The Impact of Depressive Symptoms on 5C Varsity Athletic Performance

Helena Robinowitz

Professor Gary Smith

Pomona College

Department of Economics

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Introduction

Collegiate sports make over $18 billion for athletic departments across the country (Butts 2021). Because of this, a lot of funding and research goes into ensuring that athletes are performing at their best. When determining what maximizes student athletes' performances, most think of physical strength, health, nutrition, sleep, recovery, and other physical factors. However, mental health plays an immense impact on collegiate athletes, not only as people, but as performers. Issues such as eating disorders & disordered eating, depression and suicide, anxiety and stress, overtraining, sleep disorders and attention-deficit/hyperactivity disorder, plague the collegiate athlete community. Burnsed (2014) determined that 31% of male and 48% of female student athletes reported depression or anxiety symptoms each year between 2008-2012 and Gill (2008) also found that 10-21% of student athletes are diagnosed with depression. These numbers vary by gender. Male athletes are found to be less willing to find help (Watson 2005). One reason is because male athletes are taught to be strong and stoic. Seeking help is viewed as a sign of weakness and not in alignment with the idea of masculinity (Wahto et al. 2016).

While reported rates of depression vary, openly discussing mental health is highly stigmatized among most collegiate sports. Athletics puts a hard emphasis on being tough, gritty, and strong. Asking for help is deemed as weak, and mental illness is categorized as a disadvantage. Because of this, many coaches don't openly discuss mental health, and therefore many players don't feel comfortable opening up about their struggles. A study by Wahto et al. (2016) found that 66% of student athletes reported a significant stigma regarding the attitudes and willingness to speak about

mental health in their athletic program. Watson (2005) found that this stigma stemmed from personal discomfort surrounding mental health and Proctor & Boan-Lenzo (2010) found that student athletes feared potential negative reactions from coaches. Beauchemin (2014) discussed how an integrative outreach model could increase awareness surrounding mental health, but that schools would have to be willing to fund it. This may be difficult especially at the Division III level, where schools' athletic departments may not have the necessary funding to include mental health professionals, workshops, and support in their athletic curriculum. Overall, while mental health plagues the collegiate athlete community, many athletes suffer in silence while adequate funding and research isn't placed into mental health services.

I am interested in determining the impact depressive symptoms have on athletic performance at the Division III level, focusing on the Claremont Colleges. I am focusing on the Division III level as there is extremely limited research on Division III athletes, and educating athletic directors, coaches, and training staff on the importance of mental health funding is important. I only focus on depression, as it simplifies the survey process for the respondents and because it is one of the most prevalent mental illnesses suffered by college athletes. I am finding the impact of depressive symptoms on athletic performance with data acquired through a survey I sent out to every student athlete at the Claremont Colleges, which uses questions from the Beck's Depression Inventory to determine depressive symptoms. I am also discovering the difference in impact among male sports only and among individual sports only. Lastly, I am determining the impact mental health has on athletes' happiness on their team and at their school. This paper adds to the previous body of literature because no previous

studies have determined the impact of depressive symptoms on athletic performance at the collegiate, let alone the Division III level. I hypothesize that student athletes with worse symptoms of depression will perform worse athletically and that the impact will be much greater in individual sports and men's sports. I also hypothesize that student athletes with worse symptoms of depression will be less happy on their team and at their school. However, I acknowledge that many student athletes find repose and a sense of "escape" at their sports practices, so some depressed athletes may yearn for sports and perform better in depressed states. Also, it may be possible that instead of depressive symptoms leading to worse performance outcomes, that worse performance outcomes lead to symptoms of depression. Overall, this paper screate a baseline for a new body of literature that acknowledges the impact that mental health has on athletic performance and happiness in college.

Literature Review

While previous studies look at the effect of athletic participation on depression, no study directly discusses the impact of depression on athletic performance. Previous studies, however, examine the impact of self-confidence, psychological state measures, anxiety, and mood on athletic performance in a multitude of sports. Hassmén, Koivula, & Hansson (1998) examine the impact of pre-competitive mood states on golfing performance, Terry & Slide (1995) focus on the effect of psychological states on karate competition results, Chapman, Lane, Brierley, & Terry (1997) look at the impact of anxiety and self-confidence in Tae-Kwon-Do results, and Terry, Cox, Lane, & Karageorghis (1996) examine the effect of anxiety on tennis results. Bearden,

Jain, & Filipowicz (2013) also interestingly discuss the impact of depression on the accuracy of forecasting soccer game outcomes, but not on playing the game itself.

My paper differs from this previous literature because it examines the direct impact of depressive symptoms in student athletes at the collegiate DIII level on their athletic performance, focuses on a multitude of sports, includes team sports, includes men's and women's sports, and looks at the impact of depressive symptoms on performance over an entire season instead of during a single athletic event.

Hassmén et al. (1998) study the relationship between pre-competition mood and athletic success. They have 8 male golfers from the Swedish National Team complete various trait inventories before the golfing season, and then have them complete a "Profile of Mood States" before each individual competition. They find that only some of the golfers' pre-performance mood are significantly related to their athletic performance. While this study looks at the relationship between mood and golfing outcomes, my paper looks at depressive symptoms' impact on various sports' outcomes, including team sports. Also, my paper looks at men's and women's sports.

Terry & Slade (1995) examine the impact of a karate competitor's psychological state on their competition performance. Terry & Slade have 208 karate athletes complete the Competitive State Anxiety Inventory and the Profile of Mood States 40 minutes before their competition. They conduct a multivariate analysis of variance of their pre-competition mood and anxiety scores to determine an impact on their competition results. They find that winners score higher on vigor and self-confidence, but lower on tension, depression, and anxiety. They also find that 91.96% of competitors can be accurately determined as winners or losers based on their pre-

competition moods. Lastly, they find that the mental health profiles of the winners are "above-average." While this paper does find a relationship between pre-competition depression scores and worse outcomes in karate competitions, it only looks at one karate event. My paper looks at how an athlete's depressive symptoms impact their performance over an entire season while controlling for other factors, and again focuses on multiple sports.

