

# How Changing Majors Impacts Academic Performance among Undergraduate Students

Min Xu & Chandra R. de Silva

Old Dominion University

DOI: <https://dx.doi.org/10.47772/IJRISS.2024.803005S>

Received: 20 March 2024; Accepted: 28 March 2024; Published: 27 April 2024

## ABSTRACT

This study investigates changing majors among undergraduate students. Through retrospectively tracking five graduating classes at a regional research university, the study provides empirical evidence as to when students declare their major, reach their final decisions about a major, and explores when it would be too late to change a major in order to graduate in a timely fashion. The study also examines the relationship between changing majors and academic performance. The results which suggest the need to provide students, especially freshmen with early proactive assistance in major selection might address concerns of parents and students about choosing a college major and inform academic advisers as they design programs to help students explore and decide on majors while improving timely graduation.

## INTRODUCTION

Choosing a major is one of the most important decisions which students make in college, and many factors contribute to the process of making this decision (Andrews, 2006; Cuseo, 2005; Hansen, 2007; Johnson 2005). The literature suggests that most new entering students are exploratory or investigative in terms of choosing a major. Being undecided, or changing the originally selected major becomes normal in a major selection process. The fact that about half of undergraduate students changed their major at least once before graduating has been noted for years (Gordon, 1984; Kramer, Higley, and Olsen, 1993, Wine, Janson and Wheelless 2011). Accordingly, researchers in the field have concluded that it is not meaningful to continue comparing the characteristics and performance of the undecided/major changers to those who do not change their major (Cuseo, 2005; Lewallen, 1995). Instead, they suggested that future research should examine the longitudinal process of how students go about deciding on their majors (Cuseo, 2005).

This study attempts to examine the longitudinal major selection process of bachelor's degree completers, that is, those who succeeded in college at a large research intensive university. It correlates change of majors with academic performance and suggests policies that could help all students to become degree completers.

## LITERATURE REVIEW

Previous research on choosing college majors has classified students into groups (e.g., the undecided, major changers, and the decided) and focused on identifying the characteristics of undecided students and comparing their performance to that of decided students (Cuseo, 2005).

### Undecided or Exploratory

Diverse definitions of “the undecided” exist in literature. The undecided are most often defined as students

who are unwilling, unable, or unprepared to make educational or vocational choices; and “undecidedness” can be a measure of the certainty of, or satisfaction with, student choice. (Brown, 2009; Gordon, 1995; Lewallen, 1995). Non-degree students are considered as undecided (Lewallen, 1995). Major changers (students who have changed their major at least once) have “also been classified under the generic rubric, undecided” (Cuseo, 2005, p. 30). Undeclared and undecided are sometimes used interchangeably (Cuseo, 2005). Institutions differ in academic policies regarding whether to push early major declaration. At some institutions, students are required to select/declare a major in the college application.

In addition to the diverse definitions of undecidedness, there are conflicting perspectives concerning whether being undecided differs from being decided. Some researchers believed that undecided students are “at-risk” students, and being undecided is troublesome and an attrition factor; others found that being undecided is a prevalent condition on today’s college campuses (Cuseo, 2005; Foote, 1980; Lewallen, 1995). More than three decades ago, Foote (1980) found the majority of new students (more than 90% of the arts and sciences freshman class) were undecided about their academic major and needed appropriate help in academic/career planning. According to Anderson, Creamer, and Cross (1989), undecided and decided students are not much different in terms of demographic and performance variables. Moreover, being undecided at college entrance is not necessarily a negative phenomenon. Kramer, Higley, and Olsen (1993) studied the graduating classes of 1980 through 1988 and found that students who did not choose a major during their first semester made fewer changes by degree completion than those who had initially selected a major in their first semester in college. Therefore, these authors suggest giving entering students broader latitude to explore the university and helping them to choose a major that match their interests and abilities.

The diverse definitions of “undecidedness” as well as the inconsistent findings on undecided students suggest diversity within the undecided population and little difference between this population and the decided students. As Lewallen (1995) noted, “not much is to be gained from continued research comparing undecided and decided students. These groups have been compared repeatedly using a wide array of measures. Even with varying definitions of decidedness, the results point to the conclusion that these two groups are more similar than different” (p. 28). Therefore, “Clearly, the time has come to formally recognize in our policies and practices that the majority of entering students are in an undecided mode. Being undecided is not the exception, but rather the norm” (Lewallen, 1992, p.176). Through a comprehensive review of the existing literature on student decisions about college majors, Cuseo (2005) concluded that it would be more accurate to use the term “exploratory” or “investigative” than “undecided” to refer to our new students.

