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Factors Affecting Graduation with Honors: A Case Study in Business

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Factors Affecting Graduation with Honors: A Case Study in Business

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Abstract

Many first-year college students elect to enroll in their university's honors program. These programs offer students many educational benefits not provided to non-honors students, such as smaller class sizes, priority registration, and added faculty interaction. However, of the students that enter the university as an honors student, many fail to complete their honors program. Researchers have documented completion rate as low as 18.45% (Campbell and Fuqua, 2008). So why are honors graduation rates so low? In this study variables were examined that the literature suggests affects honors graduation rates (High School GPA, ACT/SAT scores, AP credits, GPA 1st term and GPA 2nd term, Ethnicity, Gender, first generation and financial need status, as well as home state/country) to determine which of those may help explain completion of an honors program. The data for this study were incoming freshman honors students in the Walton College of Business (WCOB) at the University of Arkansas–Fayetteville from 2004-2014.

T-tests and chi square tests were used to determine if significant differences occurred within the observations of these factors in terms of graduating with honors and then used significant variables as the basis for a logit regression model where graduating with honors was the dependent variable. Based on the results of the chi square and t tests, we hypothesized eleven variables would explain whether or not a student graduated with honors. However, the final results suggest that only four factors had significant impacts on graduation with honors: GPA 1st term, high school GPA, number of AP credit hours brought into college and staying in WCOB all four years. There were limitations to the study. There are other variables, such as finding a good mentor, studying abroad, having to work, and having a poor work ethic that may have influence but were not included in this study. Future studies may want to look towards the relationship between honors graduation and the factors that were not covered in this study.

Introduction

The word honors can be defined as, "to regard or treat (someone) with admiration and respect." According to an article from the National Collegiate Honors Council, the option of joining an honors college at major public universities has become more and more common (Goodstein & Szarek, 2013, p. 85). Honors programs provide students with an opportunity to challenge themselves and expand their knowledge. Students in the Honors College have additional degree requirements beyond those of non-honors students to receive honors designation upon graduation. Usually, honors students are also rewarded for their efforts and enrollment in the program through incentives such as priority registration, freshman priority housing, bonus scholarships, and other rewards.

However, not all students who begin their college career in honors graduate with honors. In a study conducted at a Midwestern public university, only 62 or 18.45% of 336 freshman honors students completed their honors degree requirements after 5 years (Campbell and Fuqua, 2008). Evidence of incompletion also exists at University of Arkansas in Fayetteville (UAF). Each year, the university admits hundreds of incoming freshmen into each of the six undergraduate colleges' honors programs. The Walton College of Business (WCOB) is the third largest of all of the campus honors programs, usually comprising just over 20% of all honors students on campus at any point in time (OIRA, 2020). However, like at other schools, not all of these students graduate with Honors. For example, in fall 2014 WCOB admitted 149 new honors freshmen. By December 2020, 131 of these students had graduated from UAF, but only 78 (or 53%) of them had graduated with honors and only 73 (or 49%) had graduated from the WCOB Honors Program (OIRA, 2021).

In general, students do not graduate from the WCOB honors program for one of three reasons. Students leave/drop out of UAF. Students can change their major into another college

(and therefore leave WCOB honors, maybe to join another honors program or not). Finally, students can decide to drop (or be dropped from) WCOB honors due to low GPA, failure to complete their research, or for lack of continued interest. Much work is needed to understand why students fail to complete honors. One piece of the puzzle is identifying any factors that can help predict success in honors.

Literature Review

Different studies have suggested different factors that can be used to predict successful completion of an honors program. The literature suggests that factors such as *high school GPA* (Diaz, Farrugia, Wellman & Bottoms, 2019; Bowman & Culver, 2019), *ACT/SAT score* (McKay, 2009; Clark et al., 2019), *AP credits* (Fechheimer, Webber & Kleiber, 2017), *ethnicity* (McKay, 2009), *gender* (Dinan, 2016), *financial need* (Campbell & Fuqua, 2008), *first generation status* (Keller & Lacy, 2013), *in/out state residency* (Keller & Lacy, 2013), and *first semester of college GPA* (Campbell & Fuqua, 2008) can help explain whether an incoming freshman honors student will graduate with honors. These above-mentioned studies report that typically the higher the ACT/SAT score, the number of AP credits, and the first semester GPA at college, the higher the chances of graduating with honors. However, if students hold first generation status, are non-white and/or have financial needs, they may be less likely to graduate with honors. Results of studies that examine gender and residency are mixed.

