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Do academic accolades affect future academic performance? Analyzing short- and long-term impacts of the Dean's List

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The Dean's List is one accolade awarded by the Olin Business School at Washington University in St. Louis to students who achieve a certain level of academic success in their courses each semester. It is bestowed upon those with a semester GPA at or above 3.6 in at least 14 completed credits graded for credit, with no incomplete registered on that semester's transcript. Understanding the impact of these programs and their potential to incentivize students to continue to perform at or above this standard is invaluable, yet similar research has not been published for almost fifty years. This study employs the use of regression discontinuity design to analyze the effects of the Dean's List accolade on academic performance, measured by GPA and credits undertaken, in subsequent semesters. Data were obtained for 260 undergraduate students enrolled in the Olin Business School, detailing grade point average, Dean's List achievement, number of credits, and current standing across five semesters. Semester-on-semester data were then pooled to provide a detailed picture of the respective assignment variable against the outcome variable, indicating whether the treatment variable of Dean's List achievement was statistically significant when regressed against the outcome variable, measuring students' academic performance in following semesters. In response to our hypotheses, our data showed significance at the 90% level in regard to the impact of receiving the Dean's List award in semester zero on a student's academic performance in semester one, measured by GPA. Our regressions, however, did not show statistical significance of the impact of Dean's List on credits undertaken in semester one or GPA in the long term, measured in semester two. These results indicate that academic awards conferred each semester can motivate students to sustain a certain level of award-qualifying academic success, measured by GPA.

The Dean's List has been awarded at colleges and universities globally for decades. While different schools have different criteria that qualify students for this accolade, a few being minimum GPA as well as minimum number of credits taken, it signals that the student is among the top performers at that respective college or university. These awards are typically conferred once final grades are released for the semester or quarter, sometimes communicated to parents and local newspapers to further publicize the honor. Academic institutions granting this award have the opportunity to celebrate students on both a public- and private- level, representing to the student that their efforts are recognized.

Benefits of Dean's List

The Dean's List award is marked on the official transcript of each student who receives the accolade, distinguishing each who attains high enough scores from other students. In addition to the sense of personal achievement and boost in self-esteem that students experience from the honor, being

placed on the Dean's List benefits students when recruiting for jobs, internships, further higher education degrees, and other opportunities. For example, many universities, companies and other institutions have a minimum grade point average requirement for enrollment or employment, serving as an indicator that a student is a hard-worker and high-achiever. In essence, achieving the Dean's List serves as a sort of marketplace signaling on behalf of most students. By placing this accomplishment on a resume and LinkedIn page, students are able to signal and convey to employers that they are successful individuals, a quality that is sought after in the workplace.

Academic Awards on Performance

Research by Wright in the paper *Perform better or else: Academic probation, public praise, and students' decision making* outlines the effect of Dean's List status on future GPA. When students who made the Dean's List are compared to students who were narrowly ineligible, Wright found that students placed on the Dean's List have a brighter academic trajectory as measured by their GPA in subsequent semesters after receiving the award (Wright, 2019). This is just one example of how academic awards and honors in schools have a positive correlation with achievement in school. For example, students who are awarded for their work will continue to work towards grade point averages that will qualify them to achieve the same honors again. These students may adjust their course load or change their major to ensure they are taking courses where they can achieve their goals by getting high grades and receiving accolades as an outcome (Wright, 2019).

Furthermore, research performed in *Academic Honors and Performance* by Chan et al. aimed to distinguish whether receiving an award raises scholarly productivity and status. The results of this research suggest that there does exist a connection between awards and corresponding performance and status due to the face that prestigious awards may motivate winners to work harder and increase productivity, thereby increasing status (Chan, 2014).

Dean's List at the Olin Business School

Our research is inspired by understanding motivating factors for student success measured by grade point average during each semester of undergraduate education. Administered by the Olin Business School at Washington University, this Dean's List in particular is comprised of students who achieve an overall semester GPA of 3.6 or higher while taking fourteen or more credits for credit, and not having an incomplete on their record in that particular semester. It is conferred each semester once grades have been calculated and released through the online grade-reporting system.

Previous Literature

While other related existing research explores the impact of four-year honors programs on academic performance, retention, and graduation (Cosgrove, 2004); status and research productivity (Chan et al, 2014); as well as effort and ability (Siegle et al, 2010), the study most similar to our intended research was completed in 1973 at the Pennsylvania State University. In this study, performed nearly fifty years ago, researchers Seaver and Quarton measured the impact of students achieving the Dean's List on future performance. They pulled achievement variables for a sample size of 1,002 students across the university, including grade point average, credit hours, and grade points, regressing each using a regression discontinuity design model. According to Seaver and Quarton's research, *Social Reinforcement of Excellence: Dean's List and Academic Achievement*, the Dean's List accolade is "potentially a powerful social

reinforcer of the behaviors leading to academic achievement."

It was discovered that students who were placed on the Dean's List in the first term performed significantly better in the second term when compared to students who were not placed on the Dean's List (Seaver and Quarton, 1973). This shows the positive impact of the Dean's List on short-term GPA.

When measuring the long-term impact of the Dean's List on grade point average, Seaver and Quarton found no statistically significant impact in term two, but a strong impact in term three, showing that there is interesting and inconsistent impact of being awarded the accolade and performance in the longer-term.