Chapman et al. (1997) study the effects of anxiety and self-confidence on Tae-Kwon-Do performance. They look at 142 male Tae Kwon-do athletes who complete the Competitive State Anxiety Inventory 60 minutes before competing. They conduct a multivariate analysis of variance of these inventories and find that the athletes who won show less anxiety and increased self-confidence. Chapman et al. also find that 62.68% of participants can be accurately determined as winners based on their pre-competition scores, which concurs with the results found by Terry & Slade (1995). While this paper also finds that game-time anxiety and self-confidence can somewhat accurately predict athletic performance, it doesn't look at depressive symptoms, multiple sports, women, or the long-term impacts of mental illness on athletic success.

Terry et al. (1996) examine the impact of anxiety on tennis success in both singles and doubles matches. They look at 100 male and female tennis players who they also have complete the competitive state anxiety inventory 60 minutes before their matches. They also conduct multivariate analysis of variance of anxiety and self-confidence, which shows that winners have significantly higher rates of self-confidence and lower rates of anxiety than losers. They also find that they can correctly predict the winners based off their inventory scores 72% of the time for singles matches and 70%

of the time for doubles matches. This paper interestingly reveals that there may be a greater impact of mental illness on athletic performance in purely individual sports. However, this paper again only focuses on athletes' game-day mental state and on one sport.

Bearden et al. (2013) directly examine the relationship between participants' depression rates and their accuracy in forecasting the outcomes of soccer games in the 2010 Men's World Cup. They look at the relationship between their depression levels and how accurately they forecast games' results. Overall, they find that depressed forecasters are less accurate in forecasting the outcomes of the matches. While this paper looks at the direct relationship between rates of depression and forecasting accuracy, it doesn't include any athletic outcomes.

Overall, my paper builds on previous literature by examining the direct effect of depressive symptoms in DIII student athletes on their athletic performance. My paper includes a multitude of sports, both team and individual, and men's and women's sports. My paper also looks at the effects of depressive symptoms on athletic performance over an entire season, instead of just on a single athletic competition.

Methodology

Because there is no previous literature regarding the impact of depressive symptoms on collegiate athletic performance, I am creating my model based on data that I can accurately acquire through a survey. I use data from this survey that I sent out to every student athlete at the Claremont Colleges to see whether depressive symptoms have an impact on subjective performance, a program's current (March 16, 2022) SCIAC rank, and athletes' happiness levels on their team and at their school.

While my final model is a regression on subjective performance and rates of depressive symptoms using athlete characteristics as controls, I also include models that solely focus on individual sports and on men's sports. I also develop two sub-regressions that regress happiness at school and happiness on team with rates of depressive symptoms, as there may be a more direct relationship between depression and happiness. Table 1 describes each variable at the end of this section.

My main models have the performance indexes as the dependent variables, with three different versions. The first uses *SCIAC* (SCIAC Ranking as of March 16th) as the performance index. In this model, *SCIAC* is the dependent variable, and the athlete's depression score (*depression*) is the independent variable. It includes the controls listed in Table 1. The second model uses the athletes' individual performance ratings as the performance index. In this model, *IndPerf* is the dependent variable and *depression* is the independent variable. The third model uses the athletes' team performance ratings as the performance index (which only includes athletes who play on team sports). *TeamPerf* is the dependent variable and *depression* is the independent variable. The controls for these models are also listed in Table 1.

For more targeted results, I also perform sub-regressions on the *IndPerf* models. The first only includes athletes that compete individually (sports such as swimming, XC, track & field, tennis, golf, etc.) to see if depressive symptoms have a different impact on individual athletes. The second only includes athletes on men's teams, as there tends to be a greater stigma regarding discussing mental health among men. I am aiming to see if depressive symptoms have a different impact on men's teams. These models have *IndPerf* as the dependent variable and *depression* as the

independent variable. While I would like to perform a sub-regression on athletes who are officially diagnosed with depression, because only 13% of the respondents are officially diagnosed, I do not believe that there are enough respondents to do so.

I also use models to find the impact of depressive symptoms on athletes' happiness levels on their teams and their happiness levels at their schools. These are important because depressive symptoms may have a more direct impact on happiness levels. While a multitude of factors impact athletic performance (physical health, skill, confidence, coaches, etc.) athletes' happiness levels are greatly impacted by mental health. Mental health can impact how people view their friendships, loneliness levels, motivation levels, and more that all contribute to their happiness levels in their various environments. The first model has *HappinessT* (Happiness on one's team) as the dependent variable and the second model has *HappinessS* (Happiness at one's school) as the dependent variable. Both have *depression* as the independent variable. The controls for these models can also be found in Table 1.

Overall, with these models I am aiming to determine the impact of depressive symptoms on athletes' individual, team, and "official" performances, happiness levels on their teams, and happiness levels at their school.

