Early Declaration of a College Major and Its Relationship to Persistence

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As college completion rates are a top priority for institutions and other stakeholders, understanding college student persistence is important. Some perceive students making an early decision about a major as necessary for success in college, arguing that enrolling as undeclared contributes to student attrition. Previous research about undeclared students and persistence, however, is limited, conflicting, and dated. For this longitudinal study, logistic regression analyses were conducted using institutional records for 4,489 first-time in college, full-time enrolled students from the Fall 2010 cohort at a large research university in the Western United States. The results show no difference in persistence between students who matriculate as declared versus undeclared majors, which has implications for advising practice.

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Degree completion emerged in recent years as a priority for college and university administrators, politicians, families, and students (Advisory Committee on Student Financial Assistance, 2012; National Commission on Higher Education Attainment, 2013). Government leaders expect greater accountability from institutions of higher education, generally and improved retention and completion rates, specifically (Horn & Lee, 2016). Graduation rates, which are frequently used by government and accreditation entities as a measure of institutional success, (Brubacher & Rudy, 1997; Duncan, 2013; Horn & Lee, 2016; Labi, 2015) commonly provide students and families a way to compare institutions while choosing which to attend. Students and their families want to know upfront if an institution is likely to graduate students in a timely manner.

When students drop out, it results in negative consequences for students, families, institutions, and surrounding communities (Barbatis, 2010). Many state governments have implemented funding formulas tied to institutional performance as reflected by graduation and retention rates (Miao, 2012). The better an institution performs, the better the funding support received. Conversely, institutions with lower performance results receive less funding. When institutions receive less funding, however, their resources for improving performance diminish proportionally, and the downward cycle continues. These lost funds extend beyond those coming from the state. Student attrition prior to completion of a degree also costs institutions thousands of dollars in lost student tuition and fees, as well as potential future alumni donations (DeBerard, Spielmans, & Julka, 2004).

The consequences of leaving college without completing a degree are serious for students and their families (DeBerard, Spielmans, & Julka, 2004). Debt acquired during college is costly (Hanford, 2011), and dropouts default on student loans at a rate four times higher than degree completers (Casselman, 2012). As completing only some college is rarely considered a viable credential qualifying one for white collar or professional work, career opportunities are often limited for those without a degree. Communities, too, bear the consequences. For instance, when a student leaves to attend college, members of the community, not just family members, are often invested in the student's pursuit of a degree (Grossman, 1984). When the student fails, others in the community are discouraged from trying as well. Thus, the success or failure of the individual student resonates well beyond the student.

As a result, it is important that institutions understand why students drop out and, conversely, what contributes to student persistence. Increasing the number of students who persist and graduate is integral for institutions, affecting funding, rankings, and perceived legitimacy. Improving completion and persistence rates is also necessary for institutions to fulfill their responsibility to provide economic mobility between generations, support local and surrounding communities, and serve as a public good.

Some stakeholders believe that college success depends upon students making early decisions about their majors. Texas State Higher Education Commissioner Dr. Raymund Paredes, for example, has stated, "there's a lot of research at the national

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level indicating that the sooner students make up their minds, the more likely they are to graduate" (Mangan, 2011). His sentiments are echoed by others, producing a widely-held belief that starting college undeclared is a contributing factor to students' failure to persist and complete their degrees (Allen & Robbins, 2008; Onink, 2010; Simon, 2012). Each year, between 22% and 50% of first-time college students enroll as undeclared (Gordon & Steele, 2015; Kramer, Higley, & Olsen, 1994). There is an assumption that these undeclared students are at risk of dropping out—or that there exists a significant overlap between undeclared students and students at risk of non-completion. The prevalent belief is that the earlier students declare a major, the higher the likelihood they will persist, graduate, and graduate on-time (DesJardins, Kim, & Rzonca, 2003; Leppel, 2001).

No such consensus is reflected in the limited research on this topic (Gordon & Steele, 2015). There is little agreement among those who have explored whether or not starting with a major has a relationship to persistence (Graunke, Woosley, & Helms, 2006). This is largely due to inconsistent definitions of "undecided." Complicating the matter further, the designation "undeclared" is used interchangeably with other labels, including: deciding, exploratory, general studies, open-option, pre-major, undecided, and undetermined. Some authors include students who change their majors in this population (Steele, Kennedy, & Gordon, 1993), while others do not (Anderson, Creamer, & Cross, 1989). Definitions of student persistence are also inconsistent throughout the literature (Hagedorn, 2012; Mortgenson, 2012). Equally problematic are the conflation of the terms *retention* and *persistence* (Renn & Reason, 2013) and the rapidly changing and often non-linear enrollment patterns of students (Hagedorn, 2012).

