THE EFFECTS OF HIGH SCHOOL ATHLETIC PARTICIPATION ON EDUCATION AND LABOR MARKET OUTCOMES

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Abstract —We introduce a simple allocation-of-time model to explain the high school athletic participation choice and the implications of this choice for educational and labor market outcomes. Four different factors that could explain athletic participation are identified in the context of this model. A variety of tests of the model are provided using two data sets: the National Longitudinal Survey of Youth and the National Longitudinal Study of the High School Class of 1972. We find some evidence that athletic participation directly affects wages and educational attainment. However, much of the effect of athletic participation on wages and educational attainment appears to reflect differences across individuals in ability or value of leisure.

> Sports and other forms of vigorous physical activity provide educational experience which cannot be duplicated in the classroom. They are an uncompromising laboratory in which we must think and act quickly and efficiently under pressure and then force us to meet our own inadequacies face-to-face and to do something about them, as nothing else does. . . . Sports resemble life in capsule form and the participant quickly learns that his performance depends upon the development of strength, stamina, self-discipline and a sure and steady judgment.—Supreme Court Justice Byron White

I. Introduction

IN recent years, many communities have had to face the difficult choice of reducing the funding of their high school athletic programs.[1] Yet, as the above quote suggests, some would argue that such sports programs should be an integral part of the learning experience. This paper considers evidence of the effects of participation in high school athletics on later educational attainment and labor market outcomes in terms of wages and employment. Examining the raw differences, one might argue that athletic participation is quite important. From the National Longitudinal Survey of Youth, one discovers that men at an average age of 32 who had participated in high school athletics were paid 31% higher wages than those who had not participated. From the National Longitudinal Study of the High School Class of 1972, one finds that men at an average age of 31 who had participated in high school athletics were paid 12% higher wages than those who had not participated. To correctly interpret such evidence, however, we must first understand the choice of athletic participation. In section I, we introduce a simple allocation-of-time model as a vehicle for explaining the athletic participation choice and the implications of this choice for educational and labor market outcomes. Four different factors that could explain athletic participation are identified in the context of this model.

Section II then considers more carefully the evidence drawn from the above-mentioned two data sets: the National Longitudinal Survey of Youth (NLSY) and the National Longitudinal Study of the High School Class of 1972 (NLS-72). Our empirical results are similar across these two data sets. There is a clear direct link for men between athletic participation and both additional formal education and wages. These results rule out two of the four contributing factors for athletic participation in the simple allocation-of-time model as dominant factors. However, this need not imply that we must modify the model to incorporate a role for athletic participation as a contributor to individual productivity. The simple allocation-of-time model suggests two additional factors that not only explain athletic participation but are largely consistent with the findings. These two factors are ability and preference for leisure. Higher-ability individuals or individuals with a reduced preference for leisure are more likely to choose to participate in athletic events. In such cases, athletic participation can be viewed as a signal of individuals with higher ability or greater ''work ethic'' or industriousness. The resulting higher educational attainment and improved labor market outcomes that are linked to athletic participation then simply become a reflection of the inherent capabilities of more able or industrious individuals.

The view that differential ability or value of leisure is behind the correlation between athletic participation and both educational attainment and wages is partially supported by the fact that, when one introduces controls for ability, the strength of the relationships between athletic participation and educational and labor market outcomes is reduced. Further evidence is then considered in an attempt to distinguish between athletic participation that serves as a signal of an individual's ability or industriousness from athletic participation that provides individuals valuable training. We find, for instance, evidence of sorting by those who participated in athletics into positions that link wages to job performance; this favors the interpretation of athletic participation as a proxy for heterogeneity in the underlying characteristics of individuals in terms of ability or industriousness. Similarly, an application of the instrumental-variable approach of two-stage least squares to an analysis

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[1] For instance, in August of 1991, the Chicago Board of Education cut athletic budgets of its 64 high schools from $6,700 per year to $750. A 1997 ***Wall Street Journal*** (2/28/97) article reports that a decline in school funding in many areas has resulted in decreased participation in high school track teams. From 1980 to 1996, the decline in participation was ''to 454,645 from 524,890 among boys and to 379,060 from 382,584 among girls.''

of wages offers little support for an expanded model of athletic participation that incorporates a potential team production and human-capital enhancement outcome to athletic participation. However, we do find across both data sets that athletic participation is distinct from participation in other extracurricular activities in terms of its link to wages. This one finding does suggest that athletic participation may in fact serve as a training activity. Concluding remarks appear in section III.