Table 1: Descriptions of Each Variable

Model	**Variable Name**	**Description**
Dependent Variables		
One	*SCIAC*	Athlete's team's SCIAC ranking as of March 15th, 2022

Two	*IndPerf*	Athlete's individual performance compared to peak performance self-rated on a scale of 1-10
Three	*TeamPerf*	Athlete's team performance compared to peak performance self-rated on a scale of 1-10
Four	*HappinessT*	Athlete's self-rated happiness on their team on a scale of 1-10
Five	*HappinessS*	Athlete's self-rated happiness at their school on a scale of 1-10
Independent Variable		
All	*Depression*	Athlete's depression score on a scale of 1-100. Score is given based off their survey answers of 10 questions from Beck's Depression Inventory, which are answered on a scale of 1-10
Controls		
All	*Sport*	The sport the athletes plays. Each individual sport will be a dummy variable, with water polo omitted. 1=Athlete plays the sport 0=Athlete doesn't play that sport
All	*Gender*	The gender of the team the athlete plays for. 1=Women's Team 0=Men's Team
All	*PP*	Dummy variable denoting whether the athlete plays for PP or CMS. 1=PP 0=CMS

All	*Season*	Denotes the season in which the athlete competes with spring season omitted. 1=Athlete plays in that season 0=Athlete doesn't play in that season
All	*Team*	Dummy variable denoting whether the athlete plays on a team or individual sport. 1=Team Sport 0=Individual Sport
All	*Grade*	Dummy variable denoting the athlete's grade with freshman omitted. 1=Athlete is of that year 0=Athlete is not of that year
All	*Ethnicity*	Dummy variable denoting the athlete's ethnicity. White, black, Asian, Hispanic/Latino, PIslander, and Mixed, with Mixed omitted. 1= Athlete is of that ethnicity 0=Athlete is not of that ethnicity
All	*School*	Dummy variable denoting the athlete's school. Pomona, Pitzer, CMC, Scripps, and Harvey Mudd are noted on a 1/0 scale.
All	*Injury*	Dummy variable denoting the athlete's injury status. Healthy, minorly injured (less than 2 weeks missed), and severely injured (2+ weeks missed), with Healthy omitted. 1=Athlete has had that category of injury

		0=Athlete has not had that category of injury
All	*Sleep*	Indicates the average hours of sleep an athlete gets per night
All	*Coach*	A self-reported indication of how open of an environment an athlete's coach creates regarding discussing mental health and other vulnerable topics. This is rated on a 1-10 scale, with 1 being the worst and 10 being the best.
All	*Culture*	A self-reported indication of how open the athlete's team is regarding mental health and other vulnerable topics on a scale of 1-10 with 1 being the worst and 10 being the best.
All	*Practice*	A self-reported indication of how much the athlete enjoys practice on a 1-10 scale with 1 being the worst and 10 being the best.
All	*Diagnosed*	A dummy variable indicating whether the athlete is officially diagnosed with depression. 1=Diagnosed 0=Not diagnosed
All	*Other*	Dummy variables for whether the athlete struggles with other mental health issues. Other issues include ADHD, Anxiety, Performance Anxiety, Eating Disorders, and Multiple, with Multiple omitted.

		1=Athlete suffers from that other mental health issue 0=Athlete does not suffer from that other mental health issue

Data Analysis

To obtain my data, I survey 113 varsity student-athletes from the Claremont Colleges. In this survey, I ask each athlete about their personal characteristics as well as questions about their personal and team performance, team culture, happiness, depression diagnosis, and other mental health symptoms. I then ask 10 questions from Beck's Mental Health Inventory (a survey used in the medical and psychiatric fields to screen for baseline symptoms of depression) to determine their depressive symptoms. The specific questions I ask can be found in the Appendix. I then manually looked up their team's SCIAC rank (as of March 16th) for the objective performance measure. I received 113 responses from athletes from all five colleges, nine sports, men's and women's teams, and from all four grades. For athletes whose seasons are just starting, their performance measures are based off performance at practice, scrimmages, and initial competitions. While ideally, I would have received more responses, because mental health can be difficult and uncomfortable to manage for certain individuals, it is not surprising that certain athletes chose not to either fill out the survey or send it out to their team. The statistics for each variable can be found in Tables 2 through 6.

Table 2: Breakdown of Response Rate of Characteristic Variables

Variable	**Percentage of Respondents**
Sport	
Water Polo	21.9%

Lacrosse	6.1%
Baseball	7.9%
Basketball	4.4%
Football	14.9%
Soccer	22.8%
Swim & Dive	3.5%
Tennis	6.1%
Track & Field	12.3%
Gender	
Men's Team	54.9%
Women's Team	45.1%
Year	
Freshmen	38.7%
Sophomores	23.4%
Juniors	17.1%
Seniors	20.7%
Ethnicity	
White	69.6%
Mixed	13.4%
Asian	9.8%
Hispanic or Latino	5.4%
Black	1%

Pacific Islander	1%
School	
Pomona	36.6%
Pitzer	26.8%
CMC	25.9%
Scripps	7.1%
Harvey Mudd	3.6%
Team	
Pomona-Pitzer	63.4%
Claremont-Mudd-Scripps	36.6%
Season	
Fall	47.8%
Winter	8%
Spring	44.2%
Type	
Team	78%
Individual	22%
Injury	
Healthy	55%
Minor Injury	26.5%
Significant Injury	18.5%
Season Ending Injury	1%

Additional Information

Sport: I received responses from players from the 9 sports listed in Table 2. All athletes only noted playing one sport.

Gender: Surprisingly, 45.1% and 54.9% of respondents played on women's and men's teams respectively. Because of the greater mental health stigma in men's sports, I would have thought that more women would have responded than men.

Ethnicity: Table 3 notes the differences between the ethnicity breakdown of the respondents versus Pomona College and Claremont McKenna College. I chose to compare the respondent data to these two colleges because they make up the largest percentage of student-athletes. It's not surprising that there's a difference in ethnic breakdowns, as the student-athlete population at the DIII level tends to be very white.

Table 3: Breakdown of Ethnicity

	Respondents	**Pomona College**	**CMC**
White	69.6%	34%	40.9%
Mixed	13.4%	6.84%	6.54%
Asian	9.8%	16.4%	11.4%
Hispanic or Latino	5.4%	17.2%	15.3%
Black	1%	9.7%	4.38%
Pacific Islander	1%	1%	0.2%

School: Table 4 notes the differences between the school breakdown of the respondents versus the enrollment of the overall Claremont Colleges. It makes sense that Pomona College, Pitzer College, and CMC make up a larger portion of respondents because most student-athletes come from these three schools.