There is increasing consensus among students and families that majors must lead to jobs, creating higher demand for majors with perceived vocational value. As a result, students want to enter college with a guarantee of admittance to those majors. In the face of limited data, colleges and universities have frequently responded to these demands by encouraging students to both declare a major and do so as early as possible (Breneman, 1993). This has been reinforced by the movement to simplify major choices and degree plans, as reflected in the guided pathways model implemented at many two-year institutions (Bailey, Jaggars, & Jenkins, 2015). It appears that administrators and students' families increasingly agree on two things: (1) students should declare a major as early as possible, and (2) students should persist to degree completion. Because the push to declare a major early has a large impact on students, many of whom are ill-equipped as freshmen to know what they want to study and why, and because the existing literature cannot help us answer whether or not declaring a major early actually has an impact on student persistence, academic advisors will benefit from considering whether early major declaration and persistence in college are, in fact, correlated to one another. Therefore, this study addressed the following research question: does matriculating as undeclared emerge as a significant factor in the persistence of first-time college students enrolled full time?

Review of Literature

Only one study in the past 30 years has compared the persistence of undecided and decided students (Leppel, 2001). Steele, Kennedy, and Gordon (1993) examined the effects of advising programs on the retention of major-changing students. Their findings explained how advising strategies can impact major-changing students who are declared or undeclared. The limitation of both of these studies for those who would seek to understand major declaration's impact on persistence, however, is that neither examined student persistence based on the student's initial choice to matriculate as undeclared versus declared. Additionally, neither of these studies were operating with a clear definition of major-changers, making it impossible to isolate the findings to those who began as undeclared (Anderson, Creamer, & Cross, 1989).

The lack of scholarship on the topic has resulted in administrators and advising practitioners frequently operating under the unsubstantiated belief that major declaration helps students persist to graduation rather than using an evidence-based approach. In recent years, a number of dissertations have sought to remedy this (Ellis, 2011; Kittendorf, 2012; Pringle, 2014), but few, if any, have been subsequently published through peer review. Moreover, each relies on the same limited research mentioned previously as a basis for their findings.

Exploring the literature on major choice reveals that much of it has been derived from studies on decision making, or lack thereof, regarding vocational choices. A vocationally undecided student was believed by some to be facing a state of indecision that reflected normal developmental

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behavior (Akenson & Beecher, 1967; Grites, 1981, 1983; Titley & Titley, 1980). The opposing viewpoint suggested that undeclared students were experiencing more serious psychological concerns that influenced their ability to make decisions beyond the choice of a major or career (Burg & Mayhall, 2005; Fuqua & Hartman, 1983; Hartman & Fuqua, 1983; Mayhall & Burg, 2002). As indecision and indecisiveness are two distinct concepts, it is possible for both perspectives to correctly reflect unique subgroups of undeclared students (Barak & Friedkes, 1981; Fuqua, Newman, & Seaworth, 1988; Gordon, 1998; Jones & Chenery, 1980; Kelly & Pulver, 2003; Larson, Heppner, Ham, & Dugan, 1988; Lucas & Epperson, 1988, 1990; Savickas & Carden, 1992; Van Matre & Cooper, 1984; Vondracek, Hostetler, Schulenberg, & Shimizu, 1990; Wanberg & Muchinsky, 1992). Some students may be facing a temporary state of indecision (Goodstein, 1965; Holland & Holland, 1977; Osipow, 1999), while others need to address an indecisiveness personality trait that affects them across all situations that require making decisions. Holland and Holland (1977) expressed that "it is probably a mistake to treat all undecided students as if they had an indecisive disposition" (p. 413). This finding helps explain the difficulty in defining undecided students as one consistently homogeneous collective (Gordon & Steele, 2015).

The reasons for vocational indecision are different and unique for every individual (Taylor, 1982). There are likely an infinite number of factors leading to students' vocational uncertainty, including anxiety (Hawkins, Bradley, & White, 1977; Kimes, & Troth, 1974), career salience (Greenhaus, 1971; Greenhaus & Simon, 1977), locus of control (Hartman, & Fuqua, 1983), and self-efficacy (Taylor & Betz, 1983).

As mentioned earlier, only one study across three decades of literature has compared undeclared and declared students in terms of persistence in college. Leppel (2001) examined performance in college of undecided and decided students and determined that undecided students performed at lower rates, both in terms of academic achievement and persistence. This study has influenced thinking that undeclared students are at risk, and it is not the only study to do so. Earlier literature on student attrition led many to agree that starting without a major increases the student's likelihood of dropping out (Anderson, 1985; Beal & Noel, 1980; Foote, 1980; Noel, 1985; Sprandel, 1985). These studies' findings and methodologies are, however, problematic because their authors analyzed opinions and perceptions of students by administrators and staff rather than conducting empirical studies focused on the students directly (Lewallen, 1992, 1993). More importantly, these studies did not inspect the relationship between persistence and matriculation for students with or without a major.

