On the Positive Relationship between Sports and Earnings Competitiveness, Confidence, Competence, and Leadership Skills

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Abstract

It is well established that participating in sports is associated with higher salaries. However, while there have been suggested explanations, there is little empirical evidence to support them. This study uses laboratory experiments to identify personal characteristics that might be factors contributing to the relation between sports and labor market outcomes after graduation from college. We find that while participating in sports is linked to higher salaries, the earnings advantage goes to women playing varsity team sports in high school and men playing varsity team sports in college. For women, there are significant correlations between playing varsity team sports in high school and confidence, risk aversion, and leadership ability. For men, there are significant correlations between participation in varsity team sports in college and confidence, risk aversion, and competence. Unexpectedly, competitiveness is negatively correlated with participation in varsity team sports for both men and women. The connection between salaries and sports for women is linked to higher levels of confidence, leadership ability, and, possibly, teamwork skills. For men, competence, sorting into higher paid sectors and jobs, and, possibly, teamwork skills and networking are contributing to the higher salaries for athletes.

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1. Introduction

There is a substantial amount of evidence that people who participate in sports in high school or college earn higher salaries. This may be the result of a complex set of personal qualities that are associated with playing sports, such as competitiveness, self-confidence, motivation and work effort, the ability to work well with others in teams, leadership ability, networking, etc. However, while these potential sources of the higher earnings have been postulated by numerous studies, to date there is little empirical evidence linking such personal characteristics to participation in sports and higher earnings. This paper contributes to the literature on the relationship between participation in sports and labor market outcomes by explicitly measuring potential connections between participation in sports, personal characteristics, and earnings in order to learn more about the possible channels through which participation in sports may be linked to future labor market outcomes.[1]

We utilize a unique data set that matches subjects' behavior in laboratory experiments (such as choosing to compete for payoffs) with their subsequent labor market performance for up to eight years following graduation from college. We conducted experiments with graduating seniors at four institutions (Haverford College, Mills College, Santa Clara University, and Wellesley College) during 2011-2013; these experiments measured competitiveness, confidence, risk aversion, ability, and other personality characteristics. We followed the participants with post-graduate surveys of labor market outcomes from 2012 to 2019. This paper is innovative in

[1] This is closely related to the growing literature on the importance of non-cognitive abilities in affecting salaries. See Duncan and Dunifon (1998, 2012), Bowles, et al. (2001a, 2001b), Heckman et al. (2006), Almlund et al. (2011), and Humphries and Kosse (2017).

several ways. First, it is the first to link personal characteristics measured in laboratory experiments to participation in sports and post-graduation earnings of the same people. Second, by focusing our analysis on college graduates, we are able to examine the linkages between personal characteristics, participation in sports, and earnings with less influence occurring via educational outcomes because our subjects all have college degrees. This means that one channel of potential positive effects of sports on salaries, higher educational attainment, is less relevant. While this is likely one avenue by which sports may affect earnings, our evidence shows that the positive linkages go beyond educational outcomes. Third, we distinguish between participation in sports in high school and in college, which allows us to identify more precisely the areas in which sports are linked to earnings. Fourth, we categorize sports as team or non-team sports and the level as varsity or club, enabling us to focus on how different types and levels of sports participation are linked to salaries. Finally, we consider whether other factors, such as sorting into jobs in higher paid sectors might also help explain the positive connection between sports and earnings. While the question of whether the personal characteristics that are associated with higher salaries lead people to select into sports or whether participation in sports teaches or trains people such skills is an important one, the focus of this paper is to identify which characteristics link sports and salaries, however such qualities are attained.

Similar to other studies, we find that participating in sports is associated with higher salaries, but the earnings advantage goes to women playing varsity team sports in high school and men playing varsity team sports in college. For women, there are significant correlations between playing in varsity team sports in high school and confidence, risk aversion, and leadership ability, while for men who play varsity team sports in college, the significant correlations are for confidence, risk aversion, and competence. Unexpectedly, our measure of

competitiveness is negatively correlated with participation in varsity team sports for both men and women. Examining the connections between salaries and varsity team sports, we find that the main personal characteristics affecting this relationship for women are confidence and leadership skills, while for men they are confidence and competence. Sorting into sector of employment (for-profit, non-profit, or government) and jobs in business/finance are important factors linking men's salaries to sports but not women's. We conclude that the linkage between sports and salaries for women is mediated by confidence, leadership ability, and, possibly, teamwork skills, while for men it is confidence, competence, sorting into higher paid sectors and jobs, and, possibly, teamwork skills and networking.

2. Evidence and Explanations of the Positive Relationship between Sports and Earnings

The early literature examining the linkages between participation in sports tended to focus on men only, partially to avoid confounds of gendered pay rates and occupations and partly because fewer women played sports in high school or college. With changes in social norms and support from Title IX, women's participation in sports increased and recent studies include both sexes. Nearly all the studies find positive relationships between participation in school sports and educational outcomes (e.g. graduation rates, college attendance, etc.) as well as labor market outcomes (e.g. employment, occupation, earnings, etc.).[2]

One of the earliest studies on men who participate in sports is Barron, et al. (2000), who find salaries are higher by 12% to 32%; including cognitive abilities and education reduces the salary premium but does not eliminate it. Kuhn and Weinberger (2005) examine the role of

[2] Some studies examine the connection between athletic activities of adults and earnings rather than participation in school sports. Lechner (2009) estimates the return on active sports activity to be 5% to 10%, Lechner and Sari find the positive effect exceeds 10%, Hyytinen and Lahtonen (2013) find that physically active men earn 14% to 17% more than those less active, and Lechner and Downward (2017) conclude the effects differ by type of sport, gender, and age.

sports and membership in clubs and find that white males who participate in sports earn 8% to 9% more (5% to 7% with full controls) than those who do not participate in sports while those in sports and clubs earn 5% to 16% more (2% to 10% will full controls) than those who do not participate in both. Ewing (2007) finds a 6% salary advantage as well as greater fringe benefits for male athletes. Comparing two cohorts, high school seniors in 1972 and 1992, Weinberger (2014) shows that the earnings premium for white men playing sports has increased over time, increasing for those in sports from 4% to 11% and for those in sports plus other leadership roles increasing from 6% to 17%; including ability reduces the coefficients somewhat but the effects remain large.