### **Changing Majors and Academic Performance**

A high percentage of students change majors. Foote (1980) reported that 87% of new students with a specified major changed their major at least once during their first two years of college. An Education Advisory Board (EAB) report (Venit 2016) covering ten institutions estimated that 75 to 85 percent of undergraduate students change their majors at least once. Kramer, Higley, and Olsen (1993) reported that 82% of the entering students change their major during their first year in college. Indeed, high percentages of major changers have been reported at all institutional types, including selective private universities, large research universities, and small liberal arts colleges (Cuseo, 2005).

Many factors lead to changing a college major. Students may lack information, experience, or planning and decision making skills required to select a major that is congruent with their interests and abilities (Kramer, Higley, & Olsen, 1993; Firmin & MacKillop 2008). Selecting a major could be especially difficult for students from disadvantaged backgrounds, who often transfer from community colleges and lack the resources and social capital to make informed decisions (Terenzini 1996) Changing a major may also reflect an underlying process of cognitive maturation and goal clarification (Tinto, 1993; Gordon 1995; Cuseo,

2005; Johnson 2005). As Tinto (1993) stated, “Movements from varying degrees of certainty to uncertainty and back again may in fact be quite characteristic of the longitudinal process of goal clarification which occurs during the college years. Not only should we not be surprised by such movements, we should expect, indeed hope, that they occur” (p.41). Empirical evidence for the cognitive maturation process of students’ decision-making is that students reported spending more time on career and major concerns during the sophomore year than in their firstyear. First-year students often focus more on college courses, campus issues, and personal problems (Gardner, 2000). Other things being equal, second-year students should have a better understanding of how curricular experience in a major relates to career and personal goals. All the aforementioned factors suggest that identifying a major congruent with one’s interests, abilities, and values is an investigative and exploratory process (Cuseo, 2005).

Other student variables have also been studied in relation to changing majors, including academic preparation, gender, and transfer status. According to Kramer, Higley, and Olsen (1993), academic preparation during high school is not strongly correlated with the number of major changes; females changed majors slightly fewer times than males, but this result may vary by academic college. Transfer students with fewer than 24 transfer credit hours behaved the same way as freshmen in terms of the number of major changes. Therefore, the number of major changes may not relate to their status as transfer students but as to how far they are along in their academic career. The further along this path, the more academically stable they are, and therefore, fewer the changes they make.

Regarding the relationship between changing majors and college performance, Micceri (2001) reported that major changers displayed a higher graduation rate than students who made no changes to their major. He suggested that changing one’s major might double graduation chances, suggesting that changing majors may relate to an interest in attaining a degree or continued enrollment. In addition, major changers attempt and complete more credit hours than non-changers (Anderson, Creamer, & Cross, 1989). While changing the major may relate to increased persistence and graduation rates as suggested by Micceri (2001), it may also lead to extended time to degree. As Cuseo (2005) states, “Naturally, there is a downside to changing majors... it may adversely affect the outcome of time to graduation—if the change occurs after a sizable number of credit hours have been accumulated in a previous major” (p. 31). Some empirical evidence available, however, seems to challenge this view. Kramer, Higley, & Olsen (1994) reported that “since 1981, the number of semesters in attendance increased steadily, while the rate of change per semester remained constant until 1986 and then declined somewhat” (p. 93). Therefore, they could not correlate the rate of changing majors with the increased length of time to degree. In relation to community college students, Liu and Kopko (2021) state that “Switching majors had no statistically significant effect on associate degree completion” (p. 500). However, Foraker (2012) in a study of three cohorts at Western Kentucky University concluded that changing majors within the first two years had no negative effect on student performance but that changing after the second year, correlated a longer time to degree. The relationship between changing majors and the length of time to degree is an issue that will be examined further in this study.

### **The Purpose of this Research Study**

A review of the literature suggests that choosing a major is a longitudinal, exploratory process. Being undecided or changing major is a normal event occurring during the process of discovering a majors that fit a student’s interests and abilities. Therefore, it is not meaningful to continue classifying students as undecided, major changers, and decided. Instead, we need to view all students as one group of major explorers and to better understand the process of how they decide on a major and when they reach these decisions about their major. As pointed out by Cuseo (2005), “it may now be time to engage in research on the process of how students go about deciding on a major (or deciding to remain “undecided”) and move toward longitudinal assessment of when students reach these decisions during their college experience” (p.

32). As such, the purpose of this study is to describe the pattern of changes in college majors by focusing on when students reach their decisions on majors. Unlike most of the previous research that used the population of all entering college students, including those graduated or dropped out eventually, this study focuses only on baccalaureate degree completers. Through focusing on those who succeeded in college, we hope to gain more insights on how to help all students choose a college major and complete their college degree. Specifically, this study addressed the following six research questions:

1. What percentages of undergraduate students change majors? And how many times do they change majors?
2. When do students declare their majors?
3. When do students reach their final decisions about their college majors?
4. When would it be too late to change majors if a student intended to graduate in four to six years?
5. What is the pattern of changes in major across colleges/discipline areas?
6. Does changing one's major relate to student academic performance?