Table 4: Breakdown of Enrollment

	Respondents	**General Population of the 5Cs**
Pomona College	36.6%	28.3%
Claremont McKenna College	25.9%	23%
Pitzer College	26.8%	18.9%
Scripps College	7.1%	15.2%
Harvey Mudd College	3.6%	14.6%

Season: Most respondents play either a fall or spring sport. This is not surprising, as the only winter sports are swim & dive and basketball, while there are a multitude of sports in both the fall and spring.

Injury: 55% of athletes didn't suffer an injury, while 45% suffered either a minor, significant, or season ending injury. While having almost half of respondents suffering an injury seems like a lot, it isn't surprising due to this being the first season back after the year off because of COVID-19. Many athletes, while having trained last year, struggle going back to competitive play with multiple practices and/or strength

sessions in a day. And at the end of the day, a competitive match or event puts different stressors onto the body that unfortunately can lead to injury.

Table 5: Summary Statistics for Key Variables

	Mean	Median	Min	Max	S.D.
Depression	43.31	42	17	86	14.27
Other**			0	1	
Diagnosed*	0.133		0	1	0.34
S. Happiness	6.96	7	1	10	2.22
T. Happiness	7.95	8	1	10	2.10
SCIAC	2.01	2	1	6	1.37
T. Performance	7.63	8	3	10	1.64
I. Performance	6.33	7	1	10	2.19
Practice	7.21	8	1	10	2.37
Culture	7.40	8	1	10	2.35
Coach	6.21	6.5	1	10	2.61
Sleep	7.2	7	4	10	1

**Refers to a dummy variable*
***Other represents dummy variables for symptoms of anxiety, performance anxiety, ADHD, eating disorders, and multiple illnesses. Data for each illness listed in table below.*

Table 6: Summary Statistics for "Other"

	Mean	Min	Max
Anxiety	0.319	0	1
P. Anxiety	0.088	0	1
ED	0.062	0	1
ADHD	0.08	0	1
Multiple	0.124	0	1

All dummy variables

Additional Information

Practice: This variable denotes how athletes feel about practice and whether it's a positive or negative part of their day. With this variable I am aiming to understand whether athletes with depressive symptoms use practice as an "escape." Despite practices sometimes being physically and at times mentally strenuous, the average response is 7.21.

Diagnosed: This variable is a dummy variable for whether a student is officially diagnosed with depression. Only 16 out of 114, or 13.3% of respondents noted that they were officially diagnosed. This isn't surprising, as between 10-21% of college athletes are officially diagnosed with depression (Gill, 2008). However, these are the reported rates of depression, and as noted in the *Depression* data, many more athletes are struggling with symptoms of depression.

Other: This variable denotes whether an athlete struggles with symptoms of other mental health issues. These include anxiety, performance anxiety, eating disorders, ADHD, and multiple. While I initially included other disorders such as Bipolar Disorder, Insomnia, and OCD, few athletes reported struggling with these issues, so I removed them from my analysis.

Depression: This variable denotes each respondent's "official" depression score. To determine this, I asked 10 questions from Beck's Depression Inventory, which were all on a 1-10 scale, with 1 being the "least depressed" answer and 10 noting the highest

rate of depression. From these answers, each respondent received a “depression” score out of 100, with 0 entailing no depressive symptoms and 100 entailing the highest rate of depressive symptoms.

Results:

My first set of regressions have *SCIAC* as the dependent variable, as I want to see if athletes’ depressive symptoms impact their team’s “objective” performance. I run three different versions of this model, which can all be seen in Table 7. The first model is very basic—a regression on *SCIAC* on *Depression*, to see a basic relationship between these two variables. We see a small negative relationship between the two, which shows that as an athlete’s depressive symptoms increase by one measure, their team’s SCIAC ranking goes down. The next model adds each individual athlete’s controls, such as sport, gender, school, grade, etc. With these basic controls, we surprisingly see a small positive relationship between the two.

The final model adds the final controls, which account for the athletes’ team culture, coach, happiness, practice satisfaction, sleep, and other mental illnesses they may struggle with. The complete model shows a larger negative relationship between athlete’s depressive symptoms and their team’s SCIAC ranking. With the coefficient being -0.0027, the regression displays that for every 1 unit increase in an athlete’s depression score (on a scale of 0-100), that their SCIAC ranking decreases by -0.0027 places. While this is not necessarily realistic, as a team’s ranking can’t decrease by less than 1 spot, it still demonstrates the negative relationship between an athlete’s depressive symptoms and their team’s “objective” athletic performance. This is

understandable, as athletes who struggle with more depressive symptoms (loneliness, sadness, lack of motivation, etc.) may find it more difficult to perform both at practice and at game time. This could lead to an overall wise athletic performance. The R-squared value is 0.85, which shows that the model is a very strong fit.

It's also interesting to note that there is a positive relationship between *Diagnosed* and *SCIAC*, with a coefficient of 0.512. Because this is a dummy variable (1 being diagnosed with depression), this means that those who are diagnosed are ranked 0.512 places higher in SCIAC. While this demonstrates that the more likely an athlete is to be diagnosed as depressed, that the better their team is doing in SCIAC, I do not believe that this relationship is important. First of all, only 13% of my sample is officially diagnosed as depressed, while the average depression score was a 43.31, which shows that most athletes struggle with a good number of depressive symptoms. There are many issues with regards to getting an official diagnosis. Personal stigma, family and societal stigma, cost, lack of information, and many other factors impact an athlete's ability to get an official diagnosis. Because of this, I don't believe that every athlete with depressive symptoms is accounted for in the *Diagnosed* variable. Also, within those who are officially diagnosed, there may be a positive relationship because those with professional help, potential medication, and/or a self-awareness of their struggles may have found methods to manage their symptoms, which could help mitigate negative impacts on their athletic performance.