Studies that include women find that women playing sports in high school also earn more. Eide and Ronan (2001) study salaries by gender and race; their OLS analysis estimates a 14% earnings premium for playing sports for both men and women. When considering race, the higher earnings are found only for white males and white and Hispanic females. However, in their IV estimates using height as the instrument, only black males experience an earnings premium for playing sports. Stevenson (2010) finds that the sports earnings premium is 14% for women (8% with controls) and 19% for men (7% with controls).

It is possible that linkages to salaries differ by type of sports. Gorry (2016) finds that participation in team sports in high school is related to a 8-9% earnings premium for both men and women but no earnings advantage is found for participants in individual sports.

While the majority of studies focus on participation in high school sports, Long and Caudill (1991) examine men and women who earned varsity letters in sports in college. In the early years of their careers, male athletes earn 4% more than non-athletes while there is no earnings advantage for female athletes. Examining male college athletes with varsity letters,

Henderson et al. (2006) find that there is an earning advantage for male athletes in terms of mean earnings, however, more than half of former athletes earn less than non-athletes and the wage advantage is not uniform across professions. The salary premium exists for former athletes who work in business, military, and manual labor (earning 2% to 9% more) but not for the 10% of athletes who choose to become high school teachers (earning 8% less).

An important issue discussed in the literature is that of endogeneity and causation; it may be that personal characteristics that are associated with higher salaries lead people to select into sports rather than that participation in sports teaches or trains people such skills. Various methods are utilized to deal with such endogeneity and the positive and significant relationships between sports and earnings found in some studies do not always persist when using instrumental variables (e.g. Barron et al., 2000, Eide and Ronan, 2001, Stevenson, 2010, and Gorry 2016), however, there is some question about the quality of the instruments used. In this study, we investigate the mediating effects of personal characteristics that relate to both participation in sports and higher earnings in order to help us understand the positive linkages between sports and earnings, but we do not make claims about causation. That is, because we cannot eliminate selection into sports, we cannot determine whether participation in sports is responsible for the higher earnings.

In explaining the positive connections between participation in sports and labor market outcomes, authors cite numerous possible personal characteristics but do not provide evidence linking these factors to sports or earnings. Many papers include statements similar to this one from Long and Caudill (1991), "Since the models used to estimate income and graduation differentials included many measurable determinants of labor market and academic outcomes, these findings suggest that athletic participation may enhance the development of discipline,

confidence, motivation, a competitive spirit, or other subjective traits that encourage success." Rarely is there any test or evidence of these potential linkages. However, unlike most studies, Long and Caudill (1991) do attempt to measure one attribute by including a self-reported measure of "drive" in their regressions. They report that excluding the drive variable increases the coefficient on sports from $652 to $786 (20.6%), which they say "is consistent with the view that male athletes have more drive and motivation than other individuals." Two studies focus on the importance of leadership skills on educational and labor market outcomes of white males (Kuhn and Weinberger, 2005 and Weinberger, 2014), incorporating sports into the analysis. These studies show that leadership skills are linked to earnings, but that participation in sports is related to earnings beyond being connected to leadership ability.

Reviewing the literature, we identify the following postulated explanations for linkages between sports & earnings:

- Competitive or Taste to Compete
- Confidence or Self-Esteem
- Ability, Motivation and Work Effort ("Competence")
- Leadership Skills
- Teamwork Skills
- Networking in Job Market/Social Capital
- Self-Discipline/Self-Efficacy/Stress Management
- Health & Physical Appearance

We utilize our experiments and surveys to obtain measures of as many of these personal characteristics as possible given the data available to us as explained below.

3. Methodology – Description of the Experiment and Survey

The data used in this paper are taken from laboratory experiments and post-graduation surveys of the same people. The experiments were conducted with graduating seniors at Haverford College, Mills College, Santa Clara University, and Wellesley College from 2011-

2013. Seniors were contacted by email inviting them to participate in the experiment and were paid a $10 show-up fee. Anonymity was preserved by linking experiment results to a code number and in a separate location, code numbers to email addresses. Table 1 provides the sample sizes for the experiments by institutions, with a total 822 participants over the three years and four institutions.

Table 1: Experiment & Survey Samples

	Haverford College	Santa Clara University	Wellesley College	Mills College	Total
Experiment (2011-2013)	175	450	125	72	822
Survey Responses (2012-2019)	754	1,682	464	241	3,141
Response Rate (one or more surveys)	89%	84%	87%	76%	85%

The experiments included the following exercises, one of which was randomly chosen to be paid out in monetary compensation:[3]

1: A dictator allocation exercise that is used to measure social preferences.

2 & 3: Two risk eliciting exercises using lotteries based on the Holt-Laury (2002) method.

4. Students are provided a set of addition problems, consisting of three 2-digit numbers, and given two minutes to solve as many of the problems as they can, earning 60 cents for each correct answer.

5. Subjects are given a choice as to how they will be paid similar to that provided in Niederle and Vesterlund (2007), piece-rate or entering a winner-take-all tournament.