The research in this paper builds on the existing work of Long and Caudill (1991), who studied the effects of college athletic participation, and several sociologists who investigated the effects of high school athletics. Long and Caudill find that male varsity collegiate athletes receive greater incomes, measured ten years after entering college, than their non-athlete counterparts. They also find that these male varsity college athletes are more likely to have graduated from college than their non-athlete counterparts.[2] They interpret these findings to suggest that "[varsity college] athletic participation may enhance the development of discipline, confidence, motivation . . . or other subjective traits that encourage success" (p. 529). Maloney and McCormick (1993) examine the effects that college athletic participation has on various measures of academic achievement, focusing on the classroom success of athletes at a large land-grant institution. Overall, they find that athletes do not fare as well academically as non-athletes. However, most of this difference can be explained by background factors. Additionally, this "under performance" is greatest for athletes in the revenue sports, in which a seasonal phenomenon is found to exist.

Sociologists have studied the subject of high-school athletic participation, and their literature contains mixed results. Howell, Miracle, and Rees (1984) examine the earnings of males one year and five years after high school graduation. They find that no premium is earned by varsity high school athletes for those who did not attend college. They suggest that the lack of a significant effect of athletic participation on earnings may not have had time to manifest itself given the small number of years between high school and the year for which they estimate earnings equations. They do find some evidence that these athletes obtain higher levels of schooling.

Picou, McCarter, and Howell (1985) consider the effect that varsity high school athletic participation has on income and educational attainment eleven years after high school graduation for whites and blacks by gender. Their results indicate that only white males gain in terms of income and educational attainment from participating in varsity high school sports. Several other papers in the sociology literature have also considered the effects of participation in varsity high school athletics. Their major focus, however, has been on occupational status, "self-concepts," and various types of aspirations. See, for instance, Marsh (1993) and Sabo, Melnick, and Vanfossen (1993).

In general, the sociology papers ignore the human-capital model of income determination and presume that income determination is solely a function of background variables and high school performance. Ignoring variables known to affect wages (such as tenure at the firm, experience, and compensating differentials for urban areas) may bias the results. Further, the sociological studies have not formally modeled the underlying sorting/signaling aspect of athletic participation. Thus, the purpose of this paper is two-fold. First, we seek to develop a simple theoretical model for predicting relationships between high school athletic participation and educational and labor market outcomes. Second, we seek to provide empirical analysis across multiple data sets concerning the effects of athletic participation that includes controls that economists typically identify as important.

II. Models of High School Athletic Participation

To examine the potential implications of athletic participation, we first have to understand why some individuals choose to participate in athletic activities while others do not. To do so, consider a simple two-period model of time allocation as suggested by Becker (1965). In the first period, utility depends on leisure and the consumption of athletics. Leisure can be reduced in two ways. First, there is the fraction T_{e1} of the first period that is devoted to acquiring an education. The reward to time spent acquiring an education is a higher future stock of human capital and the resulting greater future income. Leisure in the first period can also be reduced by the fraction of the period devoted to participating in athletics, denoted by T_a. The gain to the time allocated to athletics is the utility value of the consumption of the good "athletics." Assuming utility is separable in leisure and the consumption of athletic activity, we have

$$\text{utility in first period} = \alpha u(T_a) + \theta v(1 - T_a - T_{e1}) \qquad (1)$$

in which the fraction of the first period spent in athletics and on education (T_a and T_{e1}, respectively) are constrained to be non-negative. We make the natural assumption of a positive but declining marginal utility to athletic participation and leisure, such that $v' > 0$, $u' > 0$, $v'' < 0$ and $u'' < 0$. In equation (1), differences across individuals in the parameters α and θ reflect differences in the consumption value of athletic activities and the value of leisure, respectively.

In the second period, utility depends on leisure and income. Income depends on the fraction of the period spent working, T_w, and on the individual's wage, w. During the second period, the individual can also devote time to the

[2] The obvious concern here is that, if these athletes are on scholarship, then the opportunity cost of "wasting" a semester is higher for college athletes than it is for non-athletes, and thus athletes have an additional incentive, ceteris paribus, to complete college. Long and Caudill control for parents' income in an attempt to minimize this "tuition" effect on graduation.