At the same time that research on undeclared students and persistence provides an incomplete picture, research has found that it is students who matriculate as declared and subsequently change their major who are at risk of dropping out of college (Foote, 1980; Kramer, Higley, & Olsen, 1994; Titley & Titley, 1980). As a result, advisors who are on the front lines of students' and parents' questions about major declaration will benefit from examining the question further.

Conceptual Framework

Too often, studies designed to examine the effects of college majors and degrees have been incomplete, examining only possible outcomes, the effects of environments on outcomes, or the effects of inputs on outcomes (Astin & antonio, 2012), while rarely considering the relationships between the inputs, environment, and outcomes collectively. Astin's (1993) input-environment-output (I-E-O) model serves as the conceptual framework for this study as it provides a lens that does not simply attribute outcomes to the experiences that students have while in college. Instead, the I-E-O model requires the researcher to consider who the student is and was prior to entering the college environment and how that affects the predictability of the outcomes being measured while the student engages with elements within the environment. It then becomes possible "to control for the effects of initial student input difference by means of multivariate analyses" (Astin & antonio, 2012, p. 30). The inputs affect the environment and influence the outputs, and the environments affect the inputs and influence the outputs. For this study, the outputs included persistence in college by number of terms enrolled and year-to-year persistence.

Research Methodology

As aforementioned, the research question examined in this study, controlling for other possible factors, was: does matriculating as undeclared emerge as a significant factor in the persistence of first-time college students enrolled full time?

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Table 1. Summary of student demographics

Variable	Total	
	N	%
Race/ethnicity		
African-American/Black	141	3.1
American Indian/Alaskan Native	45	1.0
Asian/Asian-American	1891	42.1
Latino/Chicano	823	18.3
Pacific Islander	16	.4
White/Caucasian	1401	31.2
Not reported	134	3.0
Missing cases	38	.8
Total	4489	100.0
Gender		
Female	2463	54.9
Male	2026	45.1
Total	4489	100.0
Socioeconomic status		
Lower status	1458	32.5
Not lower status	2208	49.2
Income level non-response	823	18.3
Total	4489	100.0
First-generation status		
First-generation status	1707	38.0
Non-first-generation status	2549	56.8
First-generation status non-response	233	5.2
Total	4489	100.0
Residency		
In-state resident	4341	96.7
Out-of-state/international resident	148	3.3
Total	4489	100.0

Data and Methods

The data sources included in this longitudinal study were student academic records from institutional databases at the institutional site, a Carnegie Doctoral/Research-Extensive institution. Academic record data was retrieved for the cohort entering Fall 2010 as first-time college undergraduates enrolled full time. The data included information from the Fall 2010 quarter through the Summer 2016 term. The Fall 2010 cohort of students consisted of 4,489 students, not including students who transferred, enrolled part-time (fewer than 12 units), or were pursuing their second baccalaureate degree.

The student's academic program (or "major") at matriculation was included in order to classify students into undeclared or declared groups. Additional input variables considered as possible factors included: gender, race/ethnicity, residency, first-generation status, socioeconomic status, ACT/SAT entrance exam composite scores, earned high school grade point average (GPA), advanced placement (AP) exams, and dual enrollment credits completed. The demographics from the student sample are indicated in Table 1. Environmental variables included: academic unit (i.e., college or school) of initial enrollment, academic discipline area, developmental education/workload course enrollment, first-year seminar enrollment, and undergraduate research participation. The study's output variables measured persistence by total number of terms (in quarters) enrolled, first-year persistence, second-year persistence, and third-year persistence.

Analyses

Analyses of the data included both inferential and multivariate statistics. Independent t-tests were used when examining which population, undeclared or declared students, was more likely on average to persist for more terms. For the year-to-year persistence measures, logistic regression analyses were calculated to determine the extent to which starting undeclared versus declared predicted the likelihood of persistence in college from one year to the next (first-year, second-year, and third-year persistence).

Findings

As mentioned, college student persistence was measured in two ways: by number of terms (quarters) students persisted and year-to-year continued enrollment. An independent t-test with a 95% confidence interval (CI) was calculated to compare the mean number of quarters of enrollment for undeclared versus declared students. Table 2 depicts the results of the independent t-test. As independent t-tests require that the variance between groups be tested, the Levene test statistic

Table 2. Comparison of persistence by quarters for undeclared and declared students ($N = 4{,}489$)

	n	*Mean*	*SD*	*t*	*p*
Undeclared	896	11.71	2.800	2.586	.01
Declared	3593	11.44	3.064	2.586	.01

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was first calculated. Undeclared and declared students do appear to have different variances that are statistically significant at the $p < .01$ level, according to the homogeneity of variance assumption as tested using the Levene test ($F = 9.615$, $p = 0.002$). Undeclared students persisted for more quarters (11.71) than declared students (11.44) with a difference of .27 quarters. Although this difference was statistically significant ($p < .05$), the small difference in the average number of terms enrolled may not be practically significant. Therefore, it appears that undeclared and declared students persisted and remained enrolled for roughly the same number of quarters.