Table 7: The Impact of Depressive Symptoms on SCIAC Rank (with two-sided p-values in parentheses)

VARIABLES	(1) SCIAC 1	(2) SCIAC 2	(3) SCIAC 3
Depression score	-0.00667	0.00128	-0.00273

	(0.466)	(0.820)	(0.712)
Track		-1.765	-1.819
		(0.001)	(0.001)
Baseball		-2.470	-1.743
		(0.000)	(0.000)
Lacrosse		-0.435	0.404
		(0.353)	(0.331)
Tennis		-	-
Swim & Dive			2.967
			(0.011)
Basketball			-
Football		0.882	-0.219
		(0.020)	(0.563)
Soccer		1.833	1.701
		(0.000)	(0.000)
Team Sport		1.300	0.990
		(0.011)	(0.064)
Winter Sport		0.357	-1.217
		(0.548)	(0.026)
Fall Sport		-1.876	-0.961
		(0.000)	(0.038)
Pitzer			-
Harvey Mudd		-0.214	0.163
		(0.682)	(0.726)
Pomona		0.257	0.0421
		(0.437)	(0.848)
Scripps		2.457	1.971
		(0.000)	(0.000)
PP			-0.501
			(0.120)
Women		-2.908	-2.763
		(0.000)	(0.000)
Senior		0.150	-0.0536
		(0.598)	(0.813)
Junior		0.0176	-0.219
		(0.975)	(0.385)
Sophomore		0.0598	-0.310
		(0.775)	(0.155)
Pacific Islander		2.454	2.573
		(0.021)	(0.004)
Hispanic		-0.635	-0.590
		(0.174)	(0.143)
Asian		-0.665	-0.279
		(0.095)	(0.444)
Black		-0.413	0.793
		(0.676)	(0.436)
White		-0.192	-0.357
		(0.464)	(0.173)
Minor Injury			0.167
			(0.407)
Sig. Injury			-0.124
			(0.574)
Amount of sleep			0.0752

			(0.372)
Team Happiness			0.0637
			(0.303)
School Happiness			0.00994
			(0.851)
Practice Enjoyment			-0.0335
			(0.490)
Team Culture			0.00710
			(0.941)
Coach Culture			0.0933
			(0.034)
Ind. Performance			-0.0648
			(0.218)
Team Performance			-0.433
			(0.000)
ADHD			0.619
			(0.059)
Anxiety			0.102
			(0.617)
Performance Anxiety			0.0428
			(0.908)
Diagnosed			0.513
			(0.066)
Constant	2.377	3.085	5.719
	(0.000)	(0.000)	(0.000)
Observations	113	113	102
R-squared	0.005	0.650	0.846

I then do the same set of three regressions on the dependent variables *TeamPerf* and *IndPerf* to see if athletes' depressive symptoms impact their individual performances and their perceived team performances. The results can be found in Table 8 and Table 9 respectively. With regards to athlete's team performance, we see a small negative relationship between depressive symptoms and team performance in all three models. With the coefficient being 0.003 in the final model, we see that as an athlete's depression score increases by 1 unit, their perceived team performance increases by 0.003 units. Even though this shows a positive relationship between the two, I don't believe the results to be of practical significance. There are a multitude of factors that impact team performance, as there are many players on a team. Team

performance is also impacted by coaches, team dynamics, other teams etc. which aren't necessarily impacted by each player's individual mental health. Also, because this survey was taken the first season back after the COVID-19 season, most teams have a multitude of new players. Returning players have taken time off the sport, many coaching staffs have changed, and many athletes' priorities have also changed. Overall, the final model has an R-squared value of 0.745, which means that the model is a pretty good fit.

Table 8: The Impact of Depressive Symptoms on Team Performance (with two-sided p-values in parentheses)

VARIABLES	(1) Team Perf. 1	(2) Team Perf. 2	(3) Team Perf. 3
Depression Score	-0.00650	0.000490	0.00245
	(0.564)	(0.963)	(0.858)
Track		1.589	-2.442
		(0.397)	(0.002)
Baseball		2.257	-0.332
		(0.007)	(0.667)
Lacrosse		1.198	0.834
		(0.086)	(0.180)
Tennis			-
Swim & Dive		-	-
Basketball			-1.071
			(0.547)
Football		-2.767	-1.554
		(0.000)	(0.003)
Soccer		-2.166	0.317
		(0.003)	(0.642)
Team Sport		0.408	-0.143
		(0.798)	(0.866)
Winter Sport		3.513	1.619
		(0.000)	(0.282)
Fall Sport		3.362	0.883
		(0.000)	(0.248)
Pitzer			-
Harvey Mudd		-0.008	0.162
		(0.992)	(0.818)
Pomona		-1.225	0.0441
		(0.008)	(0.894)
Scripps		-1.718	1.022
		(0.021)	(0.178)
PP			-1.101

