Analyzing the Networking Advantages for Student-athletes at Holy Cross

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Abstract

This paper investigates whether student-athletes at Holy Cross have a networking advantage with alumni over non-athletes. I conducted an experiment where I sent an identical email to alumni asking them to fill out a survey for the Economics and Accounting Department. I examined if their likelihood of responding differs depending on what kind of student sent the email by altering the introduction of the student sender. In total, there were six different email groups: female soccer player, female in Women in Economics club, female senior, male soccer player, male in Venture capital club and male senior. It was expected that alumni who participated in a varsity college sport would have a stronger affiliation towards student-athletes. The paper finds that alumni do not have a higher response rate towards athletes. However, it was discovered that female alumni respond more to females in the Women in Economic club and respond less to females on the women's soccer team. It was also found that men did not have a bias towards any particular group. Considering the findings of this paper, there is plenty of room for further research on the networking advantage for student-athletes.

1 Introduction & Literature Review

College athletics have become a major part of the identity of college institutions. Athletics also require a significant investment of the students that participate. Student-athletes must balance their time between athletic and academic commitments. With that being said, only one in thirteen high school athletes participates in college athletics.[1] For Division I schools, which is the highest level of collegiate athletics, the participation rate is under two percent of all high school athletes.[2] For student-athletes who dedicate so much of their time to their sport, are there benefits to playing a varsity sport that extend beyond athletics?

Student athletes learn skills and adopt habits that are useful outside of athletics, such as working with teammates, work ethic, and discipline. Athletes tend to be associated with many positive characteristics. For example, varsity athletes have higher GPAs than non-athletes (Dobersek and Bartling [2008]), have higher graduation rates (Long and Caudill [1991]) and have a higher affiliation to their school post-graduation (Adler [1988]). With only two percent of college athletes going on to play professionally (NCAA),[3] most athletes enter the workforce after graduation. Similar to non-athletes, student-athletes must think about their career after graduation and after their career in their sport is over.

Although the vast majority does not play professionally, the skills they learn through playing college sports are valuable in their future careers. A number of papers have begun to provide evidence of those benefits. There is evidence of wage premiums for athletes (Henderson, Olbrecht and Polachek [2006]) and also higher wages for former male athletes over non-athletes

[1] See https://www.ncaa.org/about/resources/research/estimated-probability-competing-college-athletics

[2] See https://www.ncaa.org/about/resources/research/estimated-probability-competing-college-athletics

[3] See https://www.nfhs.org/media/886012/recruiting-fact-sheet-web.pdf

(Long and Caudill [1991]). Although there are many benefits of playing a college sport, I will focus on one not yet examined.

This paper investigates whether an additional benefit of varsity athletics is that college athletes develop stronger network connections with their school's alumni than non-athletes. The connections with alumni may prove valuable for many reasons, including for advice and to help those athletes find a job after graduation. Alumni are unique sources of advice over career development advisors as they can give students an insight to what their career is like. While many of the previous studies discussed are correlational, the power of this study is that I test for the causal impact of being a college athlete on the size and strength of a student's network. I am able to do this because I have designed and run an experiment on Holy Cross alumni in which I send identical emails to alumni of the College of the Holy Cross in Worcester, MA, which is a small, liberal arts college that prides itself in school spirit and strong alumni connections. Holy Cross is a Division I school with an undergraduate population of just over three thousand and competes in twenty-five varsity sports.[4] With an athlete to student ratio of about one to four and the reputation of strong alumni relations, this is a great college at which to conduct this experiment.

The basis of the experiment is to send identical emails from Holy Cross students to alumni introducing a survey from the Department of Economics and Accounting at Holy Cross. The email includes an introduction of the student sending the email along with an explanation of the survey asking for feedback for the department. In each email, the only difference is who the student sender is. This allows me to experimentally manipulate the description of the student to the alumni to see if this affects the response rate to the survey. It is important to note that the

[4] See https://www.holycross.edu/athletics/division-i-varsity-sports

answers to the survey are not important to my experiment, only the response rate. In total, six different versions of the email were created. The types of students described in those introductory emails are a female athlete, female in an extracurricular club and a female who is not involved in any extracurricular, a male athlete, a male in an extracurricular club and a male who is not involved in any extracurricular. In total, I received 1,175 alumni email addresses that were then randomly assigned to one of the six student sender groups.

Through these methods, I find that female alumni are more likely to respond to female senders who are in an extracurricular club and female alumni respond less to female athletes. There were no findings of male alumni responding more or less to any specific student sender.

To my knowledge, this is the first study to examine the causal impact of being a varsity athlete on the size of one's network. With that being said the experiment used in my study is similar to a curriculum vitae study, except my focus is the role of participating in college athletics. As an example of a CV study, Bertrand and Mullainathan (2003) conducts a field experiment using resumes to investigate race discrimination in the labor market. In that study, a series of sample resumes were sent to employers with job openings where the only difference was the name of the applicant, which would either be a stereotypical white name or stereotypical black name. Using a probit estimation, the study finds that white names got fifty percent more callbacks than black names. Since the study holds everything constant except for the name, it concludes that there is racial discrimination in the job application process. By using similar methods, my experiment will determine if there is a networking advantage for student-athletes, members of an extracurricular club, or for a specific gender.

Curriculum vitae studies have also been done in regard to gender. Bygren, Erlandsson and Gahler (2017) study if fathers are preferred over mothers in the workforce. They use a similar method to Bertrand and Mullainathan (2003) and find that fathers are favored in the labor

market. Most curriculum vitae studies have similar study designs that allow the researcher to draw causal conclusions due to the manipulation within the field experiments.