For the second measure, year-to-year persistence in college, logistic regressions were calculated for each year through the fourth year of enrollment. For each logistic regression, variables were organized into two blocks based on Astin's (1993) I-E-O conceptual model as operationalized for this study. The first block, block one, included the demographic and pre-college academic performance variables, or inputs. The environmental variables were included in block two of the regression models.

It is important in logistic regression models to ensure that assumptions are not violated (Lund Research Ltd., 2018). The assumption of linearity of the continuous variables SAT composite score, high school GPA, and dual enrollment credits were tested with respect to the dependent variable using the Box-Tidwell procedure (Box & Tidwell, 1962). Next, a Bonferroni correction was applied using all 30 terms in the regression model, resulting in statistical significance being accepted when $p < .0017$ (Tabachnick & Fidell, 2013). As a result, all continuous independent variables included in the persistence modeling were found to be linearly related to the logit of the dependent variable, and the assumption of linearity was not violated. The assumption of multicollinearity was tested using Variance Inflation Factor (VIF) values. For all of the variables included in the study, the VIF values were below a threshold of five. Although some VIF values may reflect correlation between certain variables, values below five indicate that multicollinearity was not violated (Minitab, 2013).

First-Year Persistence

As depicted in Table 3, the logistic regression model calculated for first-year persistence resulted in a statistically significant model for both blocks one and two. For block one, the model was statistically significant at the $p < .001$ level ($\chi^2(15) = 120.334$), explained 7.9% (Nagelkerke R^2) of the variance, and classified correctly 92.5% of the cases. To ensure goodness of fit for the model, the Hosmer and Lemeshow (HL) test was calculated. The HL test was not statistically significant ($\chi^2(8) = 11.589$, $p = .171$), resulting in goodness of fit for the model. For block two, the model was again statistically significant at the $p < .001$ level ($\chi^2(12) = 56.563$). For this block, the Nagelkerke R^2 statistic explained 11.5% of the variance, and the model once again classified 92.5% of the cases correctly. The model resulted in goodness of fit, as the HL test was again not significant ($\chi^2(8) = 5.496$, $p = .703$).

The findings from the regression calculated for first-year persistence resulted in no statistically significant difference between undeclared and declared students. Whether a student started with or without a major, there was no difference in the likelihood of persisting to the start of the second year. There were, however, other variables measured in the regression, some of which had a significant effect on the likelihood of first-year persistence in college.

When examining the input variables in block one, women were 1.297 ($p < .05$) times more likely to persist through the first year than men. Once the environmental variables were introduced in the regression in block two, gender no longer appeared as statistically significant. In both blocks one and two, race/ethnicity did not result in any statistically significant difference in the likelihood of first-year persistence for any one ethnic group when compared to White students.

For both block one and block two, in-state residency appeared to be a significant factor. In block one, in-state students were 2.272 ($p < .01$) times more likely to persist beyond the first year than out-of-state and/or international students. With the inclusion of the environmental variables in block two, in-state students were still more than twice as likely to persist to the second year (*Exp. (B)* = 2.203, $p < .01$) than their peers from out-of-state and/or other countries.

In terms of the pre-college academic performance, higher earned high school GPAs and higher SAT composite scores were associated with higher likelihoods of first-year persistence. This was true for both block one and block two of the regression model. The findings in block one reflect that with each one unit increase in a student's high school GPA, the odds of that student persisting increased by 3.244 times at the

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Table 3. Logistic regression analysis for first-year persistence ($N = 3{,}624$)

Characteristic	Model 1 (B)	Model 2 (B)
Race/ethnicity (reference = White)		
African-American/Black	.186	.097
American Indian/Alaskan Native	−.053	.069
Asian/Asian-American	.278	.279
Latinx/Chicanx	−.050	−.007
Pacific Islander	.060	.269
Other demographics		
Female	.260*	.212
Non-lower socioeconomic status	.111	.156
First-generation status	.018	−.007
In-state residency	.820**	.790**
Pre-college academic performance		
High school GPA	1.177***	1.208***
Advanced placement exams	.304	.327
SAT composite score	.001**	.001**
Dual enrollment credit	.165	.128
Number of dual enrollment courses	.010	.013
Academic program		
Declared major	−.335	−.168
College (reference = Engineering)		
Agricultural and environmental science	—	.343
Biological sciences	—	−.135
Letters and science	—	−.029
Academic discipline area (reference = collegewide)		
Agricultural sciences	—	−.733
Human sciences	—	.613
Humanities, arts	—	.331
Math and physical sciences	—	.271
Developmental education		
Enrollment in developmental education	—	.105
Number of developmental education courses	—	−.001
High-impact educational practices		
First-year seminars	—	.324*
Undergraduate research opportunities	—	1.349***

Note. B = regression coefficient. Cox and Snell $R^2 = .048$. *$p < .05$. **$p < .01$. ***$p < .001$.