[3] Experiment instructions and the post-graduate surveys are provided in the supplemental materials. The experiments measured a number of characteristics that are not utilized in this paper but are reported in related work (Kamas and Preston, 2018).

6. An alternative measure of willingness to compete is the amount bet of a $10.00 allocation that they will have the highest score in a random group of four participants, where they earn four times the amount bet if they win and lose the amount bet otherwise, keeping the amount not bet.

7. The task is changed to a word game: subjects are asked to make as many words using the letters in a given word as they can in two minutes and are paid 20 cents for each letter in each valid word.

8. The subjects are given the opportunity to choose to whether they want to do either addition or word tasks. Exercise 5 (choice of piece rate or enter a tournament) and exercise 6 (betting on winning the tournament) are repeated for their chosen task.

9. After completing these exercises, students are given a socio-economic questionnaire to fill out.

Comprehensive surveys of labor market outcomes and other personal characteristics were sent to participants during the springs of 2012-2019. Subjects were contacted by email and provided a link to a Google Forms Questionnaire, where a code number was linked to their responses (but not to their email addresses). For the first five years after graduation, surveys were sent annually, thereafter biannually. Respondents were paid $10 for filling out the survey, which was increased to $20 in 2014 and after to increase response rates. Survey response numbers and rates are provided in Table 1, with 3,141 survey responses 2012-2019 with an average response rate of 85%.

4. Measuring Sports Participation and Personal Characteristics.

4.1. Participation in Sports:

At the end of the experiment, participants were asked to fill out a questionnaire with various socio-economic questions. Subjects were asked, "If you played sports in high school, please list all varsity or club sports played in high school." This was followed by a grid for them to fill out listing the sports, identifying each as club or varsity, the number of years played, and

hours per week. The same question was asked regarding participation in sports in college. [4] Sixty different sports were listed by the participants. We separate these sports into two categories, team sports and non-team sports, where team sports are defined to be sports with three or more players working together to perform better than other team(s). The idea behind our categorization of team sports is that the players do not get judged or evaluated based solely on their own individual performance, they train as a group, and their individual performance has a smaller impact on the outcome. Using this criteria, we have 18 team sports: baseball, basketball, crew, cricket, dodgeball, field hockey, flag football, football, handball, hockey, lacrosse, paintball, rugby, soccer, softball, ultimate Frisbee, volleyball, and water polo. The other 42 sports include all others sports identified by subjects (see Appendix Table 1).

Subjects who reported playing in one or more team sports are included in the team sports category and if one or more of these was at the varsity level, they are included as varsity team otherwise they are in non-varsity team. People reporting they played one or more sports but none of these were team sports are placed in the non-team sport category. If one or more were varsity sports, they are placed in non-team varsity category, the rest are categorized as non-team non-varsity.

4.2. Measuring Confidence:

We utilize two measures of confidence, one refers to confidence about performance within the experiment and the other is about future success in their careers. The questionnaire at the end of the experiment asked participants to estimate their ranking in the scoring of the arithmetic task (exercise 5) among three other people with whom they would be randomly

[4] While some college sports may not be termed "varsity" but rather "NCAA", we asked subjects to identify whether their sport was "club" or "varsity" in the questionnaire so it is their determination or understanding that categorizes the sports.

grouped (scored as 3 if ranked self as top scorer to 0 if rank self as lowest). Subjects were told they would be paid $1 if they correctly specified their ranking. The second measure relates to their confidence in their performance in their future careers. They were asked*: If 0% is the lowest and 100% is the highest, what percentile would you place your ability to compete for promotion and advancement within an employing organization after you graduate relative to other students graduating from US colleges and universities?* The responses for this variable range from 0 to 100, with higher numbers representing greater confidence.[5]

4.3. Measuring Ability, Motivation, and Work Effort (Competence)

We utilize two measures that combine the characteristics of ability, motivation and work effort, which we will term "competence". Within the experiment we calculate the subjects' average score on the addition exercises. We also use the students' reported GPAs in the post-experiment questionnaire as a broader measure of competence in areas other than math skills and performance outside of the lab.

4.4. Measuring Risk Aversion

We use the Holt and Laury (2002) method to represent risk aversion. Subjects make 15 choices between a certain payoff of $5 and a payoff of $20 if an orange ball is pulled out of a bag. For each choice, the number of orange balls increases by one, from zero to 14 out of 20 total balls. The round in which the subject switches from the sure $5 to the bet provides a measure of attitude toward risk: the higher the round, the more risk adverse the person.

[5] Two additional measure of confidence were obtained. In the experiment, subjects were asked to estimate the probability they would score the highest in their group (0 to 100%). They were also asked to estimate their expected success in an entry level job: "If 0% is the lowest and 100% is the highest, what percentile would you place your ability to succeed in an entry level job after you graduate relative to other graduating seniors from US colleges and universities?" These variables are highly correlated with the two measures we focus on here so they are not reported because they do not add much to the analysis.

4.5. Measuring Competiveness

We use the method of Niederle and Vesterlund (2007): subjects are given the option to choose to be paid for their performance in the math exercise either by a piece rate earning 60 cents for each correct answer or entering a tournament with three other randomly chosen anonymous students, earning $2.40 times the number of correct answers if they have the highest score or zero otherwise.

The decision to compete in the tournament is determined by expected payoff (based on ability and confidence), risk preferences, and taste to compete. The taste to compete is the choice to compete that is not explained by ability, confidence, or risk preferences. We measure this as the residual from a regression of the choice to compete variable (0,1 dummy) on ability (average score on addition exercises), confidence (expected ranking in group of four), and risk aversion (Holt-Laury lottery exercise score).