## METHODOLOGY

The sample for this study consists of the graduating classes of 2004 through 2008 (N=11,175) from a large research institution in Virginia, USA. The students entered the university as different types of students: *freshmen* who had never attended a postsecondary institution, *non-degree seeking* students, and *transfer* students who had already attended another college or university. Depending upon the credit hours students have earned prior to transferring, transfer students can be further classified into four groups: *transfer freshmen* (with few than 26 credit hours), *transfer sophomores* (with at least 26 but fewer than 58 credit hours), *transfer juniors* (with at least 58 but fewer than 90 credit hours), and *transfer seniors* (with at least 90 credit hours). The percentage of each type of students is steady across the five graduating classes: approximately 41% entered as freshmen, 1% as non-degree seeking students, and 58% as transfer students.

The data used for analysis are from the frozen headcount and course enrollment files maintained at the institution. Some characteristics of the data set need to be noted. Students can change their majors several times during a semester but the frozen data saves only the last record of change for a semester. This data set thus does not capture multiple changes in majors that might occur within a single semester. Secondly, all students enter the institution either with an intended major or being undecided about a major. At some point after they enter the university, they are admitted to an academic major and become declared. Unlike some institutions, the selected university does not have a policy to push students towards an early major declaration. Academic colleges at this institution also have different requirements students must meet before they can declare their majors. Before the formal declaration of the major, those with intended majors can record a change in "intent" and this is recorded as a change in the major. For our purposes, declaring a major by a student who had declared an "intent," is not considered as a change in major if the student does not change her decision about the major at the time of the formal declaration of a major. However, those who are admitted as "undecided" students are recorded as having changed their major at least once because they need to choose a major before graduation.

This study retrospectively tracks five graduating classes from degree completion to their first semester at the university. For analysis, the study employs simple descriptive statistics, such as frequency counts and percentages, and correlation analysis.

## RESULTS

In this section, we report the findings for each research question:

**Research Question 1:** What percentages of undergraduate students change majors? And how many times do they change majors?

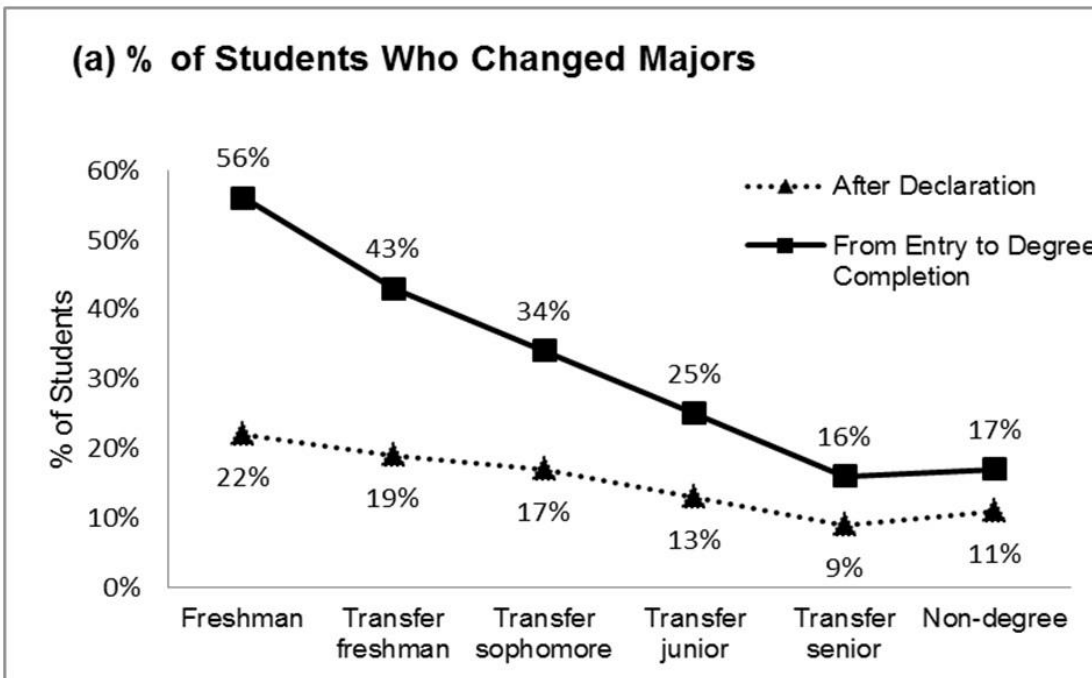
As shown in Table 1, the percentage of students who changed majors was steady across the five graduating classes. On average, 39% of all graduates changed their major at least once before degree completion, and 17% of them changed majors after their major declaration, suggesting that students became academically more stable after major declaration. The number of major changes is also steady across the five graduating classes, and the average number of major changes is 0.21 after major declaration, 0.5 over the course of their entire college career. The average number of major changes is small because around 61% of degree completers who did not change their major would have the number of changes as zero. If we count only the degree completers who changed majors, the average number of major changes is 1.24 after major declaration and 1.28 over the entire college career.