Lastly, the researchers analyzed the impact of receiving the accolade on the number of credit hours undertaken in the subsequent semester and found that there was no impact, showing that there is likely no effect on students varying their course load after achieving such an award.

Purpose

While, as other studies have researched, it is incredibly insightful to understand the impacts of these four-year honors programs, they do not cover the impact of semester honors and accolades, as well as the potential impact they may have on students' academic success each semester throughout college. Additionally, while both our research and that performed by Seaver and Quarton aim to analyze the impacts of receiving the Dean's List accolade on future performance, they differ in that the criteria used to determine a Dean's List eligible student is not the same across universities. Washington University in St. Louis' Olin Business School requires students to have a 3.6 GPA or above to make the Dean's List, while, at the time of the study, Pennsylvania State University required students to have a 3.5 GPA or above. Additionally, at the time of the study, the number of credits required by a student at Pennsylvania State University to qualify for the Dean's List, as well as the status of those courses, be it Credit, Pass/Fail, Completion, etc. is not specified. This differs from the requirements by the Olin Business School, in that a student must complete at least 14 credit hours for a grade in the semester. Lastly, Seaver and Quarton's study was performed at a large public university across the entire student population, while the research performed in this analysis focuses on the Olin Business School at a mid-size private university.

Therefore, it is imperative that this research is performed, providing a more modern perspective on research published almost fifty years ago, establishing the longevity and validity of these results. Therefore, we propose the following research design in order to formulate our own analysis of the Dean's List at the Olin Business School at Washington University in St. Louis and its impact on academic performance in subsequent semesters.

Hypothesis

Following the results of prior research on the impact of these academic accolades, we predict that being on the Dean's List in semester t=0 is positively correlated with earning a Dean's List qualifying grade point average in the subsequent semester, therefore achieving a GPA greater than or equal to 3.6 of 4.0, which would qualify the student for the award if the student is involved in over 14 credits for a letter grade in that subsequent semester, with no incomplete recorded on transcript that semester.

When observing the long-term effects of this semester accolade, we hypothesize that being on the Dean's List in an earlier semester will not have a statistically significant impact on achieving a Dean's List qualifying grade point average two semesters

later, essentially earning a GPA greater than or equal to 3.6 of 4.0 the next season.

Lastly, similar to the findings of Seaver and Quarton, we hypothesize that being awarded the Dean's List accolade in semester zero will not have a statistically significant impact on the number of credits undertaken in the subsequent semester.

We believe that our research will offer value to educators, educational policymakers, as well as academic institutions seeking to understand motivating factors for student success and aiming to reinforce high-level student performance in order to bolster future possibilities for students.

Method

Sample

Data for this analysis came from the Academic Affairs office at Washington University in St. Louis. A sample of 260 students was drawn from the population of students pursuing a Bachelor of Science in Business Administration as their primary field of study at Washington University in St. Louis' Olin Business School. Eligibility for inclusion in the sample was determined by the students' enrollment in the following five consecutive semesters: Fall 2017, Spring 2018, Fall 2018, Spring 2019, and Fall 2019. The data include students' primary major, grade point average each semester, number of credits taken each semester, and whether or not they made Dean's List each semester.

Data

Inclusion in the study was determined by the student having a Dean's List eligible credit load during the t=0 semester, meaning that the student was enrolled in over 14 credits during the primary semester that was observed.

In order to create the semester-on-semester view to analyze the short-term impact of the Dean's List, data were pooled. To aggregate this short-term view, each semester in the dataset that was followed by another semester (Fall 2017, Spring 2018, Fall 2018, and Spring 2019) was labeled as semester zero, with the subsequent semester labeled as semester one. This allowed the aggregate dataset mapping of students' grade point averages over a five-semester period of time to generate multiple data points for the semester-on-semester view for each student. When pooled for the short-term (semester-on-semester), this resulted in 716 total data points, with 655 data points within our bandwidth. This short-term mapping was used for measuring academic performance in terms of GPA and credits taken in semester one, used to test both hypothesis one and three.

When generating the long-term view, student performance was measured instead from semester zero to semester two. In this case, each semester that included a time period two semesters away in the dataset was labeled as semester zero (Fall 2017, Spring 2018, and Fall 2018). Each semester that was two semesters away, essentially the same season in the following year, was labeled as semester two (Fall 2018, Spring 2019, Fall 2019). When pooled for the long-term (season-on-season), this resulted in 602 total data points, with 548 data points within our bandwidth.

Methodology

To assess the impact of being on the Dean's List on a student's academic performance in a following semester, either semester one or semester two, we will implement a regression discontinuity design model (RDD), which will be a sharp RDD. The assignment variable will be students' grade point averages during semester t=0. The treatment effect will be whether or not the student is on the Dean's List during semester t=0. The dependent variable, or outcome variable, is the student's grade point average or credits undertaken during a

following semester, either semester one or two.

Assignment Variable

The assignment variable for this regression was grade point average, on a 4.0 scale, for each student during the semester t=0. In the short-term view of the data, the average of all 716 assignment variable data points was approximately 3.626 with a standard deviation of approximately 0.297.