4.6. Measuring Leadership:

We do not have a direct way to measure leadership skills, but the questionnaire includes the Bem Sex Role Inventory (Bem 1974, 1981) that asks subjects to state on a seven point scale the degree to which an adjective applies to them, including 20 personal characteristics such as independent, affectionate, assertive. One of the characteristics is leadership ability. We utilize this score to represent leadership skills, noting that it suffers from problems associated with all self-reported data. Furthermore, subjects' responses may be affected by self-esteem or confidence as those who are more confident in their abilities may believe that they have more leadership skills so this variable may conflate the two.

4.7 Summary of Characteristics Associated with Participation in Sports

Table 2 summarizes the postulated characteristics associated with sports that may affect earnings and the availability of these measures in our data. Column (1) lists characteristics we measure (1a) and the variables we use to measure them (1b) while column (2) lists characteristics for which we do not have measures. Row (1) lists characteristics that pertain to all sports while row (2) lists those that would be unique to team sports.

Table 2: Characteristics Associated with Participation in Sports and Associated Variables

	(1) Measured		(2) Not Measured
	(1a) Characteristic	(1b) Variable	
1. All Sports	Competition	Taste to Compete Residual	Self Discipline/Self Efficacy/Stress Management Health and Physical Appearance
	Risk Aversion	Risk Aversion Score in Lottery	
	Confidence	Expected Ranking in Group Expected Ability to be Promoted	
	Competence	Average Score on Math Task GPA	
2. Team Sports	Leadership Ability	BSR1 Score on Leadership Ability	Team Work Skills Networking in Job Market/ Social Capital

5. Participation in Sports in High School and College

Table 3 provides the numbers and percentages of individuals responding to the survey who participated in sports in high school and college by type of sport and gender. A large proportion (71%) of people played one or more sports in high school, with twice as many in team sports (49%) as in non-team sports (22%) (column 1, rows 4 & 5). Three-quarters of those playing team sports were in varsity teams (rows 6 &7). Nearly half of men and about a third of women played varsity team sports (columns 2& 3, rows 6 &7).

Participation in sports in college was about half as large as in high school with 38% of the whole sample, 45% of men and 35% of women (row 10) playing. In contrast to high school sports, non-varsity sports participation in college was roughly equal to or slightly higher than varsity sports participation for both team and non-team and both men and women. About 15% of men and 11% of women played varsity team sports in college (column 2 & 3, row 14).

Table 3: Participation in Sports by Individuals in Survey
(Percentages of Relevant Samples in Parentheses)

	(1) Total Sample	(2) Men	(3) Women
1.Total	687	227	460
High School			
2. Sport	488 (71.0%)	182 (80.2%)	306 (66.5%)
3. No Sport	199 (29.0%)	45 (19.8%)	154 (33.5%)
4. Team Sport	336 (48.9%)	136 (59.9%)	200 (43.5%)
5. Non-Team Sport	152 (22.1%)	46 (20.3%)	106 (23.0%)
6. Team Varsity Sport	257 (37.4%)	106 (46.7%)	151 (32.8%)
7. Team Non-Varsity Sport	79 (11.5%)	30 (13.2%)	49 (10.7%)
8. Non-Team Varsity Sport	108 (15.7%)	40 (17.6%)	68 (14.8%)
9. Non-Team Non-Varsity Sport	44 (6.4%)	6 (2.6%)	38 (8.3%)
College			
10. Sport	262 (38.1%)	103 (45.4%)	159 (34.6%)
11. No Sport	425 (61.9%)	124 (54.6%)	301 (65.4%)
12. Team Sport	185 (26.9%)	78 (34.4%)	107 (23.3%)
13. Non-Team Sport	77 (11.2%)	25 (11.0%)	52 (11.3%)
14. Team Varsity Sport	83 (12.1%)	34 (15.0%)	49 (10.7%)
15. Team Non-Varsity Sport	102 (14.9%)	44 (19.4%)	58 (12.6%)
16. Non-Team Varsity Sport	38 (5.3%)	12 (5.3%)	26 (5.7%)
17. Non-Team Non-Varsity Sport	39 (5.7%)	13 (5.7%)	26 (5.7%)

6. Sports and Salaries

6.1. Mean Earnings

We measure earnings as annual salaries plus bonuses reported by subjects in the post-graduate surveys. Table 4 provides mean annual salaries plus bonuses for the total sample, men, and women for those who participated in sports in high school or college, differentiated by whether the sport was team or non-team and varsity or non-varsity.[6] People participating in sports in high school earn significantly more than those who did not play sports (row 2, column 1). This translates into 9% higher earnings for men and 7% higher earnings for women, but only the latter is different at the 0.10 significance level (row 2, columns 2 and 3). Looking closer, this salary difference is primarily driven by those playing team and varsity sports. Men in team sports earn 10% more than men not playing sports (not significant) while women in team sports earn 14% more than women not in sports (significant at 0.01 level) (row 3, columns 2 and 3). Furthermore, men and women in varsity team sports earn 15% (significant at the 0.05 level) and 14% (significant at the 0.01 level) more respectively than those not in sports (row 4).

The relationship of sports to salaries is far different in college. Women who participate in college sports earn less in all categories than those not in sports (column 3). Men who participate in college sports (row 8, column 2) earn 9% more than those not in sports (significant at 0.10 level). This is primarily due to participation in varsity team sports, where men earned 13% more (significant at the 0.05 level) than their counterparts not in varsity team sports. In neither college nor high school do we see that men or women playing non-team sports earn higher salaries than those who do not play sports.[7]

[6] One individual who played professional basketball is dropped from the calculation of salaries to eliminate the large effect of this outlier.
[7] Gorry (2016) also finds that it is only team sports that are linked to higher earnings.