$p < .001$ level. The effect of high school GPA was higher in block two of the regression model. For each one unit increase in the earned high school GPA, the odds of persisting increased by 3.346 times at the $p < .001$ level. Moreover, in both blocks one and two, the odds of first-year persistence increased by 1.001 times at the $p < .01$ level for each unit increase in SAT composite score.

Two of the environmental variables, both of which are considered high-impact educational practices, appeared to be statistically significant factors in first-year persistence. Students who enrolled in a first-year seminar were 1.382 ($p < .05$) times more likely to persist than students who did not enroll. Additionally, students who participated in undergraduate research opportunities were 3.855 ($p < .001$) times more likely to persist to the second year than students who did not participate. However, this does not necessarily reflect a causational relationship, as it is possible that students who participate in research are students who seek out opportunities or programs intended to enrich their experience for other reasons and would thus be the same students who seek out resources to be successful.

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Table 4. Logistic regression analysis for second-year persistence ($N = 3{,}624$)

Characteristic	Model 1 (B)	Model 2 (B)
Race/ethnicity (reference = White)		
African-American/Black	.322	.344
American Indian/Alaskan Native	−.147	−.047
Asian/Asian-American	.397**	.419**
Latinx/Chicanx	−.168	−.114
Pacific Islander	.096	.172
Other demographics		
Female	.260*	.040
Non-lower socioeconomic status	.078	−.116
First-generation status	−.129	−.140
In-state residency	.657*	.632*
Pre-college academic performance		
High school GPA	1.087***	1.128***
Advanced placement exams	.291*	.283*
SAT composite score	.001*	.001*
Dual enrollment credit	.205	.176
Number of dual enrollment courses	.008	.006
Academic program		
Declared major	−.196	−.061
College (reference = Engineering)		
Agricultural and environmental science	—	.456*
Biological sciences	—	.557**
Letters and science	—	.499**
Academic discipline area (reference = collegewide)		
Agricultural sciences	—	−.069
Human sciences	—	.521
Humanities, arts	—	.414
Math and physical sciences	—	−.165
Developmental education		
Enrollment in developmental education	—	.108
Number of developmental education courses	—	−.054
High-impact educational practices		
First-year seminars	—	.129
Undergraduate research opportunities	—	1.734***
Equal opportunity program	—	.124

Note. B = regression coefficient. Cox and Snell $R^2 = .073$. *$p < .05$. **$p < .01$. ***$p < .001$.

Second-Year Persistence

The logistic regression model calculated for second-year persistence, as depicted in Table 4, also resulted in a statistically significant model for both blocks one and two. The model was statistically significant for block one at the $p < .001$ level ($\chi^2(15) = 159.962$), explained 8.1% (Nagelkerke R^2) of the variance, and classified correctly 87.4% of the cases. The HL test was not statistically significant ($\chi^2(8) = 4.906$, $p = .768$), resulting in goodness of fit for the model. For block two, the model was significant at the $p < .001$ level ($\chi^2(27) = 273.026$), the Nagelkerke R^2 statistic explained 13.7% of the variance, and the model classified 87.6% of the cases correctly. Additionally, the model for block two resulted in goodness of fit, as the HL test was again not significant ($\chi^2(8) = 3.367$, $p = .909$).

The findings from the regression model calculated for second-year persistence also resulted in no statistically significant difference between undeclared and declared students. Just as with first-year persistence, whether a student started undeclared or declared, there was no difference in the likelihood of that student persisting to the start of the third year.

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Similar to the results for first-year persistence, the model calculated for second-year persistence demonstrated that, when examining the input variables in block one, women were more likely to persist. Specifically, women were 1.297 ($p < .05$) times more likely to persist to the start of their third year than men. As with the first-year persistence results, once the environmental variables were introduced in the regression model in block two, gender no longer appeared as statistically significant.

Race/ethnicity, however, did result in a statistically significant difference in the likelihood of second-year persistence for one ethnic group when compared to White students. In block one, Asian/Asian-American students were 1.488 ($p < .01$) times more likely to persist to the start of the third year than their White peers. In block two, this difference increased, as Asian/Asian-American students were 1.521 ($p < .01$) times more likely to persist to the start of the third year than White students. It should be noted that Asian/Asian-American students comprised 42.1% of the cohort.

As before, in-state residency appeared to be a significant factor in both block one and block two. In block one, in-state students were 1.930 ($p < .05$) times more likely to persist beyond the first year than out-of-state and/or international students. In block two, in-state students were still nearly twice as likely to persist to the third year (*Exp. (B)* $= 1.881$, $p < .05$) than their peers from out-of-state and/or other countries.

