Southern Utah University

The Effect Sport Participation has on an Athlete's GPA at SUU

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Abstract

The research question asks if participating in a college sport at Southern Utah University has an effect on the student's GPA. A linear regression is used with GPA being the output variable to determine if there is an effect by looking at the coefficients and the p-values. Another linear regression is used with GPA as the output variable to determine if there are systematic differences within gender. The data consists of a population with both male and female sports from SUU athletics. The results show that there is an effect that the specific sport you participate in has an effect on GPA. A systematic difference was found in female sports compared to male sports having a higher expected GPA. These results are significant on all levels. The null hypothesis is failed to be rejected given that there is an impact that sports have on GPA for students.

Introduction:

For as long as Southern Utah University has had a gymnastics program, it has been one of the leading sports in highest GPA. They have won several NCAA National Championship titles for academics in the past. As a student athlete on the gymnastics team, I have experienced firsthand the expectations that being an athlete has. The demand for excellence in and out of practice is high for our sport. However, this is not the case for every sport. Some sports get away with little effort and their coaches and staff are perfectly fine with it. This led me to wonder what factors have an effect on determining the GPA for each collegiate sport. There is not a specific measure that determines only academic knowledge leads to high GPAs, other characteristics contribute to GPA as well. Gaston-Gayles states that academic and athletic motivation have a correlation. Due to the motivation that comes with expectation, this could be a reason coaches expectation have an effect on the athlete's GPA. There are many people that are smarter than most of our team, but the expectations we are expected to reach allow our team to have a high GPA. In Brecht and Burnett's research paper, they use variables such as demographics as well as cognitive and noncognitive factors to asses academic success. Therefore, there must be characteristics of sports and programs that lead to academic success. Southern Utah University is the best setting due to the accessibility of the data and the trend that certain sports at SUU outperform when it comes to team overall GPA and GPA per athlete compared to other sports on campus.

My research question is if the collegiate sport a student participates in effects their GPA. My hypothesis is that the student's sport has an effect on their GPA, which is either a negative or positive effect. The answer to my hypothesis is that there is an effect on GPA depending on the sport the student participates in. The data I will be using to determine this will be the GPA of each student athlete on each sports team at Southern Utah University. I will be using a linear regression with GPA as my y variable and include many x variables. My true model will be GPA as the y variable and sport as the x variable. I will be using Comeaux and Harrison's model as reference as well as referencing Johnson, Wessel, and Pierce's athletic variables they used, which are sport and other sport characteristics, when choosing variables for my model.

The importance of this hypothesis question are the determining factors each sport contributes to the athlete's GPAs. Athletics tends to have a bad reputation when it comes to their athletes' GPAs and academic success. In Johnson's article, he uses factors that give an insight on which sport students-athletes are more likely to be at risk academically. Therefore, certain sports might have a reputation to struggle academically compared to others. My contribution will be to show the significance sports effects students GPAs which is predicated to be positive.

The importance of this study could be helpful to the future trends of college athletics. When it comes to NCAA collegiate sports, a certain GPA must be achieved in order to keep eligibility status and continue participating in that sport. This requirement is a minimum of a 2.3 GPA for Division I schools. This study can help determine which sports are more likely to be at risk at not meeting this requirement compared to others and which sports are more likely to stay on track

for the 40-60-80 rule. This rule requires that by the end of your second year the athlete is 40% done with their major, and then 20% completed the following two years in order to stay eligible academically as well as upholding a specific GPA. There is also a respect that comes with high ranked academic sports. This study also exemplifies which sports are held to a specific goal academically.

Data:

The source of this data comes from athletics at SUU. The population of this data consists of all athletics at SUU from the year 2000 until the spring semester of 2020. Each year has two semesters fall and spring. To explain further, there are 13 sports total that consist of men's and women's basketball, men's and women's cross country, men's and women's track and field, men's and women's golf, football, gymnastics, women's soccer, softball, and volleyball. There were a couple of sports that were dropped due to the fact they are no longer apart of SUU athletics, like baseball and tennis.

Sports at SUU:

Men's Sports	Women's Sports
Basketball	Basketball
Cross Country	Cross Country
Football	Golf
Golf	Gymnastics
Track and Field	Soccer
	Softball
	Track and Field
	Volleyball

The outcome variable of interest is GPA per athlete. It is measured on a 4.0 scale. There are potential limitations that could affect the GPA of each athlete. One thing to be aware of is reverse causality. Since the data only involves students that are involved in athletics, there is no determination if participating in a sport in general effects GPA compared to non-student athletes.

Variable	Obs	Mean	Std. Dev.	Min	Max
CumGPA	7,809	3.223963	0.588991	0	4

The key independent variable of interest is the sport each athlete participates in. It will be measured by a categorical variable per sport. An issue to bring to mind, is that there could be

selection bias in which sport an athlete chooses to participate in. This could be due to demographical reasons, financial concerns, or skill level. Golf is also combined as men and women's GPA's together. This could cause a bias within gender differences.