2 Experimental Design

2.1 Student Senders

The first step of the experiment was to find real students who were willing to include their name in the email and who also are actually part of the respective sports team or extracurricular. In order to keep the name constant, I found students who fit into all groups for their gender. The female student I used was myself. I am a member of the Women's soccer team and member of Women in Economics club as well as a senior at Holy Cross. The male student is a friend of mine who is a member of the Men's soccer team and a member of the Venture Capital club as well as a senior at Holy Cross. Table 1 lays out each of the six emails groups and what characteristic was included in the introductory email.

Table 1: Student Sender Characteristics

Email Group	**Characteristic of Sender**
(1) Womenssoccer	The student is a member of the women's soccer team
(2) Econfemale	The student is a member of the Women in Economics club
(3) Femalesenior	The student is a senior
(4) Menssoccer	The student is a member of the men's soccer team
(5) Econmale	The student is a member of the Venture Capital Club

(6) Malesenior	The student is a senior

2.2 Partnerships with the Economics/Accounting Department at Holy Cross

In order to conduct my experiment, I partnered with the economics and accounting department. To be specific, the Department had intended to survey all Holy Cross graduates who had majored in either Economics or Accounting. The survey included questions on how the Department can improve the majors and asked the alumni to provide feedback on their academic experience at Holy Cross. After discussing my project with the chair of the department, it was agreed I could piggy-back on this survey by sending out the email that would ask the alums to fill out the survey. The survey was not part of the results of this study and only the department was allowed access to the survey responses. This study is focused on the number of alumni who responded to the survey and the degree to which those alums answered the survey, but not the content of their responses.

2.3 Alumni in the Study

The next task was to gather alumni emails. In mid-July with the helpful partnership of Alumni Relations and the Office of Assessment and Research, an alumni list was created with 1,175 alumni. The list included the alumni's major, gender, class year and varsity status when they attended Holy Cross. All of the recipients of the email were economics or accounting majors and members of the classes from 2010 to 2019. Table 2 provides the spread of demographic information of the alumni in the list I was provided. There is a relatively expected spread of males to females as the Economics and Accounting department is male dominated. The athlete to non-athlete ratio in this sample set is about 1:4, consistent with the school as a whole.

Table 2: Alumni Characteristics

Characteristic	Number of Alumni	Percent of the Total Sample
Male	819	69.7%
Female	356	30.3%
Athlete	441	37.5%
Economics	905	77.0%
Accounting	270	23.0%

I then randomly divided these alums into 1 of 6 groups. All alums in each group would receive the same email introducing the survey but the key to this study, alums in different groups would receive different introduction emails. Specifically, while the body of the email was the same, the only difference was in the description of the sender. Once the email groups were set, an alumni relations group sent out the email in late August. A reminder email was sent by the original sender two weeks after the initial email was sent.

2.4 Introductory Email

As previously mentioned, the basis of the email is introducing an Economics and Accounting department survey from six different student senders. The email explains that the student was sending the email on behalf of the department in order to gain feedback from alumni on how to improve the curriculum of the economics and accounting majors. In order to adhere to the guidelines of informed consent, the email also stated that the information provided would be used as part of a student honors thesis and provided an email to reach out to if they had any questions on how the information would be used. The alumni had one month to respond to the survey. After one month had passed the department chair sent out a reminder email in an attempt to increase participation. Those who responded after that one-month mark, a total of 32

respondents, are not counted in the results for the study. Figure 1 shows the email that was sent out to the alumni, where the bolded pieces indicate how the email changes across the six groups. Figure 2 shows the introduction paragraph that was sent to the alums of the other five groups.

Figure 1:

Dear Holy Cross Alum,

My name is **Caroline Harkins**. I am a senior on the **Holy Cross women's soccer team**. I'm reaching out to you today on behalf of the Department of Economics & Accounting, seeking feedback regarding your academic experience at Holy Cross.

Attached is a short survey (~5 mins.) from the Department of Economics & Accounting with questions centered around the skills gained in that department that you have found useful in your career. The information you provide is valuable in that it can help ensure the department continues to provide students with the skills and training necessary to succeed both in their careers and as responsible citizens in society. The information will also be used as part of my student honors thesis. If you have any questions about the intent of that research, please email Professor Justin Svec at jsvec@holycross.edu.

I hope you are able to give some feedback on your experiences at Holy Cross. Go Crusaders!

Thank you,
Caroline Harkins

Figure 2: Other Sample Emails

Dear Holy Cross Alum,
My name is **Caroline Harkins**. I am a senior member **in the Women in Economics Club at Holy Cross**. I'm reaching out to you today on behalf of the Department of Economics & Accounting, seeking feedback regarding your academic experience at Holy Cross.

Dear Holy Cross Alum,
My name is **Caroline Harkins**. I am a **senior at Holy Cross**. I'm reaching out to you today on behalf of the Department of Economics & Accounting, seeking feedback regarding your academic experience at Holy Cross.

Dear Holy Cross Alum,
My name is **Max Krause.** I am a senior on the **Holy Cross men's soccer team**. I'm reaching out to you today on behalf of the Department of Economics & Accounting, seeking feedback regarding your academic experience at Holy Cross.

Dear Holy Cross Alum, My name is **Max Krause**. I am a senior member of **the Venture Capital Club at Holy Cross**. I'm reaching out to you today on behalf of the Department of Economics & Accounting, seeking feedback regarding your academic experience at Holy Cross.
Dear Holy Cross Alum, My name is **Max Krause**. I am a **senior at Holy Cross**. I'm reaching out to you today on behalf of the Department of Economics & Accounting, seeking feedback regarding your academic experience at Holy Cross.

2.5 Basis for Analysis

Because the alums were randomly assigned to receive an introductory email from one of six possible senders, this study is able to examine whether the characteristics of those senders causally influenced the likelihood that the alum would participate in the survey. If varsity athletes have a networking advantage over non-athletes, then I would expect that more alumni would respond to the emails sent from current athletes. Further, because the sender was identified as either a man or a woman, I can test whether the networking advantage is larger for male varsity athletes or for female varsity athletes. Finally, since I was able to obtain information on the alum's characteristics, I will be able to test whether the gender or athlete status of the alum changes to which students they favor, specifically current male or female athletes or current male or female non-athletes.