TABLE 1.—VARIOUS FACTORS THAT PREDICT ATHLETIC PARTICIPATION (ASSUMING PARTICIPATION HAS NO PRODUCTIVITY EFFECT)

Potential Factors That Explain Why Some Individuals Participate in Athletics (positive T_a)	The Acquisition of Human Capital During High School (level of $T_{e1} + \gamma$)	The Acquisition of Human Capital (Education) After High School (level of T_{e2})	The Extent of Participation in the Labor Market (level of T_w)	The Wage Level (level of w)
Factor (A)				
Athletic participants reap a greater value to the consumption of athletic activities (higher α)	lower	lower	lower	lower
Factor (B)				
Athletic participants have higher discount factors (higher β)	lower	lower	lower	lower
Factor (C)				
Athletic participants are more capable (higher γ)	higher	higher	higher	higher
Factor (D)				
Athletic participants place a lower value on leisure activities (lower θ)	higher	higher	higher	higher

acquisition of additional education, T_{e2}, with $T_{e2} \geq 0$.[3] Thus, we have

$$\text{utility in second period} = wT_w + \theta v(1 - T_w - T_{e2}). \quad (2)$$

The wage received by the individual in the second period reflects the individual's stock of human capital H accumulated during the first and second periods. The stock of human capital acquired during the first period (the high school experience) depends on the time devoted toward studies, T_{e1}, and on the individual's ability level, γ. Additional human capital acquired during the second period reflects the time devoted to education during that period, T_{e2}. In particular,

$$w = H(T_{e1} + \gamma, T_{e2}, k), \quad (3)$$

where $H(\cdot)$ denotes the stock of human capital. Note the specific form in which ability differences are introduced in equation (3), by the parameter γ. As we discuss in more detail below, this form will result in higher-ability individuals having more "free time" in high school to devote to athletics.[4] The parameter k in equation (3) captures other factors that influence the extent of human capital acquired by an individual. Later, we interpret k as reflecting the potential training provided to athletic participants. We assume that time devoted to acquiring human capital through formal education both during high school and beyond has positive but diminishing returns. That is, $H_1 > 0$, $H_2 > 0$, $H_{11} < 0$, and $H_{22} < 0$. Finally, human capital acquired during high school in the first period is assumed to complement the return to education in the second period, in that $H_{12} > 0$.

[3] For simplicity, we ignore any explicit expenditures that are associated with the acquisition of education during the second period.

[4] Note that we do not include the possibility that more-intellectually able individuals may be more likely to participate in athletics because they are "better" athletes ("good athletes use their heads"). This is an alternative explanation for a direct correlation between intellectual ability and athletic participation.

The objective of the individual is to choose T_a, T_{e1}, T_{e2}, and T_w to maximize two period utility:

$$\alpha \cdot T_a + \theta \cdot v(1 - T_a - T_{e1}) + \beta[w \cdot T_w + \theta \cdot v(1 - T_w - T_{e2})], \quad (4)$$

subject to $T_a \geq 0$, $T_{e1} \geq 0$, $T_{e2} \geq 0$, $1 \geq T_a + T_{e2}$, and $1 \geq T_w + T_{e2}$. (Note that $1 \geq \beta \geq 0$ is the discount factor.)

In the above setting, individuals who choose $T_a > 0$ are identified as ones who participate in high school athletics. It is important to note that the above analysis assumes that athletic participation involves only the allocation of time away from two activities: leisure and the acquisition of human capital. Athletic participation makes no direct contribution to an individual's stock of human capital. Later, in addition to the "fun" aspect of athletics, we expand the model to allow athletics to have a separate contribution to human-capital development. This will capture the idea that athletic participation can develop discipline, confidence, and motivation that enhance human-capital acquisition.

Comparative static analysis, summarized in table 1, identifies changes in parameter values that increase the likelihood of participation in athletics.[5] Table 1 also indicates the likely accompanying changes in the optimal levels of $T_{e1} + \gamma$ (the acquisition of human capital during high school), T_w (the extent of participation in the labor force after high school), and T_{e2} (the acquisition of additional education beyond high school). These results illustrate that the correlation between participation in high school athletics and these other variables depends on the reason for athletic participation. The implied effect of athletic participation on wages from equation (3) is also provided in table 1.

If we adopt the view that either factor (A) or (B) is dominant, then the choice of athletic participation should be linked to a reduction in the acquisition of human capital. For factor (A), the choice of less human-capital acquisition is

[5] The reported results are derived from simulations of the model in which the optimal solution is characterized by interior solutions for the time spent acquiring human capital in each period and the time spent in the labor market.

because athletic participation simply is more enjoyable, while, for factor (B), the choice of less human-capital acquisition is because of lower returns to acquiring human capital. Factor (A) is appealing as it captures the idea that participation in athletic events is by "good athletes" who, given their skills, find athletic participation especially rewarding. The resulting effects are straightforward. First, those who participate in athletics are predicted to achieve a worse class rank in high school (lower $T_{e1} + \gamma$). Second, given complementarity in the acquisition of human capital in high school and the subsequent acquisition of human capital after high school, high school athletic participants are predicted to acquire a lower level of additional education beyond high school (lower T_{e2}). The result of these actions is a lower stock of human capital in the second period. One would thus predict that high school athletic participants are less likely to be in the labor force (a lower T_w) and, if in the labor force, paid a lower wage.

