly assign students to experimental and control groups. This resulted in the use of a quasi-experimental approach with individuals assigned to the experimental or control group based on degree programs and/or college. Some independent variables proved to

be collinear while others did not include a sufficient number of cases to support meaningful analysis following disaggregation. Ethnicity and race were collinear and examples of categories in which there were small counts are individuals who identified as Hawaiian/Pacific Islanders and parties participating in multiple advising meetings in a term. The focus on students who the analytics predicted to have a lower possibility of retention had the potential to depress measurable influence of the advising meetings on their continued enrollment.

Conclusion

When considering the factors that affect retention, the current study found that in-house proactive advising was positively associated with increased retention fall-to-fall and semester-to-semester. This is notable because it occurred for students whom university personnel identified as at risk for attrition using a subscription software package. In addition, students who received Pell Grants plus at least one other form of financial aid, completed math remediation, and transferred 30 or more credit hours persisted at higher rates semester-to-semester. Individuals identifying with historically underrepresented groups tended to persist at rates lower than their White peers semester-to-semester. While the effect was, in every case, low, these findings support the efficacy of proactive advising and financial aid, even with a population that exhibits lower retention for persons from historically underrepresented groups. They also suggest that students who transfer more than two full-time semesters of credit have strong motivation to complete their course of study. As Bettinger and Baker (2014) found, retention increases in the range achieved make proactive advising a viable and valuable investment by institutions of higher education. These results occurred while focusing on students identified as having retention risk; therefore, outcomes might be more pronounced with a general population.

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Declaration of Conflicting Interests

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Ethics Statement

Project implementation and assessment were completed in alignment with applicable federal and state regulations and guidelines for grant-funded endeavors. All evaluation and project data gathering were completed in accordance with Institutional Review Board (IRB) approved protocols. Both a project IRB protocol and a separate evaluation IRB protocol were maintained.

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References

- Ahn, M. Y., & Davis, H. H. (2020). Students' sense of belonging and their socio-economic status in higher education: A quantitative approach. *Teaching in Higher Education, 25*(1), 1-14.
- Banihashem, S. K., Noroozi, O., & Khaneh, M. P. A. (2021). Gender Differences in Engagement and Self-regulation in an Online Constructivist Learning Design and Learning Analytics Environment. In S. Jackowicz & O. T. Ozturk (Eds.), *Proceedings of ICSES 2021-- International Conference on Studies in Education and Social Sciences* (pp. 171-176), Antalya, TURKEY. ISTES Organization.
- Barefoot, B., & Gardner, J. (2018). *Your college experience: Strategies for success*. (13th ed.). Bedford/St. Martins.
- Bean, J. (1980). Dropouts and turnover: The synthesis and test of a causal model of student attrition. *Research in Higher Education, 12*, 155–187.
- Bertiz, Y., & Hebebcı, M. T. (2021). Security for online exams: Digital proctoring. In S. Jackowicz & I. Sahin (Eds.), *Proceedings of IHSES 2021-- International Conference on Humanities, Social and Education Sciences* (pp. 369-374), New York, USA. ISTES Organization.
- Bettinger, E., & Baker, R. (2014). The effects of student coaching: An evaluation of a randomized experiment in student advising. *Educational Evaluation and Policy Analysis, 36*(1), 3–19.
- Boatman, A. (2021). Accelerating college remediation: Examining the effects of math course redesign on student academic success. *Journal of Higher Education, 92*(6), 927–960. doi: 10.1080/00221546.2021.1888675
- Boston, W., Ice, P., & Gibson, A. M. (2011). Comprehensive assessment of student retention in online learning environments. *Online Journal of Distance Learning Administration, 14*(1), https://www.westga.edu/~distance/ojdla/spring141/boston_ice_gibson141.html
- Braxton, J. M., Brier, E. M., & Steele, S. L. (2007). Shaping retention from research to practice. *Journal of College Student Retention: Research, Theory & Practice, 9*(3), 377–399. doi: 10.2190/CS.9.3.g
- Burkholder, G. J., & Holland, N. (2014). International perspectives on retention and persistence. *Higher Learning Research Communications, 4*(2), 3–9.
- Cochran, J. D., Campbell, S. M., Baker, H. M., & Leeds, E. M. (2014). The role of student characteristics in predicting retention in online courses. *Research in Higher Education, 55*(1), 27–48. doi.org/10.1007/s11162-013-9305-8
- Domencich, T., & McFadden, D. L. (1975). *Urban travel demand: A behavioral analysis*. North Holland Publishing Co.
- Donaldson, P., McKinney, L., Lee, M., & Pino, D. (2016). First-year community college students' perceptions of and attitudes toward intrusive academic advising. *NACADA Journal, 36*(1), 30–42. doi:

10.12930/NACADA-15-012

- Earl, W. R. (1988). Intrusive advising of freshmen in academic difficulty. *NACADA Journal*, 8(2), 27–33.
- Ellis, K. (2017). *It takes a campus: 15 initiatives to improve retention*. Nautilus Publishing.
- Felten, P., Gardner, J. N., Schroeder, C. C., Lambert, L. M., Barefoot, B. O. & Hrabowski, F. A. (2016). *The undergraduate experience: Focusing institutions on what matters most*. Jossey-Bass Publishers.
- Glen, S. (2021). *Odds ratio calculation and interpretation*. <https://www.statisticshowto.com/probability-and-statistics/probability-main-index/odds-ratio>
- Greenland, S. J., & Moore, C. (2021). Large qualitative sample and thematic analysis to redefine student dropout and retention strategy in open online education. *British Journal of Educational Technology*, 53, 647-667. doi: 10.1111/bjet.13173
- Han, C., Farruggia, S. P., & Moss, T. P. (2017). Effects of academic mindsets on college students' achievement and retention. *Journal of College Student Development*, 58(8), 1119–1134. doi.org/10.1353/csd.2017.0089
- Henry, L. A., & Stahl, N. A. (2017). Dismantling the developmental education pipeline: Potent pedagogies and promising practices that address the college readiness gap. *Journal of Adolescent & Adult Literacy*, 60(6), 611–616.
- Higbee, J. L., Arendale, D. R., & Lundell, D. B. (2005). Using theory and research to improve access and retention in developmental education. *New Directions for Community*
- Hu, H. (2021). Dispelling the myth of elitism and establishing the evidence of inclusion: A case of CLIL in online English education amid COVID-19 pandemic. In V. Akerson & M. Shelley (Eds.), *Proceedings of IConSES 2021-- International Conference on Social and Education Sciences* (pp. 29-50), Chicago, USA. ISTES Organization.
- Kelly, B. T., Raines, A., Brown, R., French, A., Stone, J. (2021). Critical validation: Black women's retention at predominately white institutions. *Journal of College Student Retention: Research, Theory & Practice*, 23(2), 434–456. doi: 10.1177/1521025119841030
- Koch, A. K. (Ed.). (2017). *Improving teaching, learning, equity, and success in gateway courses: New directions for higher education, number 180*. Hoboken: Jossey-Bass Publishers.
- Lau, L. K. (2003). Institutional factors affecting student retention. *Education*, 124(1), 126–136.
- Lee, D. (2014). A comparison of choice-based landscape preference models between British and Korean visitors to national parks. *Life Science Journal*, 10(2), 2028–2036.
- Manyanga, F., Sithole, A., & Hanson, S. M. (2017). Comparison of student retention models in undergraduate education from the past eight decades. *Journal of Applied Learning in Higher Education*, 4, 29–41.
- Park, T., Woods, C. S., Hu, S., Jones, T. B., & Tandberg, D. (2017). What happens to underprepared first-time-in-college students when developmental education is optional? The case of developmental math and intermediate algebra in the first semester. *Journal of Higher Education*, 89(3), 318-340. doi.org/10.1080/00221546.2017.1390970
- Pascarella, E. T. (1980). Student-faculty informal contact and college outcomes. *Review of Educational Research*, 50(4), 545–595.
- Patterson, A. F. (2021). “It was really tough”—Exploring the feelings of isolation and cultural dissonance with Black American males at a predominantly white institution. *Journal of College Student Retention:*