My study leaves room to find some significant results as it controls for everything besides the extracurricular. This allows me to make causal conclusions rather than correlations. My regression analysis will then give insight on just how large of an advantage or disadvantage there is for different types of students. I will also be able to see whether there is any variation in the responses based on the alumni's gender and varsity status. At Holy Cross, it is known that male athletes have strong alumni connections and the teams hold big networking events in Boston. In the last four years at Holy Cross, there has been nothing of that sort with the women's soccer

team. Whether or not the networking events help the athletes is unknown, but this study will reveal if gender plays a role in the likelihood an alum responds.

3 Data Analysis

3.1 Measuring Responses

The responses to the survey ultimately became a column in an Excel spreadsheet that also includes some demographic information of the alumni. The alumni's gender, class year, major, varsity athlete status in college was included. I captured three datapoints regarding the alum's response to the survey: whether the respondent clicked the survey link, answered any of the survey questions, and the percentage of the survey completed. Table 3 gives some basic summary statistics including the overall response rate, and the response rate broken down by the alum's gender and athlete status. As seen, it is clear that more females clicked the link than males. Table 4 includes the response rate for the type of introductory email sent. As seen in the table, there is about the same response rate for each email group with the Women in Economics club sender having the most.

Table 3: Responses based on alumni's demographic

Type of Alum Characteristic	**Number of responses**	**Number of alumni in who received email**	**% that responded**
Total	*291*	*1,175*	*24.77%*
Male alum	*179*	*819*	*21.86%*
Male athlete alum	*75*	*322*	*23.29%*
Female alum	*112*	*356*	*31.46%*
Female athlete alum	*35*	*119*	*29.41%*

Table 4: Responses based on email group

Sender of Intro Email	**Number of responses**	**Number of emails**	**% that responded**
Entire sample	*291*	*1,175*	*24.77%*
Women's soccer	*50*	*222*	*22.52%*
Women in Economics	*52*	*181*	*28.73%*
Female senior	*50*	*203*	*24.63%*
Men's soccer	*46*	*187*	*24.60%*
Male in Venture Capital club	*48*	*171*	*28.07%*
Male senior	*45*	*179*	*25.14%*

3.2 Regression Variables

In order to run the regressions, a series of dummy variables are created in Stata. First, there is a dummy variable for each of the six email groups that control for the attributes of the sender. For example, a control for receiving an email from a women's soccer player can demonstrate whether alumni are more or less likely to respond to this sender than a female senior. Similarly, the same determination can be made across senders of the econfemale, menssoccer and econmale email groups. Figure 3 describes these variables. The women's soccer variable gives a 1 to any alumni who received an email from a women's soccer player and a zero to any alumni who received an email from a female senior. It is important to note each of these email groups are being compared to the control, male or female senior, groups. I also created two additional dummy variables, athletesender and femalesender, to test if alumni respond more to athletes or one gender over the other. There are also separate control dummy variables for the alumni recipients, namely gender, major at Holy Cross (economics or accounting), graduation year, and whether the recipient was a varsity athlete while at Holy Cross.

Figure 3: Dummy Variables

$$\boldsymbol{Womenssoccer} = \begin{cases} \mathbf{1}\ \boldsymbol{if\ email\ group = women's\ soccer\ player} \\ \mathbf{0}\ \boldsymbol{if\ email\ group = female\ senior} \end{cases}$$

$$\boldsymbol{Econfemale} = \begin{cases} \mathbf{1}\ \boldsymbol{if\ email\ group = member\ of\ Women\ in\ Economics\ club} \\ \mathbf{0}\ \boldsymbol{if\ email\ group = female\ senior} \end{cases}$$

$$\boldsymbol{Menssoccer} = \begin{cases} \mathbf{1}\ \boldsymbol{if\ email\ group = men's\ soccer\ player} \\ \mathbf{0}\ \boldsymbol{if\ email\ group = male\ senior} \end{cases}$$

$$\boldsymbol{Econmale} = \begin{cases} \mathbf{1}\ \boldsymbol{if\ email\ group = member\ of\ Venture\ Capital\ club} \\ \mathbf{0}\ \boldsymbol{if\ email\ group = male\ senior} \end{cases}$$

3.3 Regression Analysis

A probit model is used since the main dependent variable, whether the recipient clicked the email link, is binary. The results described below are the marginal effects rather than the raw estimates of the probit estimation and can be interpreted as a percentage effect of a change in that characteristic on whether the recipient clicked the email link. For example, if the marginal effect of receiving an email from a men's soccer player is 0.1528, then this means alumni are 15.28 percent more likely to respond to an email sent from male soccer player than an email sent from a male senior. In total, I ran eighteen regressions using the dependent variable, clickedlink.

4 Analysis and Results of Gender and Athlete Status of Sender

4.1 Question and Variables

In my first tests, I will examine whether the gender or athlete status of the email sender influences the likelihood that the alum participates in the survey. To do this, I first created two dummy variables in Stata, female_sender and athlete_sender. Female_sender gives a 1 to any alumni who received an email from a female student and a 0 to any alumni who received an email from a male. Athlete_sender gives a 1 to any alumni who received an email from an athlete and a 0 to any alumni who received an email from a student who is not an athlete. Figure 4 demonstrates these dummy variables. I also created interaction terms to test if the gender or

athlete status of the alum impacts their response rate to the gender or athlete status of the sender. Table 5 describes these interaction terms.