A recent study completed by Bateman (2021) found that across all majors and colleges at University of Arkansas, the factors most likely to predict completion of any of the six honors programs included GPA 1st term, students' initial and final choice of colleges, ACT score, and financial need. However, no one has conducted a similar study for business students only.

Therefore, the purpose of this study was to use data available through University of Arkansas to better understand the factors that influence whether or not an incoming freshman WCOB honors student will graduate from the University of Arkansas with honors. Understanding the factors that lead to students' dropping WCOB honors, could help the Honors College and WCOB Honors Program create interventions that can help improve retention and graduation with honors for business students.

Methods

This section describes the methods that will be broken into three parts: 1) data collection and management, 2) summary statistics, t-tests, and chi square tests as well as 3) logistic regression analysis.

Data Collection and Management

The data for this study have been obtained from UARK IT data managers (OIRA, 2021; Ritterbush, 2021). Because the focus of this study was examining whether students complete their honors program, the students included in the study must have had sufficient time to graduate from University of Arkansas at Fayetteville. Therefore, included are information on all incoming WCOB honors freshmen that enrolled in the years 2004 to 2014 as graduation data are available only through Fall 2020. Students' names and ID numbers were stripped from the data, because this information was not relevant to the study. It also helped ensure anonymity of those included in the study. Students instead were assigned a number in order to keep track of all the data. Based on the previous studies discussed in the literature review, the following parameters for each student were selected for evaluation: start term/year, last term/year, graduation term/year, High School GPA,

ACT/SAT scores, the number of AP credits brought into the U of A, and GPA 1st term. Also included in the data set were descriptive statistics such as ethnicity, gender, first generation and financial need status, and home state/country.

The data had to be cleaned up before they were used in the study. When working with large amounts of data, sometimes parameters are miscoded or recoded over time. For example, in this data set, some of the names of majors had changed from 2004 to 2014; therefore, major names were changed for consistency. Errors were also removed from the data set (such as missing data or entries that did not make sense). These errors were also reviewed by data managers and by my mentor and were either corrected or the student entry was removed from the study.

After cleaning up the data set, new variables were created from the data provided. For example, one of the new variables called *same major* (with a value of yes or no) indicated whether the student entered and graduated with the same major. Similarly, another new variable called *same college* (with a value of yes or no) indicated whether a student graduated from WCOB or another college. A list of all examined variables and their definitions can be found in Table 1.

Summary Statistics, T-Test and Chi Square Tests

Once the data were ready to work with, frequencies were generated using SAS. Frequencies provided total counts for all variables in the data set. These frequencies help us understand the variation in the dataset and variation is needed in order to run the statistical analyses. Next, the relationships between *graduating with honors* (a categorical variable whose possible values are "yes" and "no") and all the other variables listed in Table 1 were examined by looking at results of individually paired chi-square tests and t-tests. A chi-square test, most often used as *a test of independence* (Hess & Hess, 2017), is used when variables to be examined are categorical data,

Table 1. Factors Examined in this Study

Variable	
Gender	Male or female (Male=1)
Two or More	Two or more ethnicities
American Indian	American Indian ethnicity
Hawaiian	Hawaiian ethnicity
Hispanic	Hispanic ethnicity
Foreign	Foreign ethnicity
Caucasian	Caucasian ethnicity
Asian	Asian ethnicity
African American	African American ethnicity
First Gen	First generation college student
Arkansan	Student's home state is Arkansas
Pell	Student received a Pell Grant for financial need status
Stafford	Student received a Stafford Loan for financial need status
HSGPA	High school grade point average
ACT	ACT score in high school
AP Credits	Number of AP credits student brought into UofA
AP Courses	Number of AP Courses taken in high school
Honors Grad	Student that graduated with honors
GPA 1st Term	First semester GPA at UofA
Same College	Whether that student stayed in WCOB all 4 years of college
Same Major	Whether that student stayed in the same major all 4 years of college

such as *ethnicity* and *gender*. A t-test examines whether the means of two groups are different and is used when one variable is categorical (such as graduating with honors) and another is continuous, such as *high school GPA* or *ACT score.* Results of these tests helped prioritize the variables to include in the logit regression.