Table 1: Changing Majors— % of Major Changers, Number of Changes, Timing, and Length of Time to Degree

	<u>Graduating Class</u>					Total
	2004	2005	2006	2007	2008	
Number of Graduates	1,670	2,079	2,275	2,493	2,658	11,175
% of Students Who Changed Majors						
From College Entry to Completion	36%	38%	39%	41%	39%	39%
After Major Declaration	16%	18%	18%	18%	16%	17%
Average Number of Major Changes						
From College Entry to Completion	0.46	0.49	0.51	0.53	0.49	0.50
After Major Declaration	0.20	0.22	0.23	0.23	0.19	0.21
Number of Semesters Taken to Declare a Major	3.44	3.59	3.65	3.90	3.96	3.74
Number of Semesters Taken to Make Final Decision on Major	3.16	3.39	3.70	3.91	4.04	3.69
Time to Degree (in Semester)	9.68	10.26	10.44	10.81	10.90	10.38

Regarding changing majors by student type, a higher percentage of entering freshmen changed majors both after major declaration and over the course of their entire college career (Fig. 1 (a)). Freshmen also changed majors more times than other types of students, both after major declaration and over the course of their entire college career (Fig. 1(b)). However, after major declaration the difference between freshmen and transfer freshmen in the number of major changes is not statistically significant, suggesting that freshmen may have gained meaningful curricular experience by the time of their major declaration.

Fig. 1: Changing Majors by Student Type



Research Question 2: When do students declare their majors?

As shown in Table 1, the average time to major declaration is increasing but relatively steady across the five graduating classes. On average, it took undergraduate students 3.74 semesters to declare their major, that is, they declared their major during their fourth semester in college.

The average time needed to make a major declaration also differs by student type. As shown in Table 2, it took freshmen longer (5.38 semesters) than other groups to become declared perhaps due to their lack of curricular experience. The types of transfer students are defined based upon the number of college credit hours completed before entering this institution. Therefore, the results show that the more credit hours transfer students have earned, the less time they would take to declare their majors.

Table 2: Time to Major Declaration, Final Major Decision, and Degree Completion by Student Type

	Time to Major Declaration	Time to Final Decision on Major	Time to Degree
Freshman	5.38	5.55	13.03
Transfer freshman	3.86	3.98	11.57
Transfer sophomore	2.85	2.76	9.56
Transfer junior	2.43	2.17	8.16
Transfer senior	2.10	1.69	7.54
Non-degree	1.94	1.85	7.99

Research Question 3: When do students reach their final decisions about their major?

We defined time of “final decision on major” as the time when they had the major (either intended or declared) with which they graduated. To estimate when students reached their final decisions about their major, we counted the number of semesters students had spent by the time they made their last change in major. The number of semesters students spent to make their final decision and the length of time to degree are both also displayed in Table 1. As Table 1 shows, the average number of semesters students spent to decide on their majors is increasing but is relatively steady across the five graduating classes. On average, these graduates spent 3.69 semesters to make their final decision about major. That is, they would make their final decision about major during their fourth semester. Apparently, the majority of them had decided on their eventual major by the time they were ready to declare their major (time to major declaration: 3.74 semesters). Also, it appears that the later students decided on their major, the longer their time to degree.

The times taken to make final decisions and to degree completion also vary by student type, and this information is displayed in Table 2. As shown in Table 2, freshmen took longer to make their final decisions about major and to complete their degree. How late would it be considered too late to change majors in order to graduate in a timely fashion? This question is addressed in the next section.

**Research Question 4:** When would it be too late to change college majors if a student intended to graduate in four to six years?

To answer this question, we divided our cohorts of graduates into four groups based on length of time to degree: graduated within four years, during the fifth year, during the sixth year, and after the six years. The average number of semesters taken to the final decision about the major for the four groups will shed light on when it would be too late to change college majors and still graduate in four to six years.

Since freshmen need longer to make final decision about the major and to graduate than other types of students, the average time freshmen need to make their final decision represents a conservative estimate of the time needed to make final decisions for all graduates. As shown in Table 3, freshman students who graduated within four years spent an average of 4.3 semesters to decide on their major, suggesting that all types of students should have reached their final decision on a major before the end of the fifth semester if they plan to graduate within four years. Similarly, those who expect to graduate during their fifth year would have to decide on their major by the end of their sixth (5.92) term. If a student has not decided on his major by the end of the 11th term, it is unlikely that he could graduate within six years.