Figure 4:

$$\boldsymbol{Femalesender} = \begin{cases} \mathbf{1}\ \boldsymbol{if\ email\ is\ from\ a\ female\ student} \\ \mathbf{0}\ \boldsymbol{if\ email\ group\ is\ not\ from\ a\ female\ student} \end{cases}$$

$$\boldsymbol{Athletesender} = \begin{cases} \mathbf{1}\ \boldsymbol{if\ email\ is\ from\ an\ athlete} \\ \mathbf{0}\ \boldsymbol{if\ email\ is\ not\ from\ an\ athlete} \end{cases}$$

Table 5:

Interaction Term	**Variables Included**	**Context**
Inter(female_sender)(gender_alum)	femalesender*gender	Do female alumni have a bias toward female senders?
Inter(female_sender)(athlete_alum)	femalesender*athlete	Do alumni who were athletes have a bias toward female senders?
Inter(athlete_sender)(gender_alum)	athletesender*gender	Do female alumni have a bias toward athlete senders?
Inter(athlete_sender)(gender_alum)	athletesender*athlete	Do alumni who were athletes have a bias toward athlete senders?

4.2 Regression Analysis

For my initial tests, I will use the following probit regressions where I control for the gender, athlete status, class year and major of the alum.

$$clickedlink=\beta_1+\beta_2(female\_sender)+\beta_3(gender\_alum)+\beta_4(athlete\_alum)+\beta_5(econ\_alum)+\beta_6(classdummies))+\varepsilon$$

$$clickedlink=\beta_1+\beta_2(athlete\_sender)+\beta_3(gender\_alum)+\beta_4(athlete\_alum)+\beta_5(econ\_alum)+\beta_6(classdummies)+\varepsilon$$

These regressions allow me to test if gender or athlete status of the student has an impact on whether an alumni clicks link.

Next, I tested whether the type of alum affected the degree to which the gender or athlete status mattered for alum participation. To do this, I will use the same regressions above, but add interactions terms to allow me to analyze if former athletes have an affiliation towards current athletes or if female alumni are more likely to respond to female students. As seen in the regressions below, the interaction terms allow me to analyze if there is any gender or athlete bias and if there is, I can see how much bias there is.

$$clickedlink=\beta_1+\beta_2(female\_sender)+\beta_3(gender\_alum)+\beta_4(athlete\_alum)+\beta_5(econ\_alum)+\beta_6(classdummies)+\beta_7(interfemale\_sendergender\_alum)+\varepsilon$$

$$clickedlink=\beta_1+\beta_2(female\_sender)+\beta_3(gender\_alum)+\beta_4(athlete\_alum)+\beta_5(econ\_alum)+\beta_6(classdummies)+\beta_7(interfemale\_senderathlete\_alum)+\varepsilon$$

$$clickedlink=\beta_1+\beta_2(athlete\_sender)+\beta_3(gender\_alum)+\beta_4(athlete\_alum)+\beta_5(econ\_alum)+\beta_6(classdummies)+\beta_7(interathlete\_sendergender\_alum)+\varepsilon$$

$$clickedlink=\beta_1+\beta_2(athlete\_sender)+\beta_3(gender\_alum)+\beta_4(athlete\_alum)+\beta_5(econ\_alum)+\beta_6(classdummies)+\beta_7(interathlete\_senderathlete\_alum)+\varepsilon$$

4.3 Results

The first regressions I ran aimed to see whether the gender or athlete status of the sender of the email had impacted the likelihood that an alum clicked the link to the survey. The results are shown in Table 6. Column 1 shows the gender of the sender of the introductory email had no impact on the likelihood that the alum clicked on the survey link. Column 4 shows a similar result for the athlete status of the sender. Both athletesender and femalesender are not statistically significant, as seen in Table 6, leading to the conclusion that it does not matter whether the sender was an athlete or what their gender was to determine if the alumni clicked the link.

In column 2 and 3, I augment my initial regressions with interaction terms that test whether particular sub-groups respond more or less to the gender of the sender. Column 2

analyzes whether the gender of the alumni changes the likelihood they will respond to a female sender. In column 3, I show whether alums who were former varsity athletes are more or less likely to respond to a female sender. Female_sender, interfemale_sendergender_alum and interfemale_senderathlete_alum are not statistically significant demonstrating there is no change of response rate based on the gender of the sender or the gender of the alumni.

In column 4, I examine whether the athlete status of the sender influences whether the alumni responds or not. Column 5 tests to see if the gender of the alumni changes the likelihood they will respond to a student-athlete. Lastly, column 6 analyzes if the athlete status of the alum impacts the response rate to a student-athlete. Athlete_sender, interathlete_sendergender_alum and interathlete_senderathlete_alum were not statistically significant demonstrating athlete status for the sender had no impact on the likelihood of alumni responding.

It is important to note that the gender of the alum is statistically significant in all of these regressions in Table 6 and continues to be significant in nearly every regression that I have run. This means that female alums are more likely to respond than males no matter who the sender is. Various class years were also statistically significant, but there is no clear pattern amongst regressions. There is a label in each table "classdummies" with an x in each column signifying I have controlled for the class year of the alums.