Logit Regression

Logit models examine the relationship between a dependent variable (which in this study is *graduating with honors*) and the independent variables (Science Direct, 2021) which are discussed below. The use of logit models is one of the most common practices in empirical social research (Clogg, Petkova, & Haritou, 1995). Based on the other studies that examined factors that influenced graduating with honors, as well as the results of the chi square tests and t-tests, it was hypothesized that the best logit model would be:

Graduating with honors = f (*High School GPA*, *ACT/SAT scores*, *the number of AP credits*, *GPA 1st term*, *ethnicity*, *gender*, *in/out state status*, *first generation status*, *changed major, changed colleges*, and *financial need status*) (1)

It was predicted that higher HSGPA, GPA 1st Term, ACT/SAT scores, more AP Credits earned in high school, and graduating with the same major and in the same college would increase the likelihood of honors graduation. The results of the t-test and chi square test supported the prediction. For example, a student with a 4.0 HSGPA graduated with honors at a higher rate than a student with a 3.0. The same was found for a student with a higher GPA 1st term or a student with more AP credits. The data also showed students that remained in the same college and had the same major all four years graduate with honors at a higher rate than a student who switched to a different college or changed majors. We predicted that First Gen, Gender, and financial need status would have a negative impact on honors graduation. The results of the significance tests showed students that were First Gen or showed significant financial need graduated with honors at a lower rate than students that do not. The data also indicated that male students were less likely to graduate with honors than female students.

With the help of my mentor and other statisticians, the hypothesized model was built. Based on the results of the initial model, we determined if additional models would be necessary to better explain the factors that influence graduation with honors.

Results

Data Characteristics

The data set covers WCOB students from 2004-2014 that were enrolled in honors as a freshman. Data from a total of 1387 students was included in this study. Table 2 summarizes the

number of students who started in honors and then graduated with honors by demographic characteristics. There were slightly more males than females at about 52.7% to 47.3%. Most students in the data set were Caucasian, at around 92.3%. The next closest ethnicities were Hispanic (3.8%), and Asian (3.8%). Only 11% of students in the data set were first generation college students. Just over half of the students (51.6%) were Arkansas residents before attending the U of A. Just over 22% of students were awarded subsidized Stafford loans, which help students fund their education with little to no interest rates and no interest while enrolled in college. Approximately 9% of students received a Pell Grant, which are generally given to students who display an exceptional financial need. In addition, Freshman WCOB honors students entered with an average weighted HSGPA of almost 4.04, average ACT score of 30.4, and the average number of credits brought to University of Arkansas from AP was almost 12.

The most common entry major to WCOB was undeclared at about 39%. Economics and Management were the next highest majors with about 19% and 13%, respectively. Accounting, Finance, and Marketing each accounted for around 8-10% of incoming students.

Of the 1387 students that were enrolled in honors as a freshman, only 707 graduated with honors, or 51%. There were slightly more females that graduated with honors than males, 51.4% to 48.6%, despite having fewer females that began in honors. First generation college students made up 10% (70) of WCOB honors graduates. Of those that graduated with honors, 18.39% had Stafford loans and 8% of students were awarded Pell Grants. Approximately 81% of students that graduated with honors finished their degrees in 4 years or less. Of the 707 honors graduates, all but two students graduated in six years or less (99.7%); 90% of students graduated from the same