			(0.020)
Women		1.779	-1.570
		(0.001)	(0.028)
Senior		-0.174	-0.375
		(0.664)	(0.281)
Junior		-0.0597	-0.170
		(0.897)	(0.656)
Sophomore		-0.671	-0.728
		(0.092)	(0.030)
Pacific Islander		-2.306	1.517
		(0.153)	(0.280)
Hispanic		-0.350	-0.575
		(0.634)	(0.348)
Asian		-0.0692	-0.168
		(0.914)	(0.762)
Black		0.795	1.403
		(0.605)	(0.361)
White		-0.643	-0.570
		(0.148)	(0.154)
Minor Injury			0.538
			(0.096)
Sig. Injury			0.0437
			(0.902)
Hours of sleep			0.0704
			(0.578)
Team Happiness			0.00610
			(0.912)
School Happiness			0.0924
			(0.198)
Practice Enjoyment			0.0383
			(0.679)
Team Culture			0.0266
			(0.776)
Coach Culture			0.0163
			(0.811)
Ind. Performance			-0.0849
			(0.281)
SCIAC Ranking			-0.991
			(0.000)
ADHD			0.890
			(0.077)
Anxiety			0.340
			(0.234)
Performance Anxiety			-0.402
			(0.391)
Diagnosed			0.529
			(0.214)
Constant	7.918	6.580	10.10
	(0.000)	(0.001)	(0.000)
Observations	104	104	102
R-squared	0.003	0.469	0.745

The next set of regressions focuses on individual performance. With regards to athletes' general individual performance, we see a negative relationship between performance and depression in all three versions of the models, as seen in Table 9. We see a small negative relationship between depressive symptoms and individual performance in all three models. In the final model, we see a coefficient of -0.043, which demonstrates that as an athlete's depression score increases by 1 unit, their perceived individual performance decreases by 0.043 units. This makes sense, as the more depressive symptoms that an athlete faces, the greater the struggle is to perform well athletically. There is also a small positive relationship between *Diagnosed* and individual performance, but again, because of the reasons mentioned above, I do not believe this to be an important relationship. It's also interesting to note that there is a positive relationship between other mental health struggles and individual performance. It's also interesting to look at how one's satisfaction with practice, their team culture, and their coach also has a positive relationship with individual performance. This shows how fostering a good practice environment, and prioritizing vulnerability in both the team setting and with the coaches can increase individual athletes' performances. Overall, the R-squared value is a 0.556, which means the model is a relatively good fit.

This next regression on individual performance focuses on men's teams only. This is to see if the greater mental health stigma in the male athletic community has an impact on athletic performance. The results are also found in Table 9. Here, we see a negative relationship between depressive symptoms and individual performance. With the coefficient being -0.056, we see that the negative relationship is slightly higher than

when women's sports are included. While this does prove my hypothesis that there is a greater negative relationship between depressive symptoms and athletic performance in men's sports, the coefficient is not much higher. This could be due to selection bias. Maybe men who felt a high degree of stigma surrounding mental health didn't take my survey, as they felt it wasn't important. Maybe athletes at the Claremont Colleges face a lower degree of stigma surrounding mental health than in other parts of the country, as mental health programs in SAAC may have infiltrated team culture. It is interesting to note how there is a positive relationship between *Diagnosed,* other mental health struggles, and individual performance. Overall, the R-squared value is a 0.649, which denotes that the model is a relatively good fit.

My next regression on individual performance focuses on individual sports only. This is because one's depressive symptoms may have a greater impact on athletic performance when they're performing individually. The results are also found in Table 9. There is unfortunately a very small sample size of individual athletes, with only 25 observations. However, I still perform this regression to see the basic relationship between depressive symptoms and performance with individual athletes only. There is a negative relationship between depressive symptoms and individual performance, with a coefficient of -0.100. However, because of the extremely small sample size, this must be taken with a grain of salt.

Table 9: The Impact of Depressive Symptoms on Individual Performance (with two-sided p-values in parentheses)

VARIABLES	(1) Ind. Perf 1	(2) Ind. Perf 2	(3) Ind. Perf 3	(4) Men	(5) Individual
Depression Score	-0.0382	-0.0465	-0.0426	-0.0556	-0.100
	(0.008)	(0.005)	(0.053)	(0.076)	(0)
Track			-	-	-

Baseball	-0.211	-1.756	-0.123	
	(0.919)	(0.208)	(0.936)	
Lacrosse	0.786	1.339		
	(0.419)	(0.185)		
Tennis		1.589	2.188	-4.336
		(0.249)	(0.283)	(0)
Swim & Dive	-2.272	4.361		
	(0.199)	(0.188)		
Basketball	-	-		-
Football	-1.487	-1.495	-1.305	
	(0.058)	(0.065)	(0.248)	
Soccer	-0.0937	0.717	1.737	
	(0.825)	(0.708)	(0.344)	
Team Sport	-0.516	1.545		
	(0.572)	(0.252)		
Winter Sport	0.373	-0.938		
	(0.700)	(0.653)		
Fall Sport	1.205	0.111	2.359	
	(0.189)	(0.701)	(0.113)	
Pitzer	-	-		-
Harvey Mudd	-1.628	-1.630	-1.219	
	(0.159)	(0.157)	(-0.821)	
Pomona	0.482	0.115	0.586	
	(0.367)	(0.854)	(0.665)	
Scripps	1.310	0.587		
	(0.237)	(0.691)		
PP	-0.471	-0.689		2.822
	(0.357)	(0.303)		(0)
Women	0.0273	-1.240		-1.362
	(0.939)	(0.351)		(0)
Senior	0.965	0.438	0.955	
	(0.138)	(0.448)	(0.271)	
Junior	0.188	0.338	1.531	
	(0.851)	(0.600)	(0.208)	
Sophomore	-0.502	-0.289	-0.0924	-3.784
	(0.458)	(0.830)	(0.905)	(0)
Pacific Islander	2.964	3.652		5.135
	(0.231)	(0.133)		(0)
Hispanic	1.327	1.008	-1.253	
	(0.247)	(0.357)	(0.443)	
Asian	0.606	0.847	-0.104	
	(0.530)	(0.377)	(0.951)	
Black	6.186	7.142	9.404	
	(0.008)	(0.005)	(0.006)	
White	1.229	1.001	0.420	0.472
	(0.058)	(0.112)	(0.684)	(0)
Minor Injury		0.651	1.499	
		(0.410)	(0.096)	
Sig. Injury		-0.951	0.0765	0.443
		(0.104)	(0.929)	(0)
Hours of Sleep		0.351	0.0986	-1.432
		(0.353)	(0.789)	(0)
Team Happiness		-0.0791	0.248	-0.612
		(0.444)	(0.371)	(0)