Table 6: The relationship between sender and alumni

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	Clicked link	Clicked link	Clicked link	Clicked link	Clicked link	Clicked link
femalesender	-0.00573	0.0183	-0.0135			
	(0.0260)	(0.0317)	(0.0330)			
interfemalesendergender_alum		-0.0681				
		(0.0490)				
interfemalesenderathlete_alum			0.0209			
			(0.0550)			

athletesender				-0.0309	-0.00917	-0.0425
				(0.0266)	(0.0328)	(0.0339)
interathletesendergender_alum					-0.0636	
					(0.0510)	
interathletesenderathlete_alum						0.0312
						(0.0583)
gender_alum	0.0934***	0.134***	0.0937***	0.0935***	0.118***	0.0930***
	(0.0295)	(0.0434)	(0.0295)	(0.0295)	(0.0368)	(0.0295)
athlete_alum	0.0121	0.0112	0.00134	0.0133	0.0145	0.00237
	(0.0269)	(0.0269)	(0.0387)	(0.0269)	(0.0270)	(0.0334)
econ_alum	-0.0320	-0.0298	-0.0325	-0.0296	-0.0299	-0.0292
	(0.0314)	(0.0314)	(0.0315)	(0.0314)	(0.0314)	(0.0314)
classdummies_alum	x	x	x	x	x	x
Observations	1,143	1,143	1,143	1,143	1,143	1,143

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

5 Analysis and Results of Female Sender and Female Alumni

5.1 Question and Variables

The next set of tests analyze the female email groups, womenssoccer and econfemale. The first regression tests if alumni respond more to women's soccer players than a female senior. The second regression tests if alumni respond more to females in the Women's in Economics club than female seniors. These regressions essentially test my main question, "do alumni favor female athletes more than the other female senders and male athletes more than male senders." Next I tested whether the gender or varsity status of the alum has an impact on the likelihood of responding to a women's soccer player or a member of the Women in Economics club relative to their response rate to female seniors. To do this, I created interaction terms shown in Table 7

Table 7:

Interaction Term	**Variables Included**	**Context**
Interwomenssoccergender_alum	womenssoccer*gender	Do female alumni have a bias

		towards women's soccer players?
Interwomenssocerathlete_alum	womenssocer*athlete	Do alumni who were athletes have a bias towards women's soccer players?
Intereconfemalegender_alum	econfemale*gender	Do female alumni have a bias towards female economic majors?
Intereconfemaleathlete_alum	econfemale*athlete	Do alumni who were athletes have a bias towards female econ majors?

5.2 Regressions Analysis

These regressions test if a student saying they are a women's soccer player or a member in the Women in Economics club creates a higher likelihood of the alumni responding relative to an email from a female senior. I controlled for gender, athlete status, class year and major of the alum as seen in the regressions below.

$$clickedlink=\beta_1+\beta_2(womenssoccer)+\beta_3(gender\_alum)+\beta_4(athlete\_alum)+\beta_5(econ\_alum)+\beta_6(classdummies)+\varepsilon$$

$$clickedlink=\beta_1+\beta_2(econfemale)+\beta_3(gender\_alum)+\beta_4(athlete\_alum)+\beta_5(econ\_alum)+\beta_6(classdummies)+\varepsilon$$

Next, I tested whether the gender or varsity status of the alum had an impact on the likelihood they respond to a women's soccer player or a member of the Women in Economics club. I used the same regressions above but added in the respective interaction terms for both the gender and the athlete status of the alum.

$$clickedlink=\beta_1+\beta_2(womenssoccer)+\beta_3(gender\_alum)+\beta_4(athlete\_alum)+\beta_5(econ\_alum)+\beta_6(classdummies)+\beta_7(interwomenssoccergender\_alum)+\varepsilon$$

$$clickedlink=\beta_1+\beta_2(womenssoccer)+\beta_3(gender\_alum)+\beta_4(athlete\_alum)+\beta_5(econ\_alum)+\beta_6(classdummies)+\beta_7(interwomenssoccerathlete\_alum)+\varepsilon$$

$$clickedlink=\beta_1+\beta_2(econfemale)+\beta_3(gender\_alum)+\beta_4(athlete\_alum)+\beta_5(econ\_alum)+\beta_6(classdummies)+\beta_7(intereconfemalegender\_alum)+\varepsilon$$

$$clickedlink=\beta_1+\beta_2(econfemale)+\beta_3(gender\_alum)+\beta_4(athlete\_alum)+\beta_5(econ\_alum)+\beta_6(classdummies)+\beta_7(intereconfemaleathlete\_alum)+\varepsilon$$

5.3 Results

The next set of regressions examined in a more detailed way whether alums responded differently to women varsity athletes compared to other women, seen in Table 8. To study this, I move away from the aggregate athlete_sender or gender_sender of my previous regressions to more disaggregated independent variable of each email group.

In column 1, I analyze whether being on the women's soccer team influences the degree to which the alum responds. Column 2 analyzes whether the gender of the alumni changes the likelihood that they will respond to a women's soccer player. In column 3, I show that alums who were former varsity athletes are more or less likely to respond to a women's soccer player. Both womenssoccer and interwomenssoccerathlete_alum in columns 1 and 2 are not statistically significant suggesting that a female student including that they were a varsity athlete at Holy Cross had no impact on if the alumni clicked the link. However, column 3 shows that at the 10% level, if a women's soccer player sends an email to a female alum, the alum is less likely to click the link than if the email was just sent from a female senior. The size of the coefficient is large at 12.6%, suggesting that female alums might penalize female varsity athletes at a rather large degree. This is surprising because the hypothesis was that including that the student was a varsity athlete would increase the likelihood of a response, not decrease it.

In column 4, I analyze whether an email sent from a member of the Women in Economics club influences whether the alumni responds or not. Column 5 tests to see if the gender of the alumni changes the likelihood, they will respond to a member of the Women in

Economics club. Lastly, column 6 analyzes if the athlete status of the alum impacts the response rate to a female in an economics club. Econfemale was not statistically significant in any of those regressions, demonstrating that an email coming from a student is in the Women in Economics club did not influence the behavior of the alum relative to an email from a female senior. However, in the interaction term in column 6, intereconfemalegender_alum, is statistically significant with $p<0.05$. This demonstrates that including the Women in Economics club in the email to a female alumni increases the likelihood that the alumni will respond by 25.3% compared to the female senior email group.

Column 5 shows the interaction terms with athlete was not significant demonstrating the behavior of the alum is not dependent on their athlete status.