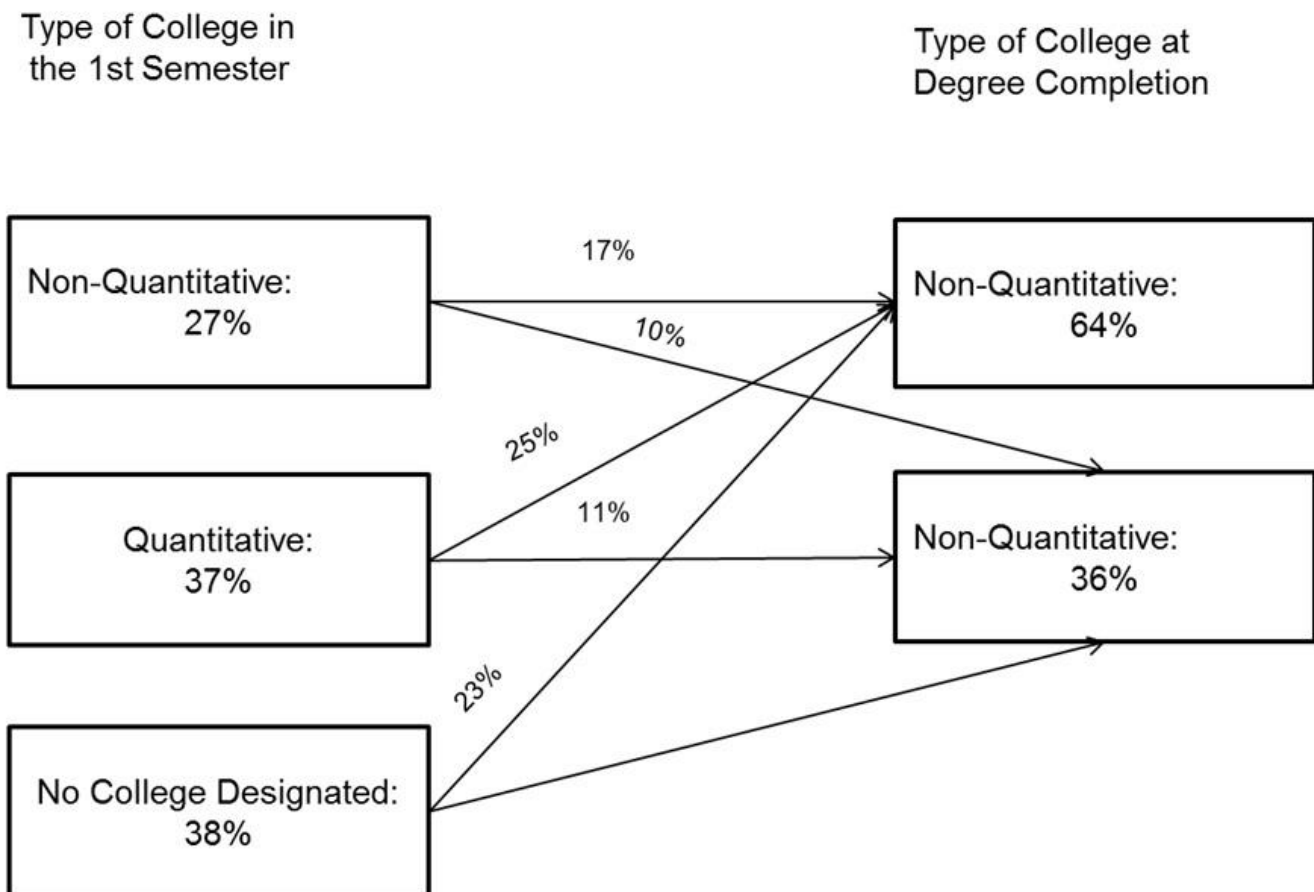
Table 3: Time to the Final Major Decision by Student Type and Length of Time to Degree

	Group by Time to Degree				
	<= 4 yrs	5th yr	6th yr	> 6yr	Total
Freshmen	4.30	5.92	7.84	10.52	5.55
Transfer Freshmen	2.96	5.09	7.73	6.17	3.98
Transfer Sophomore	2.36	4.34	5.28	6.54	2.76
Transfer Junior	1.89	3.56	5.72	6.26	2.17
Transfer Senior	1.58	2.04	5.38	3.77	1.69
Non-Degree	1.68	3.71	1.00	3.00	1.85
All Graduates	2.66	5.45	7.31	8.64	3.69