Summary Statistics	
Number of Observations	716
Mean	3.626383
Median	3.68
Min	2.4
Max	4
Standard Deviation	0.296922

Table 1. Summary Statistics of All Short-Term Data

When manipulating the data to accommodate an equal bandwidth on either side of the RD cutoff point, a Dean's List qualifying GPA of 3.6, a new bandwidth of 0.4 on either side of the cutoff point was employed. This shifted the range of the data to 3.2 to 4.0. Additionally, this shifted the mean to approximately 3.685 with a standard deviation of approximately 0.229.

Summary Statistics	
Number of Observations	655
Mean	3.685267
Median	3.72
Min	3.2
Max	4
Standard Deviation	0.2286054

Table 2. Summary Statistics of Short-Term Equal Bandwidth Data, from Grade point Average of 3.2 to 4.0

For the long-term regression, the average of all 602 assignment variable data points was approximately 3.618 with a standard deviation of approximately 0.298.

Summary Statistics	
Number of Observations	602
Mean	3.618455
Median	3.68
Min	2.4
Max	4
Standard Deviation	0.2981459

Table 3. Summary Statistics of All Long-Term Data

When manipulating the data to accommodate an equal bandwidth on either side of the RD cutoff point in the assignment variable, the range of the data was again shifted to 3.2-4.0. Additionally, this shifted the mean to approximately 3.679 with a standard deviation of approximately 0.232.

Summary Statistics	
Number of Observations	548
Mean	3.679051
Median	3.715
Min	3.2
Max	4
Standard Deviation	0.2317318

Table 4. Summary Statistics of Long-Term Equal Bandwidth Data, from Grade point Average of 3.2 to 4.0

Treatment Variable

To summarize the relationship between academic achievement and Dean's List award, GPA in semester t=0 was determined to be the assignment variable, with Dean's List awarded being the treatment variable. To code the treatment variable, we used an indicator variable, with 0 indicating that the student was not on the Dean's List in semester t=0, and 1 indicating that the student was on the Dean's List in semester t=0. This cutoff point was determined by the institutional award of the Dean's List, with a student earning at or above a 3.6 GPA with at least 14 credited courses and no registered incomplete for that semester.

This procedure precedes the regression in order to indicate that a difference in outcome can be attributed to a difference in

treatment status of the Dean's List award amongst students.

As delineated in Figure 1, there is a sharp jump in the treatment variable, indicated by students with a grade point average of below 3.6 of 4.0 in semester t=0, therefore not achieving the Dean's List being treated with the dummy variable value of 0, and students with a grade point average of 3.6 or higher in semester t=0 and receiving the Dean's List award, being treated with a dummy variable value of 1. This sharp jump designates that a sharp RDD model is to be used as the regression for this study.

This treatment variable remains constant throughout all regressions and plots, for each individual hypothesis.

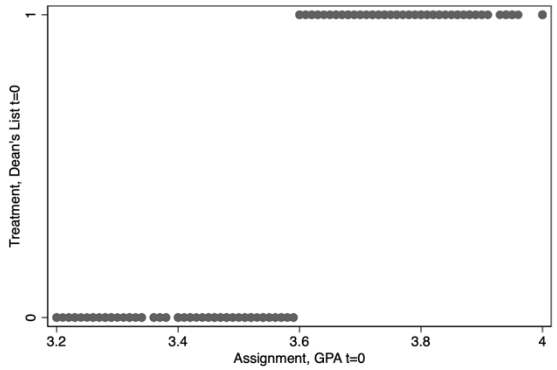

Figure 1. Scatter of Treatment, Dean's List in Semester Zero Against Assignment, Grade point Average in Semester Zero

Outcome Variable

The outcome variable in this preliminary regression was the grade point average, measured on a 4.0 scale, for each student during the subsequent semester t=1. This allowed us to measure the impact of the Dean's List on a student's academic performance, as measured by their grade point average, in the subsequent semester.

When measuring the longer-term impacts of the Dean's List on academic performance, the assignment variable and outcome variable were modified in order to reflect this longer period of time. In this case, the outcome variable was the grade point average, measured on a 4.0 scale, for each student during the semester t=2. Because only Fall and Spring semesters were measured, this would mean that t=2 would be in the same season, simply one year later than t=0.

It is possible that another benchmark for measuring academic ability is the number of credits undertaken by the student each semester. In order to test the effect of our treatment on this measure of academic performance, number of credits taken during semester t=1 stood as our outcome variable for our third and final hypothesis.

Preexisting Covariates

The number of credits undertaken during semester zero was identified as being a possible preexisting covariate, essentially a variable to be included in the regression to analyze whether controlling for it would have an impact on the significance of the regression.

Below, this preexisting covariate is mapped against the assignment variable of GPA in semester zero. This shows a discontinuity jump, signaling that more credits were undertaken for students who achieved the Dean's List as opposed to students below this cutoff.