Table 4: Mean Salaries plus Bonuses by Sports Participation and Gender
(Standard Deviations in Parentheses)

High School

	(1) Total Sample	(2) Men	(3) Women
1. No Sport	$59,385 (42,073)	$67,334 (42,039)	$57,233 (41,864)
2. All Sports	$66,038*** (40,902)	$73,598 (45,911)	$61,235* (36,592)
3. All Team Sports	$68,981*** (42,636)	$74,185 (46,710)	$65,084*** (38,893)
4. Varsity Team Sports	$70,688*** (42,631)	$76,588** (47,109)	$65,963*** (38,070)
5. Non-Varsity Team Sport	$63,798 (42,305)	$65,605 (44,418)	$62,699 (41,057)
6. All Non-Team Sports	$59,250 (35,714)	$71,649 (43,244)	$54,013 (30,600)

College

	(1) Total Sample	(2) Men	(3) Women
7. No Sport	$63,191 (41,464)	$69,423 (42,921)	$60,788 (40,655)
8. All Sports	$65,741 (41,099)	$75,659* (47,458)	$58,019 (33,433)
9. All Team Sports	$66,619* (41,124)	$74,958 (46,574)	$58,970 (33,697)
10. Varsity Team Varsity Sport	$69,306** (44,549)	$78,746** (52,452)	$60,688 (33,806)
11. Non-Varsity Team Sport	$64,653 (38,370)	$72,199 (41,719)	$57,709 (33,650)
12. All Non-Team Sports	$63,485 (41,032)	$78,246 (50,809)	$56,104 (32,916)

Note: ***, **, * Salary of those in sport is different from salary for those not in sport in the same sample at 0.01, 0.05, and 0.10 significance level

6.2. Salaries in Team Sports

Because there does not appear to be a connection between non-team sports and earnings, we turn our focus to team sports. Table 5 provides regressions of ln(salaries plus bonuses) on team, team varsity, and team non-varsity dummies in high school and college with and without controls for men and women. The controls utilized are: years since graduation, year of the survey, a dummy for working part-time, a dummy for post-graduate education, family income range (five categories: $0 - $50,000, $50,000 - $100,000, $100,000 - $150,000, $150,000 - $300,000, and over $300,000), and dummies for major (social sciences, sciences, business, and engineering, with humanities the excluded major). Odd columns present regressions with no controls and even columns present regression results when controls are included.

The results are quite clear. Women playing a varsity team sport in high school have higher earnings later on in life than women who do not play a high school varsity team sport. The difference of l7% falls to 7.5% with controls but remains significant at the 0.06 level (row 2, columns 9 and 10). Once controls are included, earnings are not significantly higher for men playing varsity team sports in high school (row 2, columns 3 and 4). The results for college are quite different. While women playing college varsity team sports do not have an earning advantage, once we include basic controls, men playing a varsity team sport in college earn 13% higher salaries than those who do not play a varsity team sport, and the difference is significant at the 0.10 level (row 7, column 4).[8]

[8] This result is similar to Long and Caudill (1991) who examine men and women who earned varsity letters in sports in college. In the early years of their careers, men in college sports earn 4% more than non-athletes while there is no earnings advantage for women.

Table 5: Salaries plus Bonuses and Sports Regressions with and without Controls

High School Team Sports												
	Men						Women					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
1. Team Sport	0.066	0.037					0.169***	0.073*				
	(0.327)	(0.498)					(0.001)	(0.062)				
2. Varsity Team			0.143**	0.056					0.168***	0.075*		
			(0.030)	(0.318)					(0.001)	(0.056)		
3. Non-Varsity Team					- 0.171	- 0.046					0.050	0.017
					(0.160)	(0.601)					(0.573)	(0.807)
4. Observations	773	758	773	758	773	758	1,507	1,474	1,507	1,474	1,507	1,474
5. R-squared	0.003	0.504	0.014	0.506	0.009	0.504	0.018	0.534	0.016	0.534	0.001	0.531
College Team Sports												
	Men						Women					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
6. Team Sport	0.061	0.061					0.002	0.023				
	(0.367)	(0.286)					(0.969)	(0.602)				
7. Varsity Team			0.109	0.131*					0.065	0.039		
			(0.210)	(0.100)					(0.357)	(0.410)		
8. Non-Varsity Team					- 0.002	- 0.020					- 0.046	0.006
					(0.982)	(0.749)					(0.567)	(0.925)
9. Observations	773	758	773	758	773	758	1,507	1,474	1,507	1,474	1,507	1,474
10. R-squared	0.002	0.506	0.004	0.510	0.000	0.504	0.000	0.531	0.001	0.531	0.001	0.531
Controls	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes

Notes: Dependent variable is ln(salaries plus bonuses). Controls are: years since graduation, year of survey, part-time dummy, post-graduate education, family income, and dummies for major. Robust p-values in parentheses; *** p<0.01, ** p<0.05, * p<0.1

7. Explaining the Linkages between Team Sports & Salaries

7.1 Correlations of Personal Characteristics and Participation in Team Sports

Correlations between personal characteristics and participation in college team sports for men and participation in high school team sports for women are provided in Table 6. While it is often assumed that people who play sports are more likely to be competitive, a significant positive correlation between the taste to compete variable and the participation in sports dummy is only evident in the case of women who play non-varsity team sports in high school. Women who play varsity team sports in high school (column 2) are less risk averse, more confident both in their success in a potential tournament and in their abilities to be promoted, and more likely to see themselves as leaders than women who did not play varsity team sports. Men who play varsity team sports in college (column 5) are less risk averse, more confident in their abilities to be promoted, and of higher ability as measured by GPA and average score on arithmetic exercises than those men who do not play varsity team sports in college. These personal characteristics may also be correlated with earnings and may be partially responsible for the higher earnings of these athletes.