**Research Question 5:** What is the pattern of changes in major across colleges/discipline areas?

The preceding results indicate that 39% of all 11,175 students changed majors before degree completion. Among those who changed majors, around 76% (N=3,298) also switched colleges. Changing majors between colleges is often a more dramatic change in career fields. Therefore, we would like to identify the pattern in changing colleges. There are six academic colleges at this institution: *Arts and Letters*, *Business and Public Administration*, *Education*, *Engineering and Technology*, *Health Sciences*, and *Sciences*. To make it easier to discuss the pattern of changing college or changing major between colleges, all colleges at this institution can be divided into two types, quantitative and non-quantitative fields, based on whether they require intensive math coursework (at least Calculus I or equivalent). Quantitative fields refer to the colleges that the majority of their majors require intensive math coursework, such as Colleges of Sciences, Engineering and Technology, and Business and Public Administration. Non-quantitative fields usually do not require intensive math coursework, and these fields include Education, Arts and Letters, and Health Sciences. The pattern in changing colleges becomes clear in Fig. 2. As shown in Fig. 2, in their first semester, 27% of those major changers were in non-quantitative colleges/fields, 37% were in quantitative colleges/fields, and 38% of them were not designated to any college (percentages may not sum to 100 percent due to rounding). By degree completion, the majority of students (64%) had moved to non-quantitative fields regardless of the type of college they initially selected at the institution. Students also migrated between quantitative fields, but fewer of them (10% of all graduates) would change from non-quantitative to quantitative fields. In addition to describing college changes in terms of quantitative and non-quantitative fields, there can be other lenses through which we can examine the pattern of college changes. Nonetheless, Fig. 2 provides one useful way to summarize the pattern of change in major/college.

Fig. 2. Pattern of College Changes (N=3,298)





**Research Question 6:** Does changing one’s major relate to student academic performance?

To answer this research question, we performed a correlation analysis of the four variables: number of major changes, time to degree, credit hours taken, and cumulative GPA. In this analysis, we counted the number of changes in major over the course of their entire college career. The credit hours taken included only those taken at this institution (not transfer hours), and neither transfer course grades were included in calculating cumulative GPA. The Pearson correlation coefficients between the four variables are displayed in Table 4.

Table 4: Correlation between the Number of Major Changes and Academic Performance (N = 11,175)

	Number of major changes	Time to degree	Credit hours	Cumulative GPA
Number of major changes	1.00	0.33	0.34	-0.13
		(<.0001)	(<.0001)	(<.0001)
Time to degree			0.64	-0.36
			(<.0001)	(<.0001)
Credit hours				-0.25
				(<.0001)
Cumulative GPA				1.00

As shown in Table 4, there are statistically significant positive correlations between the number of major changes and time to degree ( $r \approx 0.33$ ,  $p\text{-value} < .0001$ ), and between the number of major changes and credit hours taken ( $r \approx 0.34$ ,  $p\text{-value} < .0001$ ). The correlation between the number of major changes and GPA is negative and statistically significant ( $r \approx -0.13$ ,  $p\text{-value} = .0001$ ). These results suggest that the more often students change their majors, the more credit hours they take, the lower their final cumulative GPA, and the longer it takes for them to graduate.

## DISCUSSION AND IMPLICATIONS

We report the following key findings: The majority of the bachelor’s degree completers are relatively early deciders on major. It takes on average four semesters for all students and six semesters for freshmen to declare and decide on a college major. Those who managed to graduate within four years had made their final decision on a major at least before the end of their second year. On average, 39% of all graduates changed majors before degree completion, and only 17% changed majors after major declaration. For students who changed majors, the average number of changes in major is 1.3 times. When students change majors between colleges, they tend to change from a quantitative to non-quantitative field. A higher percentage of freshmen changed majors, and they changed majors more often probably due to their lack of college curricular experience as compared with transfer students. We also found that changing the major relates to academic performance: The more often students change their majors, the more credit hours they take, the lower their final cumulative GPA, and the longer it takes for them to graduate. Some of these results warrant further discussion.

### Explore but Decide Early on a College Major

Previous research reported that relatively higher percentages of students (50-75%) changed majors before graduating. The results of this study show that only 39% of all bachelor’s degree completers changed majors at this institution. If we count only those who started as freshmen, the percentage of students who changed majors is 56%, in line with previous research that reported 50-75% of major changers.

Furthermore, this study shows that more degree completers change majors before (22%) than after (17%) a formal major declaration. Therefore, although previous research suggests that the majority of college students are exploratory/investigative in terms of selecting a major/career, our results indicate that the majority of degree completers are relatively early deciders. They usually became declared and made their final change of major before the end of their second year in college. For these students, most of the self-assessment (of interests, values, abilities, realities, etc.), exploring, and discovery occurred during the first year or two in college. Therefore, it seems that the first one or two years of curricular experience were critical in discovering a major field of study.

### **Freshmen versus Transfer Students**

Freshman students constitute 41% of all baccalaureate graduates from this institution. Freshman students changed majors more times, and spent longer before they made their final decision about a major than other types of students (transfer freshman, transfer sophomore, transfer junior, and transfer senior). One possible explanation is that freshmen have less curricular experience than transfer students. This result is consistent with previous finding by Kramer, Higley, and Olsen (1993) that the number of major changes may relate to how further along (as defined by number of credit hours completed) students are in their academic career. Transfer students started at this university with more college credit hours completed in previous institutions, and therefore were more academically stable. This result suggests that due to their lack of college curricular experience, freshman students may need more assistance in selecting a major field of study.