When calculating second-year persistence, higher earned high school GPAs and higher SAT composite scores were again associated with greater likelihood of persistence. The findings in block one reflect that with each one unit increase in high school GPA, the odds of persisting increased by 2.966 times at the $p < .001$ level. The effect from high school GPA was again higher in block two of the regression. For each one unit increase in the earned high school GPA, the odds of persisting increased by 3.089 times at the $p < .001$ level. For SAT composite scores, both blocks one and two demonstrated that for each one unit increase in SAT composite score, the odds of second-year persistence increased by 1.001 times, though this result was not as statistically significantly as with first-year persistence ($p < .05$ level).

Although not a factor in first-year persistence, one additional pre-college academic performance measure was found to be statistically significant at the $p < .05$ level for second-year persistence. Within block one, students who passed one or more AP exams were 1.337 ($p < .05$) times more likely to persist than students who did not. With the addition of the environmental variables in block two, students who passed AP exams were still more likely, though less so, (*Exp. (B)* $= 1.327$ $p < .05$) to persist to the third year than those students who did not pass an AP exam.

First-year seminars, though significant in first-year persistence, were not a significant environmental factor in second-year persistence. Undergraduate research, in contrast, was once again statistically significant. Those students who participated in undergraduate research opportunities had a higher likelihood of second-year persistence. More specifically, they were 5.661 ($p < .001$) times more likely to persist to the third year than students who did not participate in undergraduate research opportunities.

When comparing the college of first entry, using the College of Engineering as the comparison variable (or dummy variable), students who first enrolled as undeclared or declared in one of the other three undergraduate colleges were more likely to persist to the third year. Students who started in the colleges of Agricultural and Environmental Sciences (*Exp. (B)* $= 1.577$, $p < .05$), Letters and Science (*Exp. (B)* $= 1.648$, $p < .01$), and Biological Sciences (*Exp. (B)* $= 1.745$, $p < .01$) were all more likely to persist than students in the College of Engineering.

Third-Year Persistence

Like the previous models, the logistic regression calculated for third-year persistence was completed using two blocks, one with the input variables and one with the environmental variables, as depicted in Table 5. This regression model did not include cases of students who had graduated ($n = 55$) within three years as persisters or non-persisters in the results because they had completed a degree and were no longer at the institution. In block one, the regression model was statistically significant ($\chi^2(12) = 123.638$, $p < .001$), explained 6.1% (Nagelkerke R^2) of the variance in persistence to the fourth year, and classified correctly 85.7% of the cases. The HL test was not significant ($\chi^2(8) = 4.510$, $p = .808$), resulting in goodness of fit for the third-year persistence regression model. In block two, the regression model was statistically significant ($\chi^2(24) = 234.047$, $p < .001$), explained 11.3% (Nagelkerke R^2) of the variance, and again

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Table 5. Logistic regression analysis for third-year persistence ($N = 3{,}569$)

Characteristic	Model 1 (B)	Model 2 (B)
Race/ethnicity (reference = White)		
African-American/Black	−.539	−.550
American Indian/Alaskan Native	−.780	−.728
Asian/Asian-American	.291	−.340
Latinx/Chicanx	−.719	−.701
Pacific Islander	1.090	−.875
Other demographics		
Female	.341**	.141
Non-lower socioeconomic status	−.171	−.089
First-generation status	−.228	−.195
In-state residency	.698**	.725**
Pre-college academic performance		
High school GPA	.728***	.693***
Advanced placement exams	.284*	.278*
SAT composite score	.000	.000
Dual enrollment credit	.264	.244
Number of dual enrollment courses	−.019	−.021
Academic program		
Declared major	.232	.158
College (reference = Engineering)		
Agricultural and environmental science	—	.287
Biological sciences	—	.671***
Letters and science	—	.429*
Academic discipline area (reference = collegewide)		
Agricultural sciences	—	−.011
Environmental sciences	—	−.176
Human sciences	—	.689
Humanities, arts	—	.407
Math and physical sciences	—	−.083
Developmental education		
Enrollment in developmental education	—	.076
Number of developmental education courses	—	−.070
High-impact educational practices		
First-year seminars	—	.066
Undergraduate research opportunities	—	1.392***

Note. B = regression coefficient. Students who graduated within 3 years were not included in this regression. Cox and Snell $R^2 = .073$. *$p < .05$. **$p < .01$. ***$p < .001$.

classified correctly 85.7% of the cases. There was once again goodness of fit, as the HL test was also not significant ($\chi^2(8) = 6.848$, $p = .553$).

The findings from the regression model calculated for third-year persistence again resulted in no statistically significant difference between undeclared and declared students. Just as with the previous persistence-by-year measures, whether a student started undeclared or declared made no difference in their likelihood of persisting.