The other variables used in the model consist of if the athlete is in season, an interaction variable of in season times sport, major of each athlete, and class the athlete is academically. The in-season interaction variable is the in season variable times the sport variable. This variable will be a dummy variable where 1 means they are in season and 0 means they are not in season. The major variable will be a categorical variable that represents each major. The majors consist of business, engineer, education, computer science, health sciences, humanities and social science, and art. The class variable which is a categorical variable for freshman, sophomore, junior, and senior, will be a fixed effect to control for the differences in difficulty each class has. These variables are important because they help determine the nature of each sport and the discipline involved in predicting the GPA. The in-season variable will be a hopeful predictor to if there is a negative effect to GPA while being in season and traveling. There could also be a positive affect for this variable as well because some sports might take less credits during season for an easier class load which could allow their GPA to increase.

Method:

To determine if the sport an athlete at Southern Utah University participates in effects their GPA, I ran a linear regression on GPA. My base model is $GPA_{it} = \beta_0 + \beta_1 sport_i + u_i$ where *i* is for student athlete. The variable sport will be a categorical variable that represents each sport. My estimated model will include an in season variable, an interaction variable, a variable that controls for major, and fixed effect ariable on the year in school each athlete is. The estimated model is $GPA_{it} = \beta_0 + \beta_1 sport_i + \beta_2(in\ season) + \beta_3(sport * in\ season)_{it} + \beta_4 major_i + \beta_5 class_{it} + u_{it}$ where *i* is for student athlete over time *t*.

My second model answers my research question of if the athletes sport effects their GPA by using the sport coefficient to determine if there is a positive or negative effect. This model meets the first two Gaus Markov assumptions of linear in parameters and random sampling. Since the data is a population random sampling is not a concern. The third assumption of non-collinearity is met because none of the variables are correlated to effect the y term of GPA. However, the assumption of exogeneity may not be met because there could be terms in the error that effect GPA like practice hours or high school GPA, but with the data that is used these variables cannot be determined. This is something to be aware of but should not make the answer less relevant. As mentioned in the data section, selection bias could be a concern in which sport the student chooses to participate in.

The third model I ran $GPA_{it} = \beta_0 + \beta_1(men'ssports)_i + \beta_2(women's\ sports)_i + u_{it}$, estimated if there are systematic differences in GPA for gender. I grouped the male sports

together and grouped the female sports together to create two new variables that represent women's sports and men's sports. This model uses cumulative GPA as the y and then the two grouped variables as the x's. I did not include golf when running this model due to the fact they are grouped together both male and females.

Base Model – Model 1

$$GPA_{it} = \beta_0 + \beta_1 sport_i + u_{it}$$

Estimated Model – Model 2

$$GPA_{it} = \beta_0 + \beta_1 sport_i + \beta_2(in\ season) + \beta_3(sport * in\ season)_{it} + \beta_4 major_i + \beta_5 class_{it} + u_{it}$$

Estimated Model – Model 3

$$GPA_{it} = \beta_0 + \beta_1(men'ssports)_i + \beta_2(women's\ sports)_i + u_{it}$$

* Where *i* is for student athlete over time *t*.

Result Section:

In my base model, women's track is the omitted variable. The results show the difference in the GPA of each athlete and if they are higher or lower due to the sport the athlete participates in. In my base model, the only sports that GPA increases by a positive number is gymnastics, soccer, softball, and women's cross country in comparison to women's track whose average GPA is a 3.38. The chart below shows the GPA change per sport.

Chart 1

	(1)
VARIABLES	cumulativegpa
gymnastics	0.315***
	[0.0321]
football	-0.408***
	[0.0196]
soccer	0.0863***
	[0.0283]
wbasketball	-0.0425
	[0.0348]
mbasketball	-0.335***
	[0.0337]
mtrack	-0.245***
	[0.0230]
golf	-0.201***
	[0.0527]
volleyball	-0.00487
	[0.0348]
softball	0.0127
	[0.0301]
menscc	-0.124***
	[0.0293]
womenscc	0.149***
	[0.0319]
Constant	3.369***
	[0.0157]
Observations	7,809
R-squared	0.135

The p-value is statically significant for all sports except for women's basketball, volleyball, and softball. The sports that have a bigger magnitude of change are gymnastics, football, and men's basketball. Gymnastics is the sport with the highest coefficient. This results in a .315 increase in GPA given you are on the gymnastics team. The sport with the lowest coefficient is football which results in a .408 decrease in GPA. To put this magnitude into perspective a .4 change in GPA can be the difference between a B+ and a B-.

In my second model, there is a control variable to determine if there is a change in coefficient once being in season. The next model adds the variable major and the last model adds the variable class. The interaction variable I have used provides a robustness check to determine the difference in GPA for athletes in season compared to not in season. Once major is added, the change in each sports coefficient is small which accounts for a robustness check. The class variable has freshman as the omitted category. Each class is significant at all three levels. There is a higher magnitude if the athlete is a senior compared to sophomore, junior, and freshman.

This model passes the robustness check because adding other variables does not affect the key variable which is sport. This allows sport to stay consistent in its effect on GPA but allows more of the variation in GPA to be explained through the r-squared value when adding other variables.