7*.2 Salaries, Varsity Team Sports, and Personal Characteristics*

Table 7 provides regressions of ln(salaries plus bonuses) on a dummy for varsity team sports and each of the personal characteristics individually included (with the same set of controls as before) for women in high school. Column 1, row 1 shows that women in varsity team sports earn 7.5% more than other women (p-value = 0.056) when no personal characteristics are included. This coefficient does not change much and its significance remains roughly the same after including the following variables one at a time: taste to compete, risk aversion, expected ranking in group, GPA, and average score on math exercises (line 1, columns

Table 6: Correlations between Participation in Team Sports and Personal Characteristics

	Women in High School			Men in College		
Personal Characteristic	(1) Team Sport	(2) Varsity Team	(3) Non-Varsity Team	(4) Team Sport	(5) Varsity Team	(6) Non-Varsity Team
Competitiveness & Risk Aversion						
1. Taste to Compete	- 0.045* (0.080)	- 0.109*** (0.000)	0.088*** (0.001)	0.017 (0.633)	- 0.050 (0.170)	0.024 (0.511)
2. Risk Aversion	- 0.096*** (0.000)	- 0.095*** (0.000)	- 0.010 (0.698)	- 0.100*** (0.005)	- 0.095*** (0.008)	- 0.033 (0.359)
Confidence						
3. Expected Ranking in Group	0.103*** (0.000)	0.061** (0.019)	0.072*** (0.005)	- 0.038 (0.290)	- 0.037 (0.304)	- 0.012 (0.746)
4. Expected Promotion & Advancement	0.238*** (0.000)	0.232*** (0.000)	0.032 (0.215)	0.079** (0.028)	0.103*** (0.004)	0.001 (0.969)
Leadership Skills						
5. Score on Bem SRI Leadership	0.206*** (0.000)	0.199*** (0.000)	0.029 (0.257)	0.136*** (0.000)	- 0.050 (0.163)	0.204*** (0.000)
Ability/Motivation/Work Effort						
6. GPA	- 0.091*** (0.000)	- 0.021 (0.428)	- 0.110*** (0.000)	0.021 (0.552)	0.089** (0.013)	- 0.054 (0.133)
7. Average Score on Math Exercise	0.084*** (0.001)	0.042 (0.103)	0.068*** (0.008)	0.023 (0.525)	0.088** (0.014)	- 0.051 (0.155)

Note: Sample is survey respondents reporting salaries. p-values in parentheses; ***, **, * significant at 0.01, 0.05, and 0.10 level respectively.

Table 7: Log Salaries plus Bonuses and Personal Characteristics Regressions
Women in High School Varsity Team Sports

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1. High School Varsity Team	0.075*	0.077**	0.077*	0.073*	0.056	0.053	0.073*	0.073*	0.045
	(0.056)	(0.047)	(0.051)	(0.063)	(0.163)	(0.175)	(0.063)	(0.062)	(0.258)
2. Taste to Compete		0.028							
		(0.552)							
3. Risk Aversion			- 0.004						
			(0.606)						
4. Expected Ranking in Group				0.034					
				(0.208)					
5. Expected Promotion					0.002*				0.002
					(0.059)				(0.224)
6. Leadership Ability						0.044***			0.036**
						(0.007)			(0.025)
7. GPA							0.117**		
							(0.026)		
8. Average Score Math Exercise								0.005	
								(0.147)	
Observations	1,474	1,473	1,474	1,473	1,474	1,466	1,464	1,474	1,466
R-squared	0.534	0.532	0.534	0.533	0.537	0.539	0.536	0.535	0.540

Notes: Dependent variable is ln(salaries plus bonuses). Controls are: years since graduation, year of survey, part-time dummy, post-graduate education, family income, and dummies for major. Robust p-values in parentheses; *** p<0.01, ** p<0.05, * p<0.1

2, 3, 4, 7, and 8). Of these, GPA is the only characteristic with a significant coefficient. These characteristics do not eliminate the linkage between varsity team sports and salaries. Column 5 shows that including confidence measured as expected promotion and advancement reduces the coefficient on varsity team sports to 0.056 (a 25% decline) and eliminates its significance (p-value = 0.163). Similarly, including leadership ability (column 6) reduces the coefficient on varsity team dummy to 0.053 (a 30% decline) and eliminates its significance (p-value = 0.175).

The coefficients on both of these characteristics are significantly different from zero. In row 9, where both confidence (column 1) and leadership (column 2) are included, the coefficient on the varsity team dummy declines to 0.045 (a total 40% decline) and is not significant (p-value = 0.258). This suggests that confidence and leadership skills are the main drivers behind the link between salaries and high school varsity team sports for women. However, when we include both variables in the regression only the coefficient of leadership is significant, indicating that leadership is the more important factor. There is a strong correlation between leadership and confidence for women ($\rho_{\text{expected promotion, leadership}} = 0.427$; p=0.000), thus, it is difficult to separate out the effects of confidence and leadership skills, and it is likely that both are important.