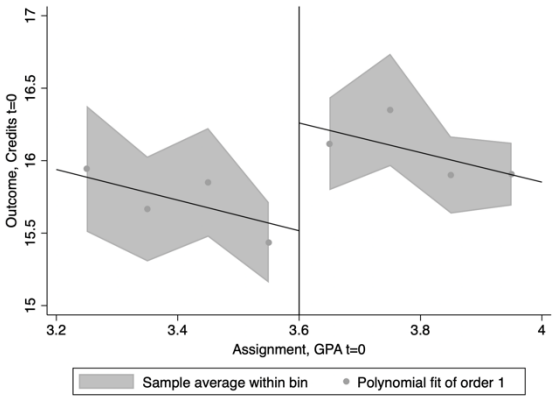

Figure 2. Reduced Form Regression Discontinuity of Grade point Average in Semester Zero Versus Credits in Semester Zero for Dean's List students (GPA ≥ 3.6 in semester zero) and non-Dean's List Students with a Polynomial of Order One

Regression Plots

To construct our regression, we employed a regression discontinuity design to analyze the impact of the difference in treatment amongst observations. Under this approach, the assignment variable is mapped against the outcome variable, with the treatment existing at the cutoff point, c. We expect to see a jump on the outcome variable, GPA in semester t=1, where the treatment, Dean's List award, is applied to the assignment variable, GPA in semester t=0, in this case, at the cutoff point depicted by the vertical line at 3.6 on the x-axis.

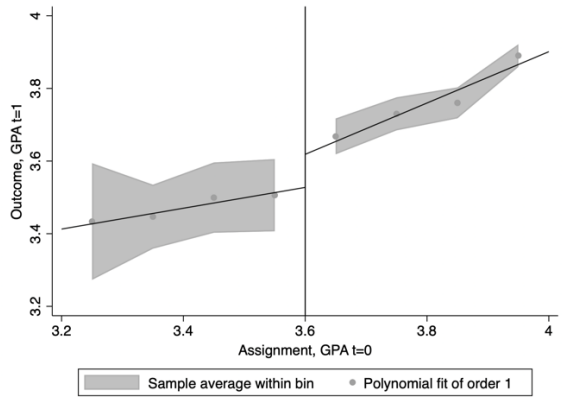

Figure 3. Reduced Form Regression Discontinuity of Grade point Average in Semester Zero Versus Grade point Average in Semester One for Dean's List students (GPA ≥ 3.6 in semester zero) and non-Dean's List Students with a Polynomial of Order One

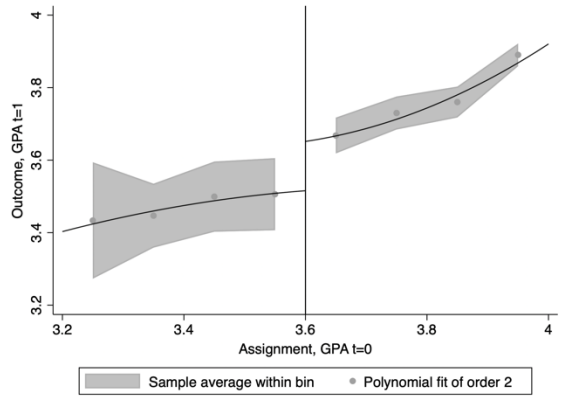

Figure 4. Reduced Form Regression Discontinuity of Grade point Average in Semester Zero Versus Grade point Average in Semester One for Dean's List students (GPA ≥ 3.6 in semester zero) and non-Dean's List Students with a Polynomial of Order Two

The pooled data were imported into STATA, where they were then binned into four evenly-spaced buckets on either side of our cutoff point of 3.6. Therefore, each bucket had a range of 0.1.

An equal bandwidth on either side of our cutoff point 3.6 was selected in order to equally map the data. This generated the range of 3.2 to 4.0 for our data, totaling 0.8, with a 0.4 range on either side of the cutoff.

Two plots were drawn in order to measure the effect of the treatment on the outcome variable, with the assignment variable on the x-axis and the outcome variable on the y-axis. One plot was created with a polynomial of order one, charting a linear fit line (Figure 3), the other was created with the polynomial of order two, rendering a quadratic fit line (Figure 4), both above and below our cutoff point, c.

In the second regression, again, a regression discontinuity design was employed, this time, to visualize the impact of the difference in treatment on the longer-term academic performance, measured by grade point average in semester t=2.

Pooled data were imported to STATA, creating four evenly-spaced buckets on either side of our cutoff point of 3.6, again generating an equidistant bandwidth of 0.4 on either side of our cutoff point, c.

Two plots were drawn to understand the long-term impact of receiving the Dean's List accolade in semester t=0, one with a polynomial of order one, charting a linear fit line (Figure 5), another with the polynomial of order two, rendering a quadratic fit line (Figure 6), both above and below c.

Our third and final plot uses the method for regression one, yet switches the outcome variable, mapping grade point average in time t=0 was mapped on the x-axis versus the outcome variable of the number of credits taken in semester t=1 on the y-axis (Figure 7).