Table 2. Frequency Counts

Variable	Yes Counts[1]	Total Count	Mean	Std Dev	Min	Max
Gender Male	731	1387	0.527	0.499	0	1
Two or More	31	1387	0.022	0.148	0	1
American Indian	26	1387	0.019	0.136	0	1
Hawaiian	0	1387	0.000	0.000	0	0
Hispanic	53	1387	0.038	0.192	0	1
Foreign	4	1387	0.003	0.054	0	1
Caucasian	1287	1387	0.928	0.259	0	1
Asian	53	1387	0.038	0.192	0	1
African American	15	1387	0.011	0.103	0	1
First Gen	153	1379	0.111	0.314	0	1
Arkansan	716	1387	0.516	0.500	0	1
Pell	126	1387	0.091	0.287	0	1
Stafford	307	1387	0.221	0.415	0	1
HSGPA		1387	4.038	0.203	3.32	4.97
ACT		1387	30.432	1.887	26	36
AP Credits		926	11.900	9.342	0	70
Honors Grad	708	1387	0.510	0.500	0	1
GPA 1st Term		1387	3.643	0.383	1.333	4
Same College	1169	1387	0.843	0.364	0	1
Same Major	324	866	0.374	0.484	0	1

[1] Yes counts are for those variables that were dummy variables where 1 or yes means the student had the characteristic. For Gender one stands for male.

college that they started in (that is, WCOB). However, only 26% of students graduated with the same major they declared as a freshman, primarily because many were undeclared at the start.

Chi Square Results

The results of the chi square tests revealed that many of the variables were significant, having a p-values equal to or less than 0.05. These results of the Chi Square analyses are presented in Table 3. The first significant variable that affected honors graduation was *same college*. While

Table 3. Chi Square Test Results

	Graduated Without Honors		Graduated With Honors		P-Value	Number of Observations	Missing Observations
Factor	No	Yes	No	Yes			
Same College[1]	67.89	45.42	32.11	54.58	0.0001	1387	196
Same Major	54.98	42.59	45.02	57.41	0.0004	866	717[2]
Grad4Yr	60.37	45.42	39.63	54.58	0.0001	1387	196
Stafford	46.48	57.65	53.52	42.35	0.0006	1387	196
Gender (male=yes)	44.51	52.94	55.49	47.06	0.0018	1387	196
Caucasian	40.00	49.65	60.00	50.35	0.0771	1387	196
American Indian	48.64	65.38	51.36	34.62	0.1129	1387	196
Asian	49.40	37.74	50.60	62.26	0.1226	1387	196
Pell	48.37	54.76	51.63	45.24	0.1908	1387	196
First Gen	48.53	53.59	51.47	46.41	0.2650	1379	204
Hispanic	48.80	52.83	51.20	47.17	0.5785	1387	196
State (Arkansas = yes)	49.48	48.46	50.52	51.54	0.7072	1387	196
Two or More	48.89	51.61	51.11	48.39	0.8565	1387	196
African American	48.98	46.67	51.02	53.33	1.0000	1387	196

[1] 54.58% of students that stayed in the same college all 4 years graduated with honors compared to only 32.11% of students that changed to another college

[2] Students that had an initial major of Undeclared were removed from the data set

54% of students that stayed in WCOB throughout all years graduated with honors compared to only about 32% of students that changed to another college. The results of the chi square test also showed that students that graduated in 4 years were more likely to graduate with honors. Gender was also a significant factor as 55% of females graduated with honors compared to only about 47% of males. Students that received a subsidized Stafford loan were less likely to graduate with honors than those that did not have financial need. While similar results were expected for students receiving Pell grants, the chi square test showed that Pell Grant recipients (even higher financial need that those receiving the Stafford alone) were not significantly more or less likely to graduate with honors. Ethnicity was also found to be an insignificant indicator of honors graduation. Lastly, home state did not significantly impact a student's likelihood of graduating with honors.

T-Test Results

The remaining factors were tested using a t-test to measure significance. These results are presented in Table 4. All of the variables examined with a t-test except age were found to be significant. The average HSGPA for honors graduates was 4.09 compared to 3.98 for students that did not graduate with honors. GPA 1st term was 3.83 for honors graduates compared to 3.45 for non-honors. Students that graduated with honors also graduated in fewer years (4.08) than non-honors students (4.18). The t-test also showed that the higher a student's ACT score, the more likely the student was to graduate with honors. AP courses and AP credits were both significant indicators for honors graduation. The average number of AP courses for honors graduates (4.71) was significantly higher than non-honors graduates (3.03), as well as the number of AP credits at 14.1 for honors and 9.19 for non-honors.