- Research, Theory & Practice*, 23(1), 55–77. doi: 10.1177/1521025118796633
- Peng, C. Y. J., & So, T. S. H. (2002). Logistic regression analysis and reporting: A primer. *Understanding statistics*, 1(1), 31–70.
- Peng, C. Y. J., Lee, K. L., & Ingersoll, G. M. (2002). An introduction to logistic regression analysis and reporting. *The Journal of Educational Research*, 96(1), 3–14.
- Quaye, S. J., Griffin, K. A., & Museus, S. D., (2015). Engaging students of color. in S. J. Quaye & Harper, S. R. (Eds.), *Student engagement in higher education: Theoretical perspectives and practical approaches for diverse populations* (2nd ed., 15–35). Routledge.
- Radunzel, J. (2021). Examining retention and transfer in relation to incoming student data for first-generation and continuing-generation students: What differences exist? *Journal of College Student Retention: Research, Theory & Practice*, 23(2), 214–242. doi: 10.1177/1521025118813516
- Reichenbach, M. (2014, January 13). McFadden's pseudo R² interpretation [Discussion post]. *Cross validated*. <https://stats.stackexchange.com/questions/82105/mcfaddens-pseudo-r2-interpretation>
- Rodriguez, A. A., & Mallinckrodt, B. (2021). Native American-identified students' transition to college: A theoretical model of coping challenges and resources. *Journal of College Student Retention: Research, Theory & Practice*, 23(1), 96–117. doi: 10.1177/1521025118799747
- Rovai, A. P. (2003). In search of higher persistence rates in distance education online programs. *The Internet and Higher Education*, 6(1), 1–16.
- Schwebel, D. C., Walburn, N. C., Jacobsen, S. H., Jerrolds, K. L., & Klyce, K. (2008). Efficacy of intrusively advising first-year students via frequent reminders for advising appointments. *NACADA Journal*, 28(2), 28–32.
- Schwebel, D. C., Walburn, N. C., Klyce, K., & Jerrolds, K. L. (2012). Efficacy of advising outreach on student retention, academic progress and achievement, and frequency of advising contacts: A longitudinal randomized trial. *NACADA Journal*, 32(2), 36–43.
- Senaviratna, N. A. M. R., & Cooray, T. M. J. A. (2019). Diagnosing multicollinearity of logistic regression model. *Asian Journal of Probability and Statistics*, 5, 1–9.
- Spady, W. G. (1970). Dropouts from Higher education: An interdisciplinary review and synthesis. *Interchange*, 1(1), 64–85.
- Sperandei, S. (2014). Lessons in biostatistics: Understanding logistic regression analysis. *Biochemia Medica*, 24(1), 12–18.
- Stone, C., & O'Shea, S. (2019). Older, online and first: Recommendations for retention and success. *Australasian Journal of Educational Technology*, 35(1), 57–69. doi.org/10.14742/ajet.3913
- Strayhorn, T. L. (2013). Measuring race and gender differences in undergraduate students' perceptions of campus climate and intentions to leave college: An analysis in Black and White. *Journal of Student Affairs Research and Practice*, 50(2), 115–132.
- Taghizadeh Kerman, N., Banihashem, S. K., & Noroozi, O. (2022). The Role of Students' Attitude towards Online Peer Feedback in Successful Uptake of Feedback in Argumentative Essay Writing. In S. El Takach & O. T. Ozturk (Eds.), *Studies on Social and Education Sciences 2022* (pp. 264-274). ISTES Organization.
- Thomas, L., Kift, S. & Shah, M. (2021). Student retention and success in higher education. pp. 1-16 in M. Shah, S. Kift, & L. Thomas (Eds.). *Student Retention and Success in Higher Education: Institutional Change*

- for the 21st Century*. Springer. doi.org/10.1007/978-3-030-80045-1
- Thomas, N. G. (2020). Using intrusive advising to improve student outcomes in developmental college courses. *Journal of College Student Retention: Research, Theory & Practice*, 22(2), 251–272. doi: 10.1177/1521025117736740
- Tinto, V. (1975). Dropout from higher education: A theoretical synthesis of recent research. *Review of Educational Research*, 45(1), 89–125.
- Toven-Lindsey, B., Levis-Fitzgerald, M., Barber, P. H., & Hasson, T. (2015). Increasing persistence in undergraduate science majors: A model for institutional support of underrepresented students. *CBE—Life Sciences Education*, 14, 1–12.
- Upcraft, M. L., Gardner, J. N., & Barefoot, B. O. (Eds.). (2004). *Challenging and supporting the first-year student: A handbook for improving the first year of college*. Jossey-Bass Publishers.
- Van Duser, K. E., Lucas, C., & Cohen, S. (2020). The influence of rising tuition on first-year students' enrollment and persistence intentions. *College Student Journal*, 54(4), 421-430.
- Varney, J. (2013). Proactive advising. In J. K. Drake, P. Jordan, & M. A. Miller (Eds.), *Academic advising approaches: Strategies that teach students to make the most of college* (pp. 137–154). NACADA.
- Yue, H., & Fu, X. (2017) Rethinking graduation and time to degree: A fresh perspective. *Research in Higher Education*, 58, 184-213. doi: 10.1007/s11162-016-9420-4

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