Table 8 gives similar regressions for men. The regression in column 1 shows that men who played varsity team sports in college earn 13.1% more than other men (with a p-value of 0.100). This coefficient is roughly the same with similar p-values when the following characteristics are included: taste to compete, risk aversion, expected ranking in team, and leadership ability and none of these variables are significant (row 1, columns 2, 3, 4, and 6). The coefficient on the varsity team dummy declines slightly (about 10-13%) and becomes insignificant when expected promotion, GPA, or average score on math exercises are included, and each of these variables is significant (columns 5, 7, and 8). In column 9, we include expected promotion and one of the measures of competence, GPA. The coefficient on college varsity team sports (row 1, column 9) declines further to 0.106 (total decrease of 19%) and the p-value rises to 0.179 and both of these personal characteristics have significant positive

Table 8: Log Salaries plus Bonuses and Personal Characteristics Regressions
Men in College Varsity Team Sports

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
College Varsity Team	0.131	0.128	0.129	0.134*	0.117	0.132*	0.118	0.114	0.106
	(0.100)	(0.103)	(0.110)	(0.095)	(0.162)	(0.098)	(0.121)	(0.149)	(0.179)
Taste to Compete		- 0.063							
		(0.279)							
Risk Aversion			-0.007						
			(0.506)						
Expected Ranking in Group				0.036					
				(0.323)					
Expected Promotion					0.005**				0.004*
					(0.050)				(0.085)
Leadership Ability						0.025			
						(0.322)			
GPA							0.184**		0.173**
							(0.011)		(0.017)
Average Score Math Exercise								0.011***	
								(0.006)	
Observations	758	758	758	758	758	758	758	758	758
R-squared	0.510	0.511	0.511	0.511	0.517	0.511	0.522	0.520	0.527

Notes: Dependent variable is ln(salaries plus bonuses). Controls are: years since graduation, year of survey, part-time dummy, post-graduate education, family income, and dummies for major. Robust p-values in parentheses; *** p<0.01, ** p<0.05, * p<0.1

coefficients. This suggests that the main personal characteristics affecting the linkage between college varsity team sports and salaries for men are confidence and competence. [9]

[9] Interestingly, while both women who play varsity team sports in high school and men who play varsity team sports in college are less risk averse than their peers, risk aversion has no effect on salaries and thus on the link between playing sports and earnings.

7.3 Other Factors Affecting Salaries: Sector of Employment

The association between varsity team sports and salaries may be more the result of sorting into higher paid jobs or sectors than personal characteristics correlated with playing on a varsity team. Table 9 presents regressions of ln(salaries plus bonuses) on high school varsity team sports, sector of employment (dummies for non-profit and government sectors with for-profit the omitted category) and employment in business/finance jobs for women's earnings. Column 1 provides the original regression on varsity team sports, column 2 includes dummies for sector of employment, column 3 includes a dummy for jobs in business/finance, and column 4 includes all the dummies. As can be seen, while all of these dummy variables have expected signs and are highly significant, none of them reduces the size of the coefficient on team varsity sports. In fact, the coefficient increases slightly (from 0.075 to 0.081 in column 4) and becomes even more significant (p-value decreases from 0.056 to 0.019). Therefore, sorting into sector or jobs in business/finance does not account for the relationship between varsity team sports and salaries for women (while personal characteristics of confidence and leadership skills do).

The findings presented in Table 10 for men in college sports are quite different: both sector of employment and business/finance job category reduce the size of the coefficient on the varsity team sport dummy, with sorting into business/finance having the largest effect (column 3). In column 4 where both sector and business/finance dummies are included, the coefficient on team varsity declines from 0.131 to 0.071 (46%) and is not close to being significant (p-value = 0.274). Thus, sorting into sectors and occupations in business and finance appear to be important factors in the connection between salaries and varsity team sports in college for men.

Table 9: Regressions of ln(Salary plus Bonuses) on Sector of Employment
Women in High School Varsity Team Sports

	(1)	(2)	(3)	(4)
High School Varsity Team	0.075*	0.078**	0.079**	0.081**
	(0.056)	(0.030)	(0.032)	(0.019)
Non-Profit Sector		- 0.292***		- 0.250***
		(0.000)		(0.000)
Government Sector		- 0.219***		- 0.182***
		(0.000)		(0.000)
Business and Finance			0.318***	0.277***
			(0.000)	(0.000)
Observations	1,474	1,462	1,474	1,462
R-squared	0.534	0.567	0.569	0.593

Notes: Dependent variable is ln(salaries plus bonuses). Controls are: years since graduation, year of survey, part-time dummy, post-graduate education, family income, and dummies for major. For-profit is the omitted sector. Robust p-values in parentheses;
*** p<0.01, ** p<0.05, * p<0.1

Table 10: Regressions of ln(Salary plus Bonuses) on Sector of Employment
Men in College Varsity Team Sports

	(1)	(2)	(3)	(4)	(5)
College Varsity Team	0.131 (0.100)	0.118 (0.105)	0.083 (0.229)	0.071 (0.274)	0.059 (0.358)
Non-Profit Sector		- 0.328*** (0.000)		- 0.270*** (0.000)	- 0.281*** (0.000)
Government Sector		- 0.280*** (0.000)		- 0.178** (0.013)	- 0.188*** (0.008)
Business and Finance			0.338*** (0.000)	0.310*** (0.000)	0.285*** (0.000)
Expected Promotion					0.002 (0.382)
GPA					0.146** (0.023)
Observations	758	747	758	747	747
R-squared	0.510	0.543	0.569	0.591	0.601

Notes: Dependent variable is ln(salaries plus bonuses). Controls are: years since graduation, year of survey, part-time dummy, post-graduate education, family income, and dummies for major. For-profit is the omitted sector. Robust p-values in parentheses; *** p<0.01, ** p<0.05, * p<0.1

In column 5, we add measures of confidence (expected promotion) and competence (GPA) to the column 4 model. The coefficient on varsity team sports declines further, to 0.059. The sectors and business/finance job categories remain significant. The coefficient on confidence is not significant when sector and business/finance job are accounted for, while competence (GPA) remains a significant predictor of earnings. In summary, for men, sector of

employment, business/finance job category, and competence are the characteristics linked to participation in sports that account for salary differences, while for women, confidence and leadership skills account for the sports related salary differences.[10]