School Happiness			0.0254	-0.171	-0.443
			(0.764)	(0.376)	(0)
Practice Enjoyment			0.140	-0.0528	1.277
			(0.191)	(0.781)	(0)
Team Culture			0.241	0.301	0.425
			(0.051)	(0.135)	(0)
Coach Culture			0.0402	-0.00315	-0.476
			(0.724)	(0.985)	(0)
Team Performance			-0.238	-0.482	-0.785
			(0.281)	(0.144)	(0)
SCIAC Ranking			-0.416	-1.133	
			(0.218)	(0.053)	
ADHD			0.449	1.919	
			(0.822)	(0.196)	
Anxiety			0.685	1.241	2.272
			(0.097)	(0.084)	(0)
Performance Anxiety			0.669	0.735	
			(0.366)	(0.500)	
Diagnosed			0.497	-0.0418	
			(0.638)	(0.973)	
Constant	7.990	7.278	4.167	8.495	24.01
	(0.000)	(0.000)	(0.132)	(0.114)	(0)
Observations	110	110	102	61	25
R-squared	0.063	0.329	0.556	0.649	1.000

My next set of regressions have *HappinessT* as the dependent variable. This regression includes athletes on men's and women's teams. This is to determine how athletes' depressive symptoms impact their happiness on their team. I only use one model for this set, which will include all controls. The results are found in Table 10. There is a small negative relationship between athletes' depressive symptoms and their team happiness index. With a coefficient of 0.001, as an athlete's depression score increases by 1 unit, their team happiness index decreases by 0.001. The minuteness of this relationship could be explained by the fact that for a lot of athletes, despite mental health issues, their teams are their biggest community on campus and a safe and happy space. For some athletes, depressive symptoms they face may be diminished when they're around their team, and the happiness they do get comes from team

settings. It is interesting to note, however, that there is a larger negative relationship between athletes who are officially diagnosed with depression and team happiness. Overall, the R-squared value is a 0.763, which shows that the model is a relatively good fit.

The last set of regressions have *HappinessS* as the dependent variable. This is to find the impact of depressive symptoms on athletes' happiness at their school. I also only use one model for this set, which will also include all controls. The results are also in Table 10. Here, there is a negative relationship between depressive symptoms and one's happiness at their school. With a coefficient of -0.091, this regression shows that as an athlete's depression score increases by 1 unit, their happiness at their school decreases by 0.091 units. This is statistically significant and logical, as a lot of athletes' depressive symptoms may lead to feelings of unhappiness in their school environment. Feelings of loneliness, isolation, lack of motivation, low self-esteem, etc. may lead to worsening social and academic performance. However, it's important to keep in mind that unhappiness at school may lead to depressive symptoms, such as loneliness, low self-esteem, etc. It's also interesting to note that there is a positive relationship between *Diagnosed* and school happiness. Again, maybe athletes who are more self-aware of their diagnosis and have professional help may be able to manage their symptoms more efficiently. Overall, the R-squared value is a 0.583. This makes sense, as there are many factors outside of the scope of this paper that impact one's happiness at their school.

Table 10: The Impact of Depressive Symptoms on Athletes' Happiness (with two-sided p-values in parentheses)

	(1)	(2)
VARIABLES	Team	School

	Happiness	Happiness
Depression Score	-0.000447	-0.0913
	(0.894)	(0.000)
Track	-	-
Baseball	-0.0602	-1.545
	(0.992)	(0.257)
Lacrosse	-0.538	-0.195
	(0.546)	(0.844)
Tennis	-1.177	-0.999
	(0.289)	(0.491)
Swim & Dive	-1.023	3.486
	(0.624)	(0.281)
Basketball	-	-
Football	-0.190	0.220
	(0.624)	(0.766)
Soccer	-1.523	0.151
	(0.062)	(0.850)
Team Sport	-0.519	0.329
	(0.613)	(0.814)
Winter Sport	0.944	-1.245
	(0.278)	(0.373)
Fall Sport	0.595	-1.269
	(0.323)	(0.277)
Pitzer	-	-
Harvey Mudd	-1.507	0.639
	(0.080)	(0.606)
Pomona	-0.109	1.011
	(0.789)	(0.087)
Scripps	-1.733	-2.964
	(0.068)	(0.028)
PP	-0.590	-0.448
	(0.239)	(0.642)
Women	1.048	0.0768
	(0.232)	(0.972)
Senior	0.205	0.886
	(0.632)	(0.152)
Junior	0.703	-0.0777
	(0.152)	(0.907)
Sophomore	0.135	-0.406
	(0.524)	(0.446)
Pacific Islander	-0.427	-2.723
	(0.790)	(0.279)
Hispanic	0.862	-1.140
	(0.304)	(0.297)
Asian	0.962	-0.973
	(0.184)	(0.318)
Black	-1.955	-5.733
	(0.329)	(0.032)
White	0.481	-1.441
	(0.280)	(0.038)
Minor Injury	-0.644	0.522
	(0.059)	(0.318)