Table 4. T-Test Results

	Graduated Without Honors		Graduated With Honors		Degrees of Freedom	T-Value	Pr>[t]
Factor	Number	Mean	Number	Mean			
Age	679	17.89	708	17.89	1385	-0.37	0.7094
HSGPA	679	3.98	708	4.09	1385	-10.47	0.0001
ACT	679	30.06	708	30.79	1385	-7.31	0.0001
AP Courses	415	3.03	511	4.71	924	-8.10	0.0001
AP Credits	415	9.19	511	14.10	924	-8.25	0.0001
GPA 1st Term	679	3.45	708	3.83	1385	-21.41	0.0001

Logit Results

The initial hypothesis was that most of the variables found to be significant in the t-test and chi square test would show similar results in the logit regression model. Therefore, the initial logit regression included all of the potential explanatory variables presented in the hypothesis. The results of the first logit regression are presented in Table 5. These results suggest that the hypothesis was rejected. Many of the included variables were not found to be significant. The only variables that were significant or had a p-value of less than 0.05 were HSGPA, GPA 1st term, first generation status, AP credits brought in, and if that student stayed in the same college throughout all four years. While we cannot interpret the coefficient of each variable directly, the sign in front of the coefficient estimate does suggest whether each variable had a positive or negative impact on a student's chances to graduate with honors. All these variables, except first generation status had a positive effect on honors graduation rates. First generation status had a negative impact on a student's likelihood of graduating with honors.

Because this regression model had many variables included that were not statistically significant, alternative models were run by removing the most insignificant variables one by one until we found a model that best explained the data. The final logit regression model is presented in Table 6. This model contains all of the variables that were found to be significant as well as gender and Stafford loans. Gender and Stafford loans were kept in the model because both gender and financial need are often a focus of examination in studies conducted about student success at University of Arkansas. Based on the sign in the estimate column of Table 6, GPA 1st term, HSGPA, AP credits brought in, and staying in the same college (that is, in Walton College) all had a positive effect on a student's likelihood of graduating with honors. The results also showed that

Table 5. Initial Logit Results

Parameter	DF	Estimate	Standard Error	T Value	Approx Pr > |t|
Intercept	1	-21.895	3.073	-7.13	<.0001
Gender	1	-0.049	0.219	-0.22	0.8229
HSGPA	1	1.802	0.607	2.97	0.003
State Rank	1	0.152	0.220	0.69	0.4904
Stafford	1	-0.433	0.269	-1.61	0.1075
Pell	1	0.405	0.425	0.95	0.34
ACT	1	0.030	0.066	0.45	0.6526
GPA 1st Term	1	3.548	0.419	8.48	<.0001
Two or More	1	0.475	0.754	0.63	0.5285
Hispanic	1	-0.150	0.577	-0.26	0.7944
Caucasian	1	-0.638	0.569	-1.12	0.2622
Asian	1	-0.655	0.679	-0.96	0.3349
African American	1	1.055	1.050	1	0.3154
First Gen	1	-0.782	0.375	-2.09	0.0368
Same College	1	0.983	0.297	3.31	0.0009
Same Major	1	-0.033	0.239	-0.14	0.8904
AP Credits	1	0.061	0.015	4.04	<.0001

Table 6. Reduced Logit Results

Parameter	DF	Estimate	Standard Error	T Value	Approx Pr > |t|
Intercept	1	-19.420	1.975	-9.83	<.0001
Stafford	1	-0.305	0.198	-1.55	0.1222
Gender	1	-0.276	0.165	-1.68	0.0938
GPA 1st Term	1	3.677	0.320	11.48	<.0001
HSGPA	1	1.246	0.433	2.88	0.0040
Same College	1	0.812	0.238	3.41	0.0007
AP Credits	1	0.043	0.010	4.11	<.0001

having Stafford loans and being male both had a negative impact on the likelihood of a student graduating with honors.

As mentioned above, it is not possible to directly interpret the impact of an independent variable in a logit regression model by looking at the value of its coefficient. Instead, this impact is examined by looking at the marginal effects. In the SAS software used (Version 9.4), logit means were run to generate the marginal effects for each variable. These marginal effects are found in Table 7.