While we are able to see a regression, discontinuity mapped on the y-axis, the

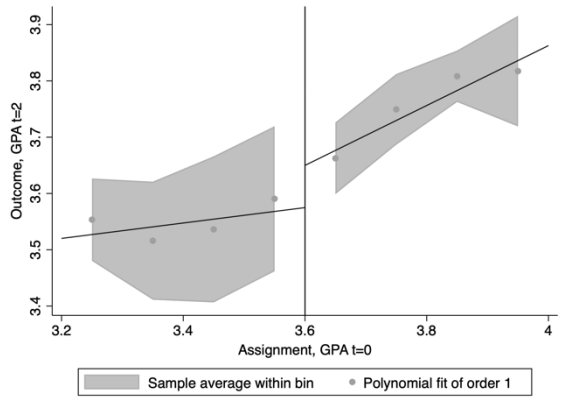

Figure 5. Reduced Form Regression Discontinuity of Grade point Average in Semester Zero Versus Grade point Average in Semester Two for Dean's List students (GPA ≥ 3.6 in semester zero) and non-Dean's List Students with a Polynomial of Order One

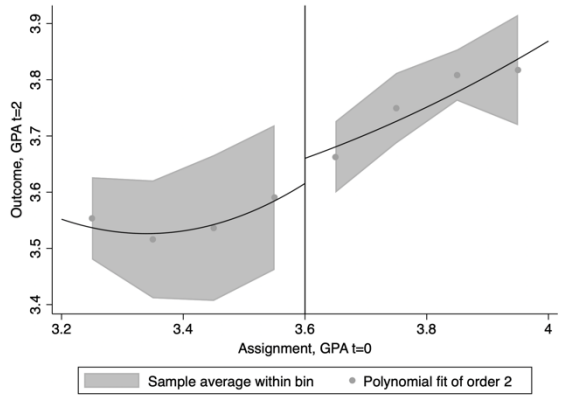

Figure 6. Reduced Form Regression Discontinuity of Grade point Average in Semester Zero Versus Grade point Average in Semester Two for Dean's List students (GPA ≥ 3.6 in semester zero) and non-Dean's List Students with a Polynomial of Order Two

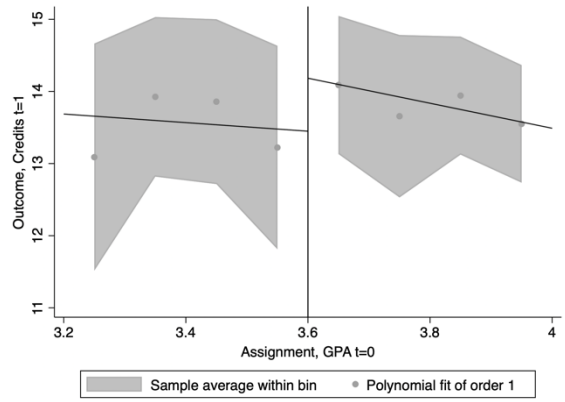

Figure 7. Reduced Form Regression Discontinuity of Grade point Average in Semester Zero Versus Credits in Semester One for Dean's List students (GPA ≥ 3.6 in semester zero) and non-Dean's List Students with a Polynomial of Order One

regression will show if there is a statistically significant impact of the treatment on the outcome variable of credits in semester one.

Regression Output

Regression results included three or five key variables in addition to the constant and the preexisting covariate of credits in semester zero, depending on the polynomial order of the regression. These variables included the assignment term, assignment term squared, interaction term for the linear effect, interaction term for the quadratic effect, treatment (Dean's List) indicator variable, as well as the constant. For each regression, linear output is charted in the results section, with quadratic output noted in the appendix.

The assignment term was constructed using the assignment variable value – 3.6, our cutoff for receiving the treatment. For the quadratic regression function, this variable was squared, producing (assignment variable value – 3.6)^2.

Two interaction terms were created, one solely for the quadratic regression function. The first interaction term, "AT" was constructed by multiplying the "Assignment-3.6" variable and multiplying it by the treatment dummy, essentially 0 or 1. The quadratic effect interaction term was created by multiplying this squared assignment term [treatment*(assignment – 3.6)^2].

For the linear effect, the outcome variable was regressed against *Assignment – 3.6, Dean's List,* and *Interaction: AT* as long as Assignment was greater than or equal to 3.2, our bandwidth cutoff.

For the quadratic effect, the outcome variable was regressed against *Assignment – 3.6, (Assignment – 3.6)^2, Dean's List, Interaction: AT,* and *Interaction: A^{2}T*, as long as Assignment was greater than or equal to 3.2, our bandwidth cutoff.

This calculation process was completed for both the short-term and long-term effect.

Results

Our results present several important findings for understanding the effect of receiving the Dean's List accolade on future academic performance. We will first discuss the impact on short-term academic performance measured by GPA in semester one (semester-on-semester), then discuss the impact on long-term academic performance measured by GPA in semester two (season-on-season). After, we will discuss the impact on short-term academic performance as measured by the number of credits undertaken in semester one.