Sig. Injury	-0.359	-0.109
	(0.439)	(0.846)
Hours of Sleep	-0.00644	-0.138
	(0.536)	(0.720)
School Happiness	0.0848	0.164
	(0.302)	(0.302)
Practice Enjoyment	0.371	-0.0442
	(0.000)	(0.678)
Team Culture	0.463	-0.0831
	(0.000)	(0.517)
Coach Culture	-0.0520	-0.0804
	(0.558)	(0.501)
Ind. Performance	-0.0453	0.0281
	(0.444)	(0.764)
Team Performance	0.00980	0.287
	(0.912)	(0.198)
SCIAC Ranking	0.234	0.0707
	(0.303)	(0.851)
ADHD	-0.168	0.129
	(0.553)	(0.809)
Anxiety	0.206	-0.0300
	(0.414)	(0.893)
Performance Anxiety	0.477	0.944
	(0.385)	(0.273)
Diagnosed	-0.261	1.444
	(0.485)	(0.050)
Constant	1.572	10.92
	(0.381)	(0.001)
Observations	102	102
R-squared	0.763	0.583

Conclusion

Overall, this paper finds that there is a small negative relationship between Claremont Colleges student-athletes' depressive symptoms and both their perceived individual athletic performance and their SCIAC rank. This is reasonable, as depressive symptoms such as isolation, loneliness, low self-esteem, lack of motivation, sadness, etc. can impact one's ability to perform well athletically. This model also finds small negative relationships between depressive symptoms and happiness at school. This is also logical, as depressive symptoms can greatly impact how ones feels that they fit in at school academically and socially. This paper also found a slightly larger negative

relationship between depressive symptoms and individual performance when focusing solely on men. However, this relationship was not as large as I had hypothesized, which may have occurred for a multitude of reasons described above. A small negative relationship between depressive symptoms and individual performance was found when focusing on individual athletes only. While this is logical and reaffirmed my hypothesis, it must be taken with a grain of salt, as the sample size was only 25 athletes. However, it's important to note the possibility of reverse causation. Performing worse athletically or academically, feeling left out socially, or feeling isolated from one's team could lead to worse depressive symptoms. Unfortunately, with the data and methods I have, I'm unable to control for this.

Regarding my paper as a whole, a few aspects could have been improved. I wish there was more previous literature available. This would have allowed me to draw inspiration on previous models. I also wish there were data available online. Because I had to find my own data, I had to focus on variables that I could obtain in ethical manners. I couldn't delve into questions about specific depressive symptoms, perform psychiatric tests, or monitor athletes over a long period of time. With professional data, I could have included more specific depression, athletic performance, and control data to make my study more accurate. I would have also been able to include a greater number of data points for individual athletes and athletes with official diagnoses of depression. It would also have been ideal to be able to use official sports metrics instead of just using a SCIAC rank and perceived performance measures on a scale of 1-10 to dictate performance. This could be combined with panel data, where I could track changes in athletes' performance measures as well as changes in their

depressive symptoms. For example, with soccer I could track changes in playing time, shots, tackles, etc. over a period, to see how changes in depressive symptoms impact objective performance measures. If I could combine this with student-athlete interviews, this could solve the issue of reverse causation, as the cause of depressive symptoms would be known. Also, it would be beneficial to look at symptoms from a plethora of mental health illnesses, as student-athletes struggle with more than just depression.

However, this paper does bring necessary issues to light. Unfortunately, the impacts of mental health can be life threatening, and there have been many cases of collegiate athletes taking their own lives. While the incidents shown in the mainstream media tend to be cases of big-name DI athletes, incidents occur throughout all divisions. Because of the stigma surrounding mental health issues in the athletics community, change is slow moving and many athletic departments and coaches hesitate to implement long-term mental health awareness and support resources into their programs. There has also been no previous literature about the impact of mental health and its symptoms on athletic performance, happiness, academic success (focusing solely on collegiate athletes), athletic department success, etc. Showing that depressive symptoms have a negative impact on athletic performance, even though small, shows the importance of supporting student athletes' mental health in college. Examples of this include:

- Providing mental health resources at low cost for student-athletes
- Having mental health professionals talk to teams during pre-season

- Encouraging captains and older players to create vulnerable spaces for team members
- Checking in on players
- Allowing players to miss practices, lifts, recovery sessions, etc. for mental health reasons
- Acknowledging that players have more on their plate besides athletic commitments
- Including mental health support workshops in training schedule
- Providing mental health awareness speakers for teams

Because mental health symptoms aren't physically noticeable, many times athletes struggle alone and in silence. I hope to start the necessary conversation that mental health not only impacts athletics, but athletes' overall happiness, and that athletic department and school funding, especially at the DIII level, needs to go towards mental health support.

Appendix

Survey Questions

1. What sport do you play?
2. What school do you go to?
3. Do you play on a men's or women's team?
4. What year are you?
5. What ethnicity are you?
6. Have you suffered an injury this season?
    a. Season ending, significant, minor, or none
7. How many hours of sleep do you get per night on average?
8. Are you diagnosed with depression?
9. Do you struggle with symptoms of other mental illnesses?
    a. Anxiety, Eating Disorder, Performance Anxiety, ADHD, Multiple

Scored on scale of 1-10 (1 being the worst & 10 being the best)

10. How happy/included do you feel on your team?
11. How happy/included do you feel at your school?
12. Do you feel like practice is a positive part of your day?
13. Do you feel like you can be vulnerable with your teammates?
14. Does your coach openly discuss mental health?
15. How have you been performing this season?
16. How has your team been performing this season?

Questions from Beck's Depression Inventory scored on a scale of 1-10 (1 being "none" and 10 being "all the time")

17. How often do you feel overwhelmed?

18. How often do you feel sad?

19. How often do you feel lonely?

20. How excited about the future do you feel?

21. How do you generally feel about yourself?

22. How much joy do you gain out of your hobbies/interests?

23. How often are you irritated?

24. How motivated do you feel on a daily basis?

25. How excited are you about social interaction?

26. How excited are you about life in general?

27. How do you feel about your mental health?

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