Table 8: The relationship between female senders and female alumni

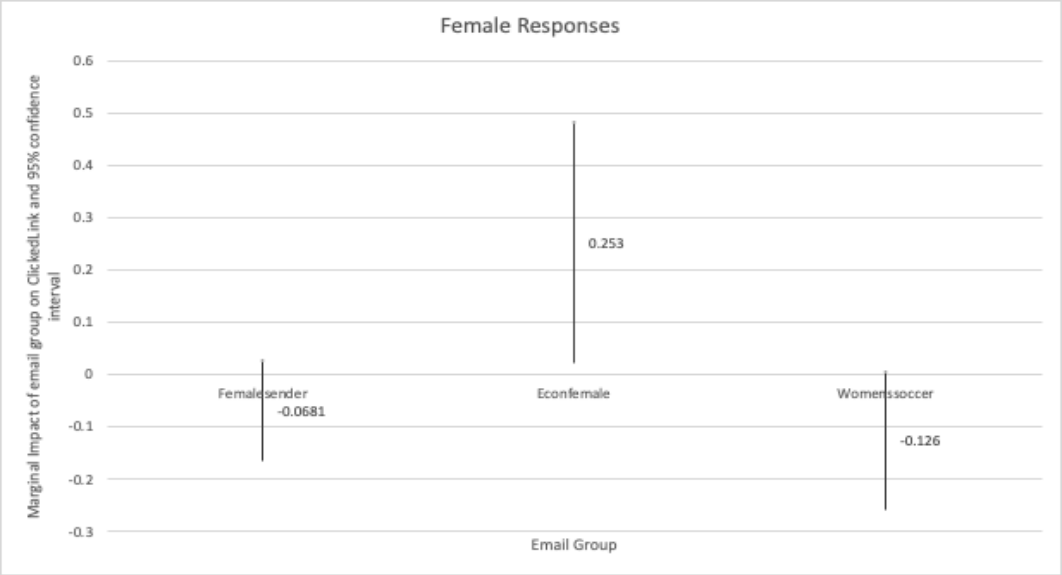
	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	Clicked link	Clicked link	Clicked ink	Clicked link	Clicked link	Clicked link
womenssoccer	-0.0245	-0.0497	0.0164			
	(0.0417)	(0.0535)	(0.0489)			
Interwomenssoccerathlete_alum		0.0680				
		(0.0939)				
Interwomenssoccergender_alum			-0.126*			
			(0.0676)			
econfemale				0.0507	0.0661	-0.0233
				(0.0464)	(0.0572)	(0.0562)
Intereconfemaleathlete_alum					-0.0428	
					(0.0898)	
Intereconfemalegender_alum						0.253**
						(0.118)
gender_alum	-0.0468	-0.0486	0.0237	0.145***	0.145***	0.0284
	(0.0441)	(0.0440)	(0.0659)	(0.0530)	(0.0530)	(0.0704)
athlete_alum	0.0317	-0.00252	0.0356	-0.0111	0.0102	-0.0103
	(0.0438)	(0.0623)	(0.0440)	(0.0481)	(0.0672)	(0.0482)
econ_alum	-0.0517	-0.0516	-0.0538	-0.0333	-0.0332	-0.0388
	(0.0500)	(0.0499)	(0.0501)	(0.0532)	(0.0532)	(0.0536)

Classdummies_alum	x	x	x	x	x	x
Observations	425	425	425	384	384	384

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

It is interesting that the interaction term with econfemale and gender is statistically significant when the femalesender and gender interaction term is not. Possible reasoning behind this is the femalesender regression combines all three descriptions of female senders, including the female sender being a varsity athlete for whom there might be a networking penalty. In the graph below, I plot the marginal impact of female_sender, econfemale and womenssoccer on the likelihood of the alum to respond, in Figure 5. As part of the graph, I also plot the 95% confidence interval on those coefficients. The econfemale variable, which is statistically significant, demonstrates a higher likelihood of an alumni responding. The femalesender variable includes both the womenssoccer emails and the econfemale emails, which is why the confidence intervals of femalesender is about in the middle of the other two email groups. In a way, econfemale and womenssoccer cancel each other out to create femalesender. The womensoccer variable is pulling down the femalesender variable due to the negative coefficient in the regression results. This is the opposite of what I predicted to happen, and I am curious why female alums seem to penalize women varsity athletes by not responding to their survey requests more so than if the survey requests were sent by another type of female. However, female alumni do recognize a comradery amongst female economics majors. This could be due to the fact that the Economics department is dominated by males and females want to encourage female economics majors to continue on in this field.

Figure 5: Female Responses



6 Analysis and Results of Male Sender and Male Alumni

6.1 Question and Variables

The next set of tests analyze the male email groups, menssoccer and econmale. The regressions that I ran were able to determine whether males have a bias in deciding to click link or not. As a preview of my findings, it can be concluded that males tend to be indifferent to the identity of the sender to whether they decide to click the link or fill out the survey. Similar to the female section of the analysis, I tested if alumni respond more to men's soccer players than a male senior and if alumni respond more to males in the Venture Capital club than male seniors. These regressions are able to test my question regarding whether if alumni favor male athletes more than the other male senders. Next I tested whether the gender or varsity status of the alum has an impact on the likelihood of responding to a men's soccer player or a member of the Venture Capital club than a male senior. To do this, I created more interaction terms shown in Table 9.

Table 9:

Interaction Term	Variables Included	Context
Intermenssocergender_alum	menssocer*gender	Do female alumni have a bias towards men's soccer players?
Intermenssocerathlete_alum	menssocer*athlete	Do alumni who were athletes have a bias towards men's soccer players?
Intereconmalegender_alum	econmale*gender	Do female alumni have a bias towards male econ majors?
Intereconmaleathlete_alum	econmale*athlete	Do alumni who were athletes have a bias towards male econ majors?