Regression Results (GPA in Semester One)

Variable	*Estimate*	*Standard Error*	*t*	*P>|t|*	*95% Confidence Interval*	
Assignment-3.6	0.2866899	0.1804885	1.59	0.113	-0.06772	0.64110
Dean's List	0.0910676	0.0487892	1.87	0.062	-0.00474	0.18687
Interaction: AT	0.4197613	0.2125352	1.98	0.049	0.00242	0.83710
Constant	3.527484	0.0394723	89.37	0.000	3.44998	3.60499

Table 5. Short-Term Dean's List Impact Regression Output for Polynomial of Order One

Variable	*Estimate*	*Standard Error*	*t*	*P>|t|*	*95% Confidence Interval*	
Assignment-3.6	0.2883037	0.1808133	1.59	0.111	-0.06675	0.64335
Dean's List	0.0899318	0.0491746	1.83	0.068	-0.00663	0.18649
Interaction: AT	0.4197055	0.2126926	1.97	0.049	0.00206	0.83735
Credits t=0	0.0015283	0.0078723	0.19	0.846	-0.01393	0.01699
Constant	3.503771	0.1283792	27.29	0.000	3.25168	3.75586

Table 6. Short-Term Dean's List Impact Regression Output for Polynomial of Order One

Dean's List (Semester One GPA)

The Dean's List coefficient in these two regressions can be interpreted as the effect of being on the Dean's List in semester zero on grade point average in semester one. The coefficient for this ranged from 0.0899318 to 0.0910676 depending on whether the variable Credits t=0 was included or not included in the regression. While the Dean's List variable was not statistically significant at the 95% confidence level, it was significant at the 90% confidence level. As observed in Figure 3, the 95% confidence intervals above and below the cutoff overlap. This is supported in the data in that we are observing the 95% confidence intervals to include 0, ranging from [-0.004736, 0.186871] to [-0.006628, 0.186492]. This means that there is not statistical significance at this level that the Dean's List has an impact different from zero. There are a few possible explanations for this phenomenon in our data. One could be that the sample size of 655 is insufficient for observing trends in the data. Another explanation could be that there are underlying covariates that, if observed as stand-alone variables in the regression could increase the statistical significance of this variable. Lastly, this could just be a sign of a weak connection between being awarded the Dean's List accolade and having a Dean's List qualifying GPA in semester one.

Interaction Term (Semester One GPA)

In these regressions, the Interaction Term coefficient measures the difference in slope between the regression line above and below our cutoff point. This variable is statistically significant at the 95% confidence level, demonstrating that there does exist a difference in slope between these two regression fit lines. This is additionally

significant to our research as, due to the positive coefficient and statistical significance, we can observe that each increase in the assignment variable, GPA in semester zero, will produce a higher- and higher-grade point average, estimated to be 0.4197613 greater (according to the regression output in Table 5), in semester one.

Credits (Semester Zero)

Credits in semester one is a variable used to control the impact of number of credits undertaken in semester zero on the outcome variable. As shown in Table 6, this pre-existing covariate is not statistically significant in explaining the variation in the outcome variable, with a p-value of 0.846.

Regression Results (GPA in Semester Two)

Variable	*Estimate*	*Standard Error*	*t*	*P>|t|*	*95% Confidence Interval*	
Assignment-3.6	0.1487027	0.1943069	0.77	0.444	-0.23298	0.53039
Dean's List	0.0578347	0.0539775	1.07	0.284	-0.04820	0.16386
Interaction: AT	0.5373705	0.2314517	2.32	0.021	0.08272	0.99202
Constant	3.578307	0.0434081	82.43	0.000	3.49304	3.66358

Table 7. Long-Term Dean's List Impact Regression Output for Polynomial of Order One

Variable	*Estimate*	*Standard Error*	*t*	*P>|t|*	*95% Confidence Interval*	
Assignment-3.6	0.1471229	0.1947584	0.76	0.450	-0.23545	0.52970
Dean's List	0.0588519	0.054438	1.08	0.28	-0.04808	0.16579
Interaction: AT	0.5374738	0.2316608	2.32	0.021	0.08241	0.99253
Credits t=0	-0.00135	0.0088709	-0.15	0.879	-0.01878	0.01608
Constant	3.599214	0.1440924	24.98	0.000	3.31617	3.88226

Table 8. Long-Term Dean's List Regression Output for Polynomial of Order One with Control for Preexisting Covariates by Credits (t=0)

Dean's List Effect (Semester Two GPA)

The Dean's List coefficient in these two regressions can be interpreted as the effect of being on the Dean's List in semester zero on grade point average in semester two. The coefficient for this ranged from 0.0578347 to 0.0588519 depending on whether the variable Credits t=0 was included or not included in the regression. The Dean's List variable was not statistically significant at the 95% confidence level, with a p-value of 0.284 and 0.28. Unlike what was observed in the short-term regression, there was no significance at the 90% confidence level. This finding is congruous with the outcome found in Quarton and Seaver's research, that receiving the Dean's List accolade in semester zero is not a significant predictor of academic performance in semester two.

Interaction Term (Semester Two GPA)

Similar to the short-term regression output, the long-term Interaction Term coefficient is statistically significant with a p-value of 0.021. However, since the Dean's List variable itself is not statistically significant, this variable offers little insight.

Credits (Semester Zero)

Consistent with our findings from the short-term regression output, displayed in Table 8, the variable Credits t=0 did not have a statistically significant impact on the data, with a p-value of 0.879.