In block one for the third-year persistence model, gender was again a significant factor prior to the introduction of the environmental variables. More specifically, female students were 1.418 ($p < .001$) times more likely to persist into the fourth year than male students. In block two, as with the previous persistence-by year-measures, gender no longer appeared statistically significant in terms of third-year persistence once the environmental variables were included in the regression model.

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Block one of the third-year persistence model also shows that Asian/Asian-American students (*Exp. (B)* = 1.372, $p < .05$) were statistically more likely to persist to the start of the fourth year when compared to White students. This was also true for block two, where the results reflected that Asian/Asian-American students were 1.358 ($p < .05$) times more likely to persist than their White peers. Moreover, in-state resident students were more likely than out-of-state/international students to persist to the start of the fourth year in both block one (*Exp. (B)* = 1.973 ($p < .01$) and block two (*Exp. (B)* = 1.995, $p < .01$).

In terms of pre-college academic performance measures, high school GPA remained statistically significant. In block one, for each unit increase in high school GPA, the odds of third-year persistence increased by 2.018 times at the $p < .001$ level. With block two, high school GPA was statistically significant, but slightly less so, as for each unit increase in high school GPA, the odds of persisting into the fourth year increased by 1.982 times at the $p < .001$ level. For students who passed one or more AP exams, there was again a higher likelihood of persisting. In block one, students who passed AP exams were 1.325 ($p < .05$) times more likely to return for the fourth year than students who did not. In block two, students who passed AP exams were 1.315 ($p < .05$) times more likely to persist.

As one of the high-impact practices examined in this study, only undergraduate research was statistically significant in terms of third-year persistence. Participants in undergraduate research opportunities were 4.024 ($p < .001$) times more likely to persist into the fourth year of college. Additionally, when comparing the college of first entry, students who first enrolled as undeclared or declared in one of the other three undergraduate colleges were more likely to persist to the fourth year. Students who started in the colleges of Agricultural and Environmental Sciences (*Exp. (B)* = 1.532, $p < .05$), Letters and Science (*Exp. (B)* = 1.567, $p < .01$), and Biological Sciences (*Exp. (B)* = 1.985, $p < .01$) were all more likely to persist than students in the College of Engineering.

Limitations

This design of this study includes several limitations. As each college or university is unique in a variety of ways, the use of one institutional site limits the applicability of the results to other institutions. Some of the variance factors between institutions include: size, geographical location, student population, major and minors offered, technology, and mission. Certain factors may limit applicability even at other similar research institutions. Specifically, the institutional site in this study operated on a quarter-based academic calendar. Research institutions that operate on a semester-based academic calendar may find different outcomes.

Another limitation of this study is that the cohort included only first-time students enrolled full time. The findings, as a result, could vary for students who enroll part-time, transfer from another institution of higher education, or were enrolling to pursue their second baccalaureate degree.

Finally, one of the limitations results from the data available at the institutional site. A number of other variables might mediate the effects of the interactions between the inputs and the environment on the measured outcomes of this study. For example, the study examined three of the ten types of High-Impact Educational Practices. Additionally, some of the effects measured in this study may differ over time due to changes in student demographics, the way programs and majors are structured, and the possible unique interactions that each student has while at the institution.

Discussion

Undeclared and declared students are more similar than they are different. When a student matriculated, whether undeclared or declared, that first decision regarding major declaration was not a predictor of student persistence. Across each persistence-by-year measure, there was no difference between undeclared and declared students in terms of likelihood of persistence in college. Contrary to perceptions reflected in the literature, undeclared students are not at a higher risk of dropping out than declared students.

Within each of the various demographic groups, there exist students who are undeclared and others who are declared. Neither status of declared or undeclared reflects a homogenous group of students with easily defined and consistent characteristics (Gordon & Steele, 2015). Students who are undeclared or declared variously earn higher and lower high school GPAs and higher and lower SAT composite scores. Within both the undeclared and declared populations are students who did or did not complete dual enrollment and/or AP credit

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while in high school, as well as student who need or do not need remediation in mathematics, English, and/or chemistry. In other words, characterizing undeclared and declared students is difficult, and neither group should be defined solely by whether they declared a major or not. As a result, it may be more important to examine other factors such as demographic, engagement, or environment.