### **Math Ability/Performance as a Factor in Choosing College Majors**

This study found that among students who changed majors, around 76% also switched colleges. Overall, the migration between colleges has a pattern: moving from quantitative to non-quantitative fields, suggesting that math requirements may be a barrier for some students who initially select certain quantitative majors. Therefore, in addition to the other factors discussed in the literature, math ability/performance is an important factor to consider when we advise students on choosing a college major.

### **The Relationship between Changing Major and Academic Performance**

Changing one's major was found to be related to student academic performance. First, the more often a student changed his/her major, the more credit hours he/she took. This result is consistent with Anderson, Creamer, and Cross (1989) who found that major changers attempted more credit hours. This may be due to the fact that students who changed majors have to take extra credit hours to meet new major requirements. Second, the more changes students made to their major, the longer it took them to graduate, and this result confirms the previous claims by Kramer, Higley, and Olsen (1994) and Cuseo (2005) about the possible relationship between changing major and length of time to degree completion. Moreover, this study found that the more often students change their majors, the lower their final GPA. This negative correlation simply means students who changed majors more times would generally have a lower final college GPA compared with those who changed fewer times. It should be noted that this negative correlation does not suggest that changing a major is harmful for individual students. In fact, the lower cumulative GPA may reflect the fact the initial majors did not fit their interests and abilities, and advisors at our institution have often observed increased GPA among students who changed majors. Furthermore, a recent research study in German universities suggests that there is little correlation between factors that promote changing majors and those that lead to drop-out from the institution ( Bäumle, Grunschel, and Dresel 2022, p. 863).

### **Implications for College Policies and Future Research**

The results of this study have implications for advising and institutional policy. First, the results of this study suggest that freshmen need more educational support/interventions in choosing a major than transfer

students because their relative lack of curricular experience compared with other types of students. Second, the results of this study show that on average, bachelor degree completers should decide on their major field of study at least before the end of their second year. Although it is not appropriate to push early declaration/deciding of college majors as previous research has suggested, it is critical that educational interventions to facilitate the process of major exploration should take place early, such as during the first-year. Such early intervention/support would allow students to have time and opportunities to explore and change majors and would still graduate in a timely fashion. As suggested by Gordon (1995) and Cuseo (2005), programs and services that facilitate the process of major and career exploration can include many formats and can be integrated in freshman seminars or general education courses. Jaradat and Mohammad (2017) emphasize the importance of academic advising. The goal is to provide students with early, proactive, and effective support that students need for successful major exploration. Also, everyone on campus can play an important part in this effort. As Kramer, Higley, and Olsen (1993) stated, “advisors, academic administrators, and faculty can facilitate students’ academic progress by creating an institutional environment that promotes student exploration of the curriculum, provides an integration and collaboration of academic planning resources, especially early on in the undergraduate experience; supports planning and decision making, and offers exposure to a variety of campus resources and individuals” (p. 96). This study supports Peterson’s (2006) advocacy for “providing students with strongly linked academic and career advising services, (including access to internships and mentor opportunities), throughout their college experience” and her claim that “On-going advisor training needs to be provided to keep advisors current on academic trends and on changes in student populations, especially as changes relate to the needs and expectations of student advisees” (pp. 148-149).

This study focuses only on “when” but not “how” students reach their decisions about college majors due to data limitations. To gain an even better understanding of the longitudinal process of major selection, we also need data regarding how students make these decisions and whether there is a pattern of students’ decision-making process, and this could be a direction for future research. Also, the proposition that changing majors did not significantly vary by ethnicity in quantitative fields although it might vary by gender (Sklar 2018) is also worth investigating further. Instead of using quantitative methods, qualitative methods such as interviewing may be more suited to answer such research questions. In addition, this study discovered that math ability/performance is an important factor in choosing a college major. It would be helpful to conduct further studies on how to advise students to choose a major based on their previous high school math performance. Brown (2009) has suggested ensuring that high school counselors know all of a university’s programs so that they could effectively advise students who apply to that institution.

In conclusion, the results of this study show that bachelor’s degree completers are relatively early deciders. They decided on and declared their major within two years. Changing the major frequently is found to be associated with increased credit hours taken, a lower GPA, and extended time to degree completion. In addition, math ability/performance is identified as an important factor to consider when choosing a college major/career. All these findings suggest the need to provide students, especially freshmen, with proactive assistance in major selection during an early stage of their college career. Having program/advising services regarding college major exploration available to students during an early stage of college could help students assess their interests, abilities, and explore curriculum/career more effectively, so they would have time and opportunities to explore and change majors and graduate in a timely fashion.