6.2 Regressions Analysis

The next regressions test whether male below examined if an email sent from men's soccer player or a male in the Venture Capital club aided more responses than an email sent from a male senior. Again, the gender, class year, athlete status and major of the alum was controlled for.

$$clickedlink=\beta_1+\beta_2(menssoccer)+\beta_3(gender\_alum)+\beta_4(athlete\_alum)+\beta_5(econ\_alum)+\beta_6(classdummies)+\varepsilon$$

$$clickedlink=\beta_1+\beta_2(econmale)+\beta_3(gender\_alum)+\beta_4(athlete\_alum)+\beta_5(econ\_alum)+\beta_6(classdummies)+\varepsilon$$

Lastly, I tested if the gender or athlete status of the alum yielded more responses for an email sent from a men's soccer player or a male in the Venture Capital club than a male senior. The same regressions above were used, but I added interaction terms as seen below.

$$clickedlink=\beta_1+\beta_2(menssoccer)+\beta_3(gender\_alum)+\beta_4(athlete\_alum)+\beta_5(econ\_alum)+\beta_6(classdummies)+\beta_7(intermenssoccergender\_alum)+\varepsilon$$

$$clickedlink=\beta_1+\beta_2(menssoccer)+\beta_3(gender\_alum)+\beta_4(athlete\_alum)+\beta_5(econ\_alum)+\beta_6(classdummies)+\beta_7(intermenssoccerrgender\_alum)+\varepsilon$$

$$clickedlink=\beta_1+\beta_2(econmale)+\beta_3(gender\_alum)+\beta_4(athlete\_alum)+\beta_5(econ\_alum)+\beta_6(classdummies)+\beta_7(intereconmalegender\_alum)+\varepsilon$$

$$clickedlink=\beta_1+\beta_2(econmale)+\beta_3(gender\_alum)+\beta_4(athlete\_alum)+\beta_5(econ\_alum)+\beta_6(classdummies)+\beta_7(intereconmalegender\_alum)+\varepsilon$$

6.3 Results

These final set of regressions represent the emails sent from males, either a men's soccer player or a male in the Venture Capital Club with the results seen in Table 10. In column 1, I analyze whether the being a member of the men's soccer team influences the degree to which the alum responds. Column 2 analyzes whether the gender of the alumni changes the likelihood that they will respond to a men's soccer player. In column 3, I show that alums who were former varsity athletes are more or less likely to respond to a men's soccer player. Menssoccer, intermenssoccergender_alum and intermenssoccerathlete_alum are not statistically significant demonstrating there is no change of response rate based a men's soccer player sending the email versus a male senior.

In column 4, I analyze whether an email sent from a male in the Venture Capital club influences whether the alumni responds or not. Column 5 tests to see if the gender of the alumni changes the likelihood that they will respond to a male in an economics club. Lastly, column 6 analyzes if the athlete status of the alum impacts the response rate to a male member of the Venture Capital club. Econmale, intereconmalegender_alum and intereconmaleathlete_alum were not statistically significant demonstrating the alumni do not favor male athletes or male economics majors over male seniors. Due to the insignificance of the interaction terms, it can also be concluded that males are indifferent to the identity of the sender to whether they click the link to fill out the survey.

Table 10: The relationship between male senders and male alumni

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	Clicked link	Clicked link	Clicked link	Clicked link	Clicked link	Clicked link
menssoccer	0.00527	0.0312	-0.0313			
	(0.0455)	(0.0577)	(0.0572)			
intermenssoccerathlete_alum		-0.0659				
		(0.0859)				
Intermenssoccergende_alum			0.109			
			(0.110)			
econmale				0.0360	0.0450	0.0167
				(0.0478)	(0.0608)	(0.0592)
intereconmaleathlete_alum					-0.0241	
					(0.0981)	
intereconmalegender_alum						0.0592
						(0.111)
gender_alum	0.134**	0.135**	0.0763	0.101*	0.102*	0.0703
	(0.0532)	(0.0533)	(0.0742)	(0.0551)	(0.0553)	(0.0769)
athlete_alum	0.0103	0.0480	0.00784	0.0132	0.0261	0.0111
	(0.0478)	(0.0713)	(0.0478)	(0.0495)	(0.0733)	(0.0496)
econ_alum	-0.0132	-0.0169	-0.0163	-0.0731	-0.0736	-0.0758
	(0.0575)	(0.0580)	(0.0578)	(0.0604)	(0.0605)	(0.0607)
classdummies_alum	x	x	x	x	x	x
Observations	366	366	366	350	350	350

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

7 Other Dependent Variable Results

The dataset included other dependent variables, answeredany and percentageanswered. I ran the same 18 regressions for these two dependent variables.

After running the same regressions as clickedlink, the same qualitative findings were true of answeredany and percentageanswered, as seen in Table 11. Again, it was found that alumni do not have a bias in favor of athletes, but females do value students who are members of the Women in Economics club. The results for both dependent variables were identical due to percentage answered not being a binary variable. In both, intereconfemalegender was statistically

significant with a p-value of 0.010, demonstrating females are 29.17% more likely to respond to females in the Women in Economics club than to female seniors. The likelihood of females answering any of the survey questions from a female in the Women in Economics club was nearly 4% higher than clickedlink, demonstrating a stronger bias to continue on to answer questions if the alumni has the connection to another female economics major.

Table 11:

	Answered Any	**Percentage Answered**
Interfemalesendergender_alum	-0.0782 (0.047)	0.0782 (0.047)
Intereconfemalegender_alum	0.2917* (0.122)	0.2917* (0.122)
Interewomenssoccergender_alum	-0.0963 (0.072)	-0.0963 (0.072)

5 Conclusion

The data and regression analysis demonstrate that female alumni are 25.3% more likely to respond to a member of the Women in Economics club than a female senior. However, despite original expectations, the data does not show that alumni are more likely to respond to student-athletes, regardless of whether the alum was a varsity athlete while in college. In fact, the data hints at female alumni penalizing female varsity athletes by responding less often to a survey request though the result could use more evidence from other studies to be truly convincing. The data also demonstrates males are surprisingly insensitive to the characteristics of the sender.