Regression Results (Credits in Semester One)

Variable	*Estimate*	*Standard Error*	*t*	*P>|t|*	*95% Confidence Interval*	
Assignment-3.6	-0.3590211	2.956737	-0.12	0.903	-6.16493	5.44689
Dean's List	0.5684849	0.8041242	0.71	0.48	-1.01051	2.14748
Interaction: AT	-1.148025	3.478043	-0.33	0.741	-7.97758	5.68153
Credits t=0	0.2235719	0.1287308	1.74	0.083	-0.02921	0.47635
Constant	9.979689	2.099313	4.75	0.000	5.85744	14.10194

Table 9. Future Credits Regression Output for Polynomial of Order One with Control for Preexisting Covariates with Credits (t=0)

Dean's List (Semester One Credits)

When mapping the credits in semester one against the adjusted assignment variable for semester zero, interaction term and preexisting covariate of credits in semester zero, we find that the Dean's List coefficient is not statistically significant at the 95% confidence level, with a p-value of 0.48. The finding that Dean's List does not have an effect on credits in the subsequent semester is consistent with the results found in 1973 by researchers Seaver and Quarton. This is likely due to the fact that the quantity of academic credits pursued by a student does not necessarily equate to the quality of academic performance.

Interaction Term (Semester One Credits)

The Interaction Term coefficient effect on semester one credits is not statistically significant, with a p-value of 0.741. This indicates that there is not a statistically significant difference in slope above and below the cutoff point, which differs from the regression results for grade point average in both the short-term and the long-term.

Hypothesis Revisited

Our primary hypothesis conjectured that being awarded that academic accolade of the Dean's List in semester zero would have a positive relationship with a student's grade point average in the subsequent semester, semester one. The results of our analysis are consistent with our hypothesis at the 90% confidence level. This means that, with 90% confidence, we can say that there does exist a positive impact between receiving the Dean's List accolade and a student's academic performance, measured by grade point average in the subsequent semester.

This finding, however, does not extend to the long-term. Our second hypothesis articulated that being on the Dean's List in semester zero will not have a statistically significant impact on achieving a Dean's List qualifying grade point average two semesters later, essentially earning a GPA greater than or equal to 3.6 of 4.0 the next season. Our results indicate exactly that: in semester two, there does not exist a statistically significant impact of the Dean's List on academic performance, measured by GPA.

Our final hypothesis asserted that, similar to the findings of Seaver and Quarton, being awarded the Dean's List accolade in semester zero will not result in an increase in the number of credits taken in the subsequent semester. This hypothesis was upheld through our research, as the Dean's List variable represented in the corresponding regression (charted in Table 9) is not statistically significant.

Conclusion

Our research illustrates the successful impact that the academic award of the Dean's List has on short-term academic performance, measured by GPA. This academic accolade serves as positive reinforcement for the

success of students, motivating them to achieve similar academic success in the short-term future. Now more than ever, students are balancing many responsibilities, in addition to a world of distractions stemming from various technologies, such as social media, smart phones, and streaming services. With an increase in diversions for students, it is imperative for universities to ideate creative ways to ensure students focus on their studies and perform at their best. Students' success is reflective of the universities they attend, an incentive for institutions to successfully motivate their students.

As it was found that there is not a statistically significant impact of the Dean's List on long-term academic performance, it is important that these awards are conferred each semester, offering students continued motivation to sustain their academic success. These findings indicate that colleges and universities can bolster their students' academic success by finding ways to reward students with a certain level of academic achievement. The Dean's List is just one example of an accolade that can incentivize students to achieve, supplementary to many other major awards such as the Chancellor's List, bestowed upon students for achieving a perfect 4.0 grade point average.

While being awarded with Dean's List does have an impact on short-term academic performance, measured by GPA, it does not have an impact on credits taken in the subsequent semester, which we used as another potential measure of academic performance. This, consistent with the findings of Quarton and Seaver, may represent the fact that quantity is not always representative of quality. Taking more credits in the subsequent semester is not representative of achieving a higher GPA, but rather can present more challenges related to pursuing more course-hours and maintaining a certain level of success. This can add one more thing to the workload of college and university students, making it harder to achieve a Dean's List qualifying grade point average.

One challenge of employing academic awards to boost performance is that it may hurt students who are close to the cutoff, but do not receive the award. For example, someone who received a 3.59 GPA at Washington University does not make the Dean's List and may consequently feel that their work is not being rewarded rather than feeling motivation to push towards achieving a Dean's List qualifying GPA. This feeling may cause future distress and less motivation to perform at or above this Dean's List qualifying standard.

In regard to challenges arising from our data analysis, we made choices regarding the bandwidth of the plots and regressions, as well as bucket sizes for our assignment variable. Because there were choices to be made, this will raise questions about the alternatives we considered. In terms of bandwidth, we employed an equal bandwidth on either side of our cutoff, GPA in semester zero equal to 3.6, in order to display a bandwidth even in range, being 0.4. There are, however, options to institute an optimal bandwidth based on the size and distribution of the data, which could have made the window either smaller or larger. Employing a smaller bandwidth, in particular, would have better conveyed the impact just around the cutoff point, expressing the impact of just making and just missing the Dean's List. While a smaller bandwidth would be ideal, the dataset would have to have been much larger. Stemming from this smaller dataset, the data were unequal on either side of the cutoff point, with a mean and median both above the cutoff, making the dataset right-skewed. Had we had more data points for observation, the distribution would have been closer to normal, providing ever more accurate and reliable results. In terms of

bucketing the data, we looked at both 0.05 range and 0.1 range bucket sizes. When choosing the size of the bucket, it is important to acknowledge that with a larger size, the variance of the estimated coefficients will likely decrease due to the increased number of observations in the bucket, yet the smoothing error will increase. This phenomenon is precisely the opposite for smaller bucket sizes, with variance of the estimates increasing and smoothing error decreasing. This is a tradeoff that must be made when evaluating bucket sizes. Lastly, we also faced a lack of enough data points in order to provide robust conclusions in terms of statistical significance. Our regression of Dean's List qualification in semester zero against academic performance in terms of grade point average in semester one indicated significance at the 90% confidence level, but not the 95% confidence level. Likely, with more data points for observation, a more conclusive judgement would be made.