8. Conclusion

This paper examines the connection between participating in sports in high school or college and higher earnings after graduation from college. We utilize laboratory experiments to measure personal characteristics such as competitiveness, confidence, ability, and risk aversion to investigate possible sources of the positive linkage between sports and earnings. Similar to other studies, we find substantial evidence that participation in sports is linked to higher earnings. Categorizing sports as team and non-team sports and as varsity and non-varsity sports, we find that the earnings advantage goes to women who played varsity team sports in high school (mean earnings 15% higher) and men who played varsity team sports in college (mean earnings 13% higher). Regressions with controls show that these female high school athletes earned 7.5% more than other women and these male college athletes earned 13% more than other men.

Focusing on the sports that are linked to higher earnings, we find significant correlations between personal characteristics and participation in varsity team sports in high school for women for confidence (expected ranking in group and prospects for promotion and advancement), leadership skills, and risk aversion. For men, the significant correlations between varsity team sports in college and personal characteristics are found for confidence (expected

[10] There may be concern that, because these data come from college graduates early in their careers, there are a significant number who are not employed because of investments in further human capital through schooling or internships, and this selection into employment may be biasing our results. Therefore, we estimate all our previous regressions using a Heckman correction for selection into employment. We use major, whether the individual has children, income, years since college graduation, and years since graduation squared as the variables estimating selection into employment. The magnitudes and significance levels of the coefficients on the sports variables are virtually identical to those estimated without the selection correction.

promotion), competence (GPA, and average score on math exercises) and risk aversion. Interestingly, competitiveness is significantly negatively correlated with varsity team sports in high school for women, and negatively but insignificantly correlated with varsity team sports in college for men.

Examining the linkages between sports, personal characteristics and earnings, we find that when we include personal characteristics in earnings equations, for women, confidence in being promoted and leadership skills reduce the size and significance of the varsity team dummy while the other characteristics do not affect it. For men, confidence in being promoted, GPA, and score on math exercises do the same. We then consider whether the connection between sports participation and earnings reflects sorting into higher paid jobs or sectors of employment. For women, including sector (profit, non-profit or government) and job in business/finance in the regressions does not affect the relationship between varsity team sports and earnings. On the other hand, sorting into sectors and occupations in business and finance appear to be important factors in the connection between salaries and varsity team sports in college for men. Thus, for men it is sector of employment, job in business/finance, and competence that are the characteristics linking participation in sports to higher earnings, while for women, it is confidence and leadership skills.

Our findings have implications about two characteristics that may be linked to sports and salaries for which we do not have explicit measures: teamwork skills and networking. The human capital achieved by participating in sports would be expected to differ depending on the sport. Team sports require working together and cooperation with others, while individual sports do not. Because we find higher salaries for both men and women participating in team sports only and not in non-team sports, teamwork skills may contribute to success in the labor market

and may contribute to the residual effect of sports on earnings that we do not explain. This result also has implications on the question of whether people with personal characteristics that are rewarded in the labor market select into sports or whether they develop human capital through participation in sports. Considering personal characteristics such as high ability, confidence, or work effort, it could be argued that selection into sports should be the same for team and non-team sports. Finding that team sports affect salaries, while non-team sports do not, tends to weaken the argument that it is selection into sports rather than skills attained from participation. To conclude that it is selection into sports would require that people with characteristics linked to higher salaries select into team sports but not non-team sports. While it may be that people more willing and able to work with others sort into team sports, they are also likely to learn to work with others toward a common goal while playing on a team. The importance of team sports in earnings may signal that at least some of the premium results from human capital accumulation.

If the higher earnings are partially the result of networking, we might expect networking in the job market to be enhanced by participation in college team sports and much less likely in high school team sports since these social connections likely dissipate over time. Therefore, because it is men in college varsity team sports who enjoy the earning advantage (while for women it is high school varsity team sports), it is likely that the higher salaries of men may be linked to networking.[11] This is reinforced by the fact that choosing into sector and business/finance jobs that are likely helped by networking is relevant to men's earning advantage but not women's. In summary, for women, it is confidence, leadership ability, and, possibly,

[11] Long and Caudill (1991) who also found that while men in college sports earn more than non-athletes while women do not, conclude that this suggests that "The idea that athletics generates "business contacts" may explain why the results are different for females."

teamwork skills associated with playing varsity team sports in high school that persist during and after graduation from college that appear to drive higher earnings. For men, it is competence, sorting into higher paid jobs and sectors, and possibly teamwork skills and networking that account for the link between sports and earnings.

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Appendix Table 1: Categorization of Sports

Team Sports	Non-Team Sports	
Baseball	Badminton	Mixed Martial Arts
Basketball	Bowling	Paddling
Crew	Boxing	Racquetball
Cricket	Cheerleading	Rifling
Dodgeball	Color Guard	Rock Climbing
Field Hockey	Cross Country	Sailing
Flag Football	Cycling	Salsa Dancing
Football	Dance	Ski Team
Handball	Dance Team	Sky Diving
Hockey	Diving	Snowboarding
Lacrosse	Equestrian	Sparring
Paintball	Fencing	Squash
Rugby	Figure Skating	Swimming
Soccer	Golf	Table Tennis
Softball	Gymnastics	Taekwondo
Ultimate Frisbee	Ju Jitsu	Tennis
Volleyball	Judo	Track & Field
Water Polo	Karate	Triathlon
	Kickboxing	Weightlifting
	Marathon	Wrestling
	Martial Arts	Wushu