The chart below shows the coefficients of all three models.

Chart 2

	(1)	(2)	(3)	(4)	(5)
VARIABLES	cumulativegpa	cumulativegpa	cumulativegpa	cumulativegpa	cumulativegpa
gymnastics	0.315***	0.315***	0.305***	0.301***	0.338***
	[0.0321]	[0.0321]	[0.0421]	[0.0416]	[0.0404]
football	-0.408***	-0.410***	-0.364***	-0.328***	-0.316***
	[0.0196]	[0.0214]	[0.0548]	[0.0542]	[0.0526]
soccer	0.0863***	0.0848***	0.275**	0.292**	0.305**
	[0.0283]	[0.0297]	[0.127]	[0.125]	[0.121]
wbasketball	-0.0425	-0.0441	-0.0425	-0.0212	-0.000894
	[0.0348]	[0.0361]	[0.0348]	[0.0344]	[0.0334]
mbasketball	-0.335***	-0.337***	-0.335***	-0.315***	-0.311***
	[0.0337]	[0.0350]	[0.0337]	[0.0334]	[0.0324]
mtrack	-0.245***	-0.245***	-0.254***	-0.255***	-0.226***
	[0.0230]	[0.0230]	[0.0286]	[0.0284]	[0.0275]
golf	-0.201***	-0.203***	-0.201***	-0.195***	-0.201***
	[0.0527]	[0.0535]	[0.0527]	[0.0522]	[0.0506]
volleyball	-0.00487	-0.00632	0.291**	0.259*	0.230*
	[0.0348]	[0.0359]	[0.142]	[0.140]	[0.136]
softball	0.0127	0.0126	0.0186	0.0316	0.0532
	[0.0301]	[0.0301]	[0.0391]	[0.0386]	[0.0375]
menscc	-0.124***	-0.125***	-0.184	-0.189*	-0.205*
	[0.0293]	[0.0306]	[0.113]	[0.111]	[0.108]
womenscc	0.149***	0.148***	0.181	0.196	0.151
	[0.0319]	[0.0331]	[0.159]	[0.157]	[0.152]
inseason		0.00300			
		[0.0178]			
sr					0.369***
					[0.0172]
jr					0.322***
					[0.0185]
so					0.240***
					[0.0182]
Constant	3.369***	3.368***	3.369***	3.326***	3.166***
	[0.0157]	[0.0178]	[0.0157]	[0.100]	[0.0976]
Control for Interaction			✓	✓	✓
Control for Major				✓	✓
Observations	7,809	7,809	7,809	7,809	7,809
R-squared	0.135	0.135	0.136	0.161	0.211

The change in coefficients for each sport when the control variables and interaction variable are added do not change by much. I omitted the sports that are in season for both fall and spring semester which consists of golf and women's and men's basketball. The magnitude of the variables almost stay the same besides soccer increasing by .07 and football increasing by .013 once in season compared to not in season. Depending on the nature of each sport could explain if there is a positive or negative effect on GPA in season. This is because some sports might take an easier credit semester knowing there will be a significant amount of traveling. However, some

sports might be impacted negatively due to what traveling season brings. The p-value is not significant on the in-season variables besides volleyball.

The results, if there are differences between women and male sports, are significant. Both variables have a significant p-value at all three confidence levels. The magnitude for men's sports is comparably lower than women's sports as seen in chart 3. Male sports are expected to have a lower GPA by .308 compared to female sports who are expected to have a higher GPA by .109. As mentioned earlier, for male sports this could be the difference between a B+ and a B-. This shows that there is an effect gender has on GPA when it comes to athletics.

Chart 3

	(1)
VARIABLES	cumulativegpa
mensports	-0.308***
	[0.0176]
womsports	0.109***
	[0.0190]
Constant	3.351***
	[0.0152]
Observations	7,809
R-squared	0.106

The overall impact each sport has on the GPA of a student athlete is significant in the fact there is a change in the coefficients depending on the sport. Gymnastics has the biggest effect on GPA with women's cross country coming in second.

Conclusion:

The research question of if sport effects GPA per athlete is answered through these results. The magnitude of each coefficient shows that there are both negative and positive effects on each sport with women sports mainly having a positive effect. This can conclude that there could be a systematic difference in gender results meaning female sports have an expected GPA average that is higher than the expected average GPA for males. However, there could be other factors that impact GPA according to gender. For example, women might have other factors that allow their GPA to be higher than men's GPA that aren't accounted for. Given the model and the variables used, there is a significant difference between male and female sports when it comes to GPA.

The main sport in comparison was the effect gymnastics has on GPA. There is a positive affect that this sport has and it also has the highest magnitude out of the rest of the sports. This could be for many reasons that is not focused on in the data. For instance, the type of students recruited

out of high school, the expectations of each athlete in gymnastics, or the expected GPA each sport is held to by their coaches and staff. Therefore, the null hypothesis is failed to reject given that there is an impact that sports have on GPA for students.

References

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