In the future, research should use more data points in order to interpret the statistical significance of the Dean's List on future academic performance. This data should look into both short- and long-term effects. Additional research may seek to understand additional variables that may have an impact on the efficacy of the Dean's List and a student's likeliness for achieving the Dean's List. It would also be interesting to explore the impact of academic awards at different levels of a student's career – from high school, through undergraduate and graduate years. This could even extend to the impact of receiving the Dean's List during university years on the performance of an individual at the firm-level. Data that exist through all years could show a lasting impact of academic awards that outlives their legacy at a particular program, and rather impacts the student throughout their whole career.

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Appendix

Variable	*Estimate*	*Standard Error*	*t*	*P>|t|*
Assignment-3.6	0.1264518	0.7231295	0.17	0.861
(Assignment-3.6)^2	-0.3882658	1.6966500	-0.23	0.819
Dean's List	0.1359974	0.0780705	1.74	0.082
Interaction: AT	0.123069	0.856723	0.14	0.886
Interaction: A^{2}T	1.444479	1.9846810	0.73	0.467
Constant	3.515661	0.0650371	54.06	0.000

Table 10. Short-Term Dean's List Impact Regression Output for Polynomial of Order Two

Variable	*Estimate*	*Standard Error*	*t*	*P>|t|*
Assignment-3.6	0.1335985	0.724326	0.18	0.854
(Assignment-3.6)^2	-0.3755863	1.6987860	-0.22	0.825
Dean's List	0.134575	0.0783725	1.72	0.086
Interaction: AT	0.1134811	0.8583638	0.13	0.895
Interaction: A^{2}T	1.441714	1.9861680	0.73	0.468
Credits t=0	0.0018125	0.0078887	0.23	0.18
Constant	3.487923	0.1371515	25.43	0.000

Table 11. Short-Term Dean's List Regression Output for Polynomial of Order Two with Control for Preexisting Covariates by Credits (t=0)

Variable	*Estimate*	*Standard Error*	*t*	*P>|t|*
Assignment-3.6	0.7331657	0.8086838	0.91	0.365
(Assignment-3.6)^2	1.40027	1.8805550	0.74	0.457
Dean's List	0.0081331	0.0866992	0.09	0.925
Interaction: AT	0.0410689	0.9522052	4.00	0.966
Interaction: A^{2}T	-1.605992	2.1968740	-0.73	0.465
Constant	3.621759	0.0727643	49.77	0.000

Table 12. Long-Term Dean's List Impact Regression Output for Polynomial of Order Two

Variable	*Estimate*	*Standard Error*	*t*	*P>|t|*
Assignment-3.6	0.7287246	0.8100128	0.9	0.369
(Assignment-3.6)^2	1.393193	1.8829090	0.74	0.46
Dean's List	0.0090345	0.087007	0.1	0.917
Interaction: AT	0.0480103	0.9543056	0.05	0.96
Interaction: A^{2}T	-1.607993	2.1989070	-0.73	0.465
Credits t=0	-0.0012709	0.0088994	-0.14	0.886
Constant	3.641222	0.1545294	23.56	0.000

Table 13. Long-Term Dean's List Regression Output for Polynomial of Order Two with Control for Preexisting Covariates by Credits (t=0)

Variable	*Estimate*	*Standard Error*	*t*	*P>|t|*
Assignment-3.6	3.857494	11.85203	0.33	0.745
(Assignment-3.6)^2	10.20742	27.7969500	0.37	0.714
Dean's List	0.4656701	1.282396	0.36	0.717
Interaction: AT	-8.269892	14.04527	-0.59	0.556
Interaction: A^2T	-3.482886	32.4993300	-0.11	0.915
Credits t=0	0.2272585	0.2272585	1.76	0.079
Constant	10.23333	2.244187	4.56	0.000

Table 14. Future Credits Regression Output for Polynomial of Order Two with Control for Preexisting Covariates by Credits (t=0)

Variable	*Estimate*	*Standard Error*	*t*	*P>|t|*
Assignment-3.6	0.2883037	0.1808133	1.59	0.111
Dean's List	0.0899318	0.0491746	1.83	0.068
Interaction: AT	0.4197055	0.2126926	1.97	0.049
Credits t=0	0.0015283	0.0078723	0.19	0.846
Constant	3.503771	0.1283792	27.29	0.000

Table 15. Short-Term Dean's List Regression Output for Polynomial of Order One with Control for Preexisting Covariates by Credits (t=0)