The goal of this experiment was to examine whether student-athletes have a unique relationship with alumni, specifically alumni who played a sport during their time at Holy Cross. The experiment was one of many ways to test for networking advantages. By only manipulating the gender and activity of the sender, the study was able to draw causal conclusions. However,

there were some limitations to this study. One limitation is the sample size. The list of alumni was given to me prior to the email being sent out. Due to sensitive nature and primary concerns associated with emailing Holy Cross alums, being given any number of alumni emails was a positive in this process. Ideally, a more robust examination of the topic would have involved a larger sample size. Also, the alumni graduated from 2010-2019. This means the alumni's ages are anywhere from about twenty-four to thirty-five-year-old. Many people in their twenties might not be in a position to help college students get a job or interview. However, they are sources of advice and can give students an insight to what their career is like. With that being said, having sent this survey to alumni who were more established in their jobs could have led to more responses to the survey as they are in a position where they really could help a student along with their career.

Another limitation was the content for the survey. Due to the fact that it was an Economics department survey, the focus was on improving the economics and accounting majors and the survey did not focus on advice that could have helped me. This was expected as this experiment partnered with the department in order to gain access to the emails, but if the survey had been geared more towards helping the student learn more about the alumni's careers there may have been a different result. The last limitation was the sports teams that were used. To keep the experiment as clean as possible, a male and female soccer player sent the emails. If the email had come from a Holy Cross football player, who has large alumni networking events, the study could have produced different results. Also, the success of the teams and the advertisement of the games to alumni could also have been a factor. The Holy Cross football program has had immense success and that success has led to more publicity from the athletic department. This type of attention could have increased the responses from alumni as they would

have another level of familiarity with that specific team. The women's soccer program does not have those alumni networks and has not had the same success or publicity to the public, which could make it harder to gain the attention of alumni.

Although this experiment was able to capture some of the networking tendencies of alumni, perhaps my study more accurately examined the degree to which an alum's loyalty to their alma mater depends on the identity of the college student emailing them. A curriculum vitae study could have answered my research question and may have seen the results that were originally anticipated. If a study was conducted where resumes were created identically, with some including a college sport, some including clubs and others omitting both of these extracurriculars it could have been seen that athletes receive more call backs than non-athletes. This type of method would have mirrored more directly the Bertrand and Mullainathan (2003) study. However, this alternative type of study would not have been feasible in the time frame I had due to the hiring cycles for different industries. An entire calendar year most likely would have been required.

Although this specific experiment demonstrated there are no statistically significant networking advantages for student-athletes at Holy Cross, there is anecdotal evidence to believe that there is an advantage. Holy Cross gives numerous resources to students to help them find their careers and find a job after graduation. One of the resources is Handshake. This website allows a student to make a profile, similar to LinkedIn, and apply for jobs right on the site. It also allows employers and recruiters to message students. Throughout the fall semester, almost every student is contacted by different employers based on their major and industries they show interest in on their profile. However, student-athletes receive extra messages where the employer or recruiter specifically states they are only interested in hiring student athletes. As an example,

figure 6 shows a message I received this fall for a position in financial services. It is important to note the name of the employer has been removed from the message.

Figure 6:

Caroline,

I am not sure if you are open to new opportunities in Financial Services, but we are hiring here at *Employer Name* in New York City.

I am reaching out to **collegiate athletes** graduating by 2022 with Economics backgrounds for entry-level full-time Financial Advisor positions for after graduation. We usually start the interview process early in order to help ease the transition for after graduation.

Athletes tend to succeed because most of Financial Advising is about "**winning"** trust with client to manage the relationship.

Finance experience is not necessary and you can always learn. What is more important is a **strong work ethic and strong communication skills.**

If interested in learning if this position might be a good fit, I suggest attending on of our information sessions over the next few weeks via zoom. It doesn't hurt to attend for 15 minutes and see if this career might be a good fit!

If interested, please use the link here to pick a time that works for you. From there you will receive a calendar invite with a link to join on Zoom for the info session!

If you cannot attend an information session and would like to apply directly instead, let me know here and I can send you the link to apply directly.

Sincerely,
Employer Name

Not only do employers reach out to athletes, some job postings employers even state under “Preferred Requirements” that they are looking for student-athletes. Although it is not a requirement, it does demonstrate that employers seek out former athletes. They are valued by employers for the skills they learn while balancing the demands of being both a full-time student and a full-time college athlete. Henderson, Olbrecht and Polachek (2006) shows in their paper that there is a wage premium in the business industry and Long and Caudill (1991) demonstrates

that former male college athletes have a 4% higher salary than non-athletes. Both these papers along with the explicit messages and job descriptions requesting athletes, demonstrates that while my experiment did not find any evidence of a networking advantage for college athletes, there may be some advantage for college athletes in the job search.

This study represents the first test of whether there is any networking advantage for college athletes and there is so much room for further research. Upon starting the literature review, it was nearly impossible to find existing papers that tested the causal effect of being a varsity athlete and how this translates to where they end up in the workforce. With so few college athletes moving on to play professionally, it is an extremely relatable topic for many college athletes. Expanding this type of study or conducting a curriculum vitae study in relation to athletes at other colleges could create an entire new area of academic literature and findings. If the same experiment done in this paper were to be done at a larger scale, for example at a college that has very strong athletic teams who year after year compete for National Championships, there could be evidence of advantages of networking for student-athletes. This paper is just the beginning of the possible research of networking advantages. Although there were no advantages shown in this specific study and analysis, there is an opportunity to continue on with growing the literature on this topic.

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