Implications

If, as this study found, matriculating with a declared major does not predict persistence, there are implications for institutional leaders, policy makers, and student-support practitioners to consider. For example, policies that require students to select a major upon initial entry into an institution are unnecessary, since they do not increase the likelihood of students persisting in college. Institutions that currently do not have an option to select *undeclared* or *undecided* should consider adding such an option given that many declared students change their majors (Kramer, Higley, & Olson, 1994). Conversely, the argument could be made that, if the likelihood of persisting is not affected by an early declaration of a major, institutions could require all students declare a specific program of study. Still, students face a variety of pressures to decide (Grites, 1981, 1983), and such a policy would only contribute to the pressure. Additionally, students want to know that their institutions care about their welfare (Braxton, Hirschy, & McClendon, 2004). Such a policy would communicate the opposite by forcing a premature and uniformed early decision. Policies related to major declaration and major changing should be designed to allow, and even encourage, students to take time to explore possible majors. Similarly, admissions practices should place less emphasis on academic major. Whether they do so early or not, students who select a major with a higher level of congruence with their personal interests are more likely to maintain a choice of academic program (Allen & Robbins, 2008; Leuwerke, Robbins, Sawyer, & Hovland, 2004). Sometimes, finding a major that is highly congruent with the student's interests requires time to explore options, especially given that many majors are unknown to students prior to matriculation.

The results of this study also have implications for institutional financial aid policies and practices. Some institutions interpret federal financial aid policies as excluding undeclared students from eligibility and will not disburse federal aid to students who first enroll as undeclared. That interpretation, according to the findings from this study, reflects statistically unfounded policy. Many colleges and universities do permit students to be undeclared or undecided and provide them financial aid without violating federal financial aid regulations. All institutions should follow this practice. Students who need or wish to explore majors should not be penalized when declaring a major early makes no difference in the likelihood of persisting.

Furthermore, many institutions have implemented incentive-based budget systems (Hossler, 2004) which allocate funding based, in part, on the number of students who are declared in each major. This leaves undeclared students and the departments that enroll a large proportion of undeclared students unable to access the same level of resources or support that declared students and departments that enroll declared students receive. Moreover, these systems do not take into account that many declared students change majors at a rate much higher than undeclared students (Kramer, Higley, & Olson, 1994). If undeclared and declared students are equally likely to persist, institutional leaders may need to reconsider how funding is allocated, as incentive-based budget systems that operate in this manner do not communicate a sense of care for the welfare of the student and the department's role in student exploration, which in turn could impact attrition rates (Braxton, Hirschy, & McClendon, 2004).

There are also implications for the practice of academic advising. The findings suggest that other variables, such as demographic factors, may be more important for advisors to consider than whether the student has declared a major. To adequately address these factors, advisors must demonstrate cultural competence and humility. Best practice suggests that an advisor self-assesses his/her cultural competence and behave with greater cultural humility. Through this process, they can better address the unique needs of each student (Clark & Kalionzes, 2008; Harding, 2008; Moorhead, 2005). In practice, because each student experiences an intersection of identities (Crenshaw, 1989; Cunningham, 2016), advisors should take the unique needs of each student into account rather than focusing on a single demographic variable in the advising process (Harding, 2008; Johnson, Walther, & Medley, 2018).

Academic advisors, whether professional staff or faculty, should engage in advising both declared

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and undeclared students about major and career exploration. For advisors to assist students with major exploration, they must take time to prepare in advance for each interaction the way an instructor might prepare for a class. Advisors should determine which learning outcomes each student needs to achieve in order to progress through the process of major exploration and choice. This also requires structuring interactions with the student in such a way that assesses where the student is in terms of their decision, identifies what further information they may need to make their decision, and assists the student in taking the next steps. Additionally, advisors must follow up with the student in a timely manner to be sure the student is making progress. This means that advisors must go beyond discussing what courses to take in the next term and consider the student's broader academic career and goals.

Advisors should start this work with students early, beginning with their first interaction. Undeclared students have essentially declared a desire and need for assistance with exploring and choosing an initial choice of major. Advisors should support that exploration without pressuring the student to quickly declare a major. Declared students, in contrast, need assistance with either confirming their initial major choice, revising that choice, or rejecting and finding a new interest-congruent major to pursue.

Conclusion

The popular perception has been that undeclared students are at greater risk of dropping out of college than their declared peers. Many believe that for students to persist in college and to persist to degree completion, they must declare majors as early as possible (Allen & Robbins, 2008; Mangan, 2011; Onink, 2010; Simon, 2012). Those perceptions regarding undeclared students, however, are not supported by the findings of this study. Undeclared and declared college students are more similar than different, especially in terms of persistence. Rather than requiring or expecting students to make a premature, uninformed decision, institutional policy and practice should permit and encourage students to explore their options. All students should be approached as if they are in need of assistance with major exploration. The findings from this study also reflect that there are some perceived truths regarding major declaration that can lead to misperceptions of students and/or student persistence and thus perpetuate inequity. Despite these beliefs, being undeclared is not indicative of a deficiency or greater risk of dropping out of college. Therefore, these findings should remind advising practitioners that other perceived "truths" we have about students may also be wrong.

Finally, there remains research to be done. Next steps in research into the impact of major choice should include demographics and involvement in high-impact educational practices, as these appear to influence students' likelihood of persistence.

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