The interpretation of each of the marginal effect for the significant variables is as follows:

- for each 1-point increase in GPA 1st term, a student was 61% more likely to graduate with honors, ceretis paribus
- for every 1-point increase in HSGPA, a student was almost 21% more likely to graduate with honors,
- a student that stays in WCOB throughout his/her college career was 13.6% more likely to graduate with honors than a student that transfers into a different undergraduate college on campus,
- for each additional AP credit brought in, a student was less than 1% more likely to graduate with honors,
- Male students were 4.6% less likely to graduate with honors than a female.
- Students with Stafford loans were 5% less likely to graduate with honors.

Based on the marginal effects, the GPA 1st term, HSGPA, and staying in WCOB all 4 years all had a positive effect on a student's likelihood of graduating with honors. While the number of AP credits a student brought in also had a positive effect on honors graduation, it was less than a

Table 7. General and Expected Marginal Effects on Each Variable

Variable	Marginal Effects[1]	Std Dev	Expected Effects[2]
GPA 1st Term	0.617	0.314	0.194
HSGPA	0.209	0.203	0.042
Same College	0.136	0.364	0.050
AP Credits	0.007	9.342	0.068
Gender	-0.046	0.499	-0.023
Stafford	-0.051	0.221	-0.011

[1] Marginal effect associated with a one unit change in each variable
[2] Expected effects of each variable based on the characteristics of the observations in this data set

1% increase. If a student had a Stafford loan or was a male, they were less likely to graduate with honors.

While the marginal effects provide the general relationship, it is possible to examine the expected marginal effect by looking at the standard deviation in each of the significant variables in Table 2 and multiplying that by the marginal effect. These results are presented in the last column of Table 7. When interpreting marginal effects by analyzing the effect of a one standard deviation in the explanatory variable on the outcome, a slightly different ordering of the marginal effects is revealed in the sense that AP credits take on a larger role than when analyzing a one-unit change in the explanatory variable on the outcome. The findings are more or less identical otherwise when comparing marginal effects to those multiplied by the explanatory variable's standard deviation.

Recommendations

The information obtained in this study shows which factors had a significant impact on a student enrolled from 2004 through 2014 to graduate with honors. The data from this study can be

used to help WCOB target specific areas that will improve its honors graduation rates. With GPA 1st term having the most significant impact on honors graduation rates, it is crucial for the Walton Honors Program to act as early as possible in a student's academic career to help the student achieve success. It is possible, for example that with the implementation of programs designed to target honors students with a low GPA 1st term, WCOB could improve honors graduation rates. One example could be requiring honors students that have below a 3.5 GPA in their 1st term to take a class that helps them improve their study habits. This could help increase a student's GPA and chances to remain in and then graduate with honors. Another measure that WCOB could take to help increase honors graduation rates is based on HSGPA. The results of this study found HSGPA to be a better predictor for honors graduation than ACT scores and AP Credits. Since we did not see a significant relationship with ACT scores and honors graduation, the Walton Honors Program may want to weigh HSGPA more heavily than ACT scores during the honors admissions process for freshman students. Lastly, keeping students in WCOB throughout their entirety of their career has a significant influence on whether a student is likely to graduate with honors. It is important WCOB make efforts to retain their students each year if they want to improve their honors graduation rates.

Summary and Conclusions

In this study, I wanted to take a deeper look at the factors that affect honors graduation rates within WCOB. Based on findings of previous studies, I was able to determine which factors would be tested. The study used data that covered freshman honors students in WCOB at the University of Arkansas from 2004-2014. We used t-tests and chi square tests to measure the significance level of each of our factors. Based on the results of the significance tests, I was able to build a hypothesis before using a logit regression model to find the factors that had the biggest

impact on honors graduation. The results showed that there were four main factors that had the most influence on honors graduation: GPA 1st term, HSGPA, AP credits brought to college and staying in WCOB all four years.

While we were able to identify factors that influenced honors graduation, there were limitations to the study. There were many other factors that may have had an influence on honors graduation that we could not measure in this study. For example, this study does not measure engagement in WCOB honors or how much people work. Other factors such as finding a good mentor, getting study abroad money, or getting research money are also not included in this study. Any of these factors could have an impact on honors graduation, however, this information was not attainable with the data set we were given. Future studies may want to look towards the relationship between honors graduation and the factors that were not covered in this study.

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