## REFERENCES

1. Anderson, B. C., Creamer, D. G., & Cross, L. H. (1989). Undecided, Multiple Change, and Decided Students: How Different are They? *NACADA Journal*, 9(9), 46-50.
2. Andrews, L. L. (2006). *How to Choose a College Major* (2nd ed.): McGraw-Hill.
3. Bäumle, L., Grunschel, C. & Dresel, M. (2022) Student dropout at university: a phase-orientated view on quitting studies and changing majors. *European Journal of Psychology of Education* 37, 853–876.

<https://doi.org/10.1007/s10212-021-00557-x>

4. Brown, K. S. (2009). *Factors that Predict Academic Achievement for Students Who Are Undecided Majors*. Ph.D. Dissertation, the Virginia Polytechnic Institute and State University.
5. Cuseo, J. (2005). Decided, Undecided, and in Transition; Implications for Academic Advisement, Career Counseling, and Student Retention. In R. S. Feldman (Ed.), *Improving the First Year of College: Research and Practice* (pp. 27-48): Lawrence Erlbaum Associates.
6. Firmin, M. W & MacKillop, L. C. (2008) Frequent Major Changing: Extrinsic and Intrinsic Factors. *NACADA Journal*, 28(2), 5-13.
7. Foote, B. (1980). Determined- and Undetermined-major Students: How Different are They? *Journal of College Student Personnel*, 21(1), 39-34.
8. Foraker, M. J. (2012). Does changing majors really affect the time to graduate? The impact of changing majors on student retention, graduation, and time to graduate. Bowling Green, KY: Western Kentucky State University, Office of Institutional Research. 21p.
9. Gardner, P. D. (2000). From Drift to Engagement: Finding Purpose and Making Career Connections in the Sophomore Year. In L. A. Schreiner & J. Pattengale (Eds.), *Visible Solutions for Invisible Students: Helping Sophomores Succeed* (pp. 67-77): University of South Carolina.
10. Gordon, V. N. (1995). *The Undecided College Student: An Academic and Career Advising Challenge*. (2nd Ed.) Springfield, IL: Charles C. Thomas.
11. Hansen, R. S. (2007). *The Complete Idiot's Guide to Choosing a College Major*: Alpha.
12. Jaradat, Maram S., and Mohammad B. Mustafa. 2017. "Academic Advising and Maintaining Major: Is There a Relation?" *Social Sciences* 6 (4), 151 ff. <https://doi.org/10.3390/socsci6040151>
13. Johnson, Dianne (2005) Predicting College Students Who Change Majors: Reasons and Motivations of Major Changers, Ph.D. Dissertation, University of Idaho.
14. Kramer, G. L., Higley, H. B., & Olsen, D. (1994). Changes in Academic Major Among Undergraduate Students. *College and University*, 69(2), 88-98.
15. Lewallen, W. C. (1992). *Persistence of the 'Undecided': The Characteristics and College Persistence of Students Undecided About Academic Major or Career Choice*. Ph.D. Dissertation, University of California, Los Angeles.
16. Lewallen, W. C. (1995). Students Decided and Undecided About Career Choice: A Comparison of College Achievement and Student Involvement. *NACADA Journal*, 15(1), 22-30.
17. Liu, V., Mishra, S. & Kopko, E. (2021) Major Decision: The Impact of Major Switching on Academic Outcomes in Community Colleges. *Research in Higher Education*, 62, 498–527 . <https://doi.org/10.1007/s11162-020-09608-6>
18. Micceri, T. (2001). *Change Your Major and Double Your Graduation Chances*. Paper presented at the AIR Forum, Long Beach, CA.
19. Peterson, Kathleen F. (2006) Changing their Majors: How do Students Choose Their Majors and Why Do So Many Change, PhD Dissertation, University of Minnesota.
20. Sklar, Jeffrey C., (2018) Event History Analysis for Investigating the Likelihood and Timing of Changing Majors, *NACADA Journal*, 38 (1), pp. 47-60
21. Terenzini, P. T., Springer, L., Yaeger, P. M., Pascarella, E. T., & Nora, A. (1996). First-generation college students: Characteristics, experiences, and cognitive development. *Research in Higher Education*, 37(1), 1–22.
22. Tinto, V. (1993). *Leaving College: Rethinking the Causes and Cures of Student Attrition* (2nd ed.): University of Chicago Press.
23. Venit, E. (2016). How late is too late? Myths and facts about the consequences of switching college majors [White paper]. Retrieved from the EAB website: <https://www.eab.com/-/media/EAB/Technology/Student-Success Collaborative>.
24. Wine, J., Janson, N., & Wheelless S. (2011). 2004/09 Beginning postsecondary students longitudinal study (BPS:04/09) full-scale methodology report (NCES 2012-246). Retrieved from the National Center for Education Statistics web site: [https://nces.ed.gov/pubs2012/2012246\\_1.pdf](https://nces.ed.gov/pubs2012/2012246_1.pdf).