Alternatively, if we adopt the view that either factor (C) or (D) is dominant, then the choice of athletic participation should be linked to an increase in the acquisition of human capital. For factor (C), this follows directly as the more able can acquire a given amount of human capital in less time. Given diminishing returns to additional human-capital acquisition in high school, it follows that the more able will find it less costly to devote time to athletics. For factor (D), the greater human-capital acquisition that accompanies the increased likelihood of athletic participation is due to a reduction in the value of leisure foregone. The resulting predictions for either factor (C) or (D) are thus the opposite of factors (A) and (B). First, athletic participants are predicted to achieve a better class rank in high school (higher $T_{e1} + \gamma$). Second, high school athletic participants are predicted to acquire a higher level of additional education beyond high school (higher T_{e2}). The result of both these actions is a higher stock of human capital in the second period. When factors (C) or (D) dominate, one would thus predict that high school athletic participants would be more likely to be in the labor force (a higher T_w) and, if in the labor force, would be paid a higher wage.

III. Empirical Evidence on the Effects of Athletic Participation

We rely on two data sets to test the predictions cited in table 1: the National Longitudinal Survey of Youth (NLSY) and the National Longitudinal Study of the High School Class of 1972 (NLS-72). In 1979, the initial wave of the NLSY was conducted for individuals between the ages of 14 and 21. Since then, periodic surveys of these individuals have been performed. In 1984, survey participants who attended high school were asked if they participated in high school athletics. A follow-up question asked in which of these high school organizations did they most actively participate.[6] Of our NLSY sample, 57% of the male respondents identified themselves as having participated in athletics. Of these, 37% indicated that this was the type of high school organization in which participated most actively. This represents 21.3% of the entire sample. Our measure of athletic participation for the NLSY includes both variables. All individuals who indicated that athletics was the organization in which they participated most actively are also included in the broader measure of athletic participation. Thus, we can use results for the more narrow definition of athletic participation to define the incremental impact of a relatively more intensive involvement in athletic activities.

The 1972 base year of the NLS-72 surveyed high school seniors from over 1,000 different schools. The first follow-up survey was conducted in 1974 and added to the base year additional 1972 high school seniors from schools that did not participate earlier. In this survey, a broad definition of athletic participation similar to that contained in the NLSY can be constructed, one that simply indicates participation in athletics during high school including intramural and club teams. Here, too, we can construct a second measure of athletic involvement that captures a more intensive involvement in athletics. However, this second measure does not exactly match the way intensive involvement in athletics is identified in the NLSY. In particular, for the NLS-72, the question on athletics asked the individual to distinguish between active participation and participation as a leader. Of the 63% of the male respondents in our NLS-72 sample who identified themselves as having participated in athletics, 25.7% indicated this participation was as a leader. This represents 16.3% of the entire sample. As with the NLSY, in our analysis below we include both measures of athletic participation, with the second defining the incremental impact of a more intensive athletic involvement.

For both the NLSY and NLS-72, the samples used are substantially below the initial size of the surveys for a variety of reasons. One key reason is that we restrict our analysis to men. The reason we do this is that the opportunities for women to participate in athletics were severely limited in the NLS-72 sample, and to a lesser extent in the NLSY sample.[7] A second reason for the small sample drawn from the NLSY survey is that many men in the original sample were eliminated by our restriction of the analysis to individuals who completed high school. This restriction was because participation in athletic activities is linked to an individual's choice of whether to complete high school. It

[6] Besides athletics, these organizations included school-sponsored hobby or subject-matter clubs; student council or government; the staff of year books, school newspapers, or school magazines; and performing arts organizations, including band, drama, and orchestra.

[7] The effect of legislation such as Title IX (passed in 1972) is just recently being felt. For instance, in 1971, 294,015 women and 3,666,917 men participated in high school athletics. In 1994–1995, these figures are 2,240,461 for women and 3,536,359 for men (Source: 1995 National Federal of State High School Associations). To a large extent, this growth highlights the limited opportunities available for women to participate in athletics prior to 1972. Thus, an analysis of female participation in athletics prior to 1972 (NLS-72 data) must include the effect of the substantial barriers to participation that women faced prior to 1972. On the other hand, an analysis that considers female participation during the 1970s and early 1980s (NLSY data) must adjust for the expanding and uneven growth in athletic opportunities occurring during this period brought on by Title IX legislation.

also makes the data set comparable to the NLS-72 sample, which includes only high school graduates.

Another reason for the small sample sizes that are common across the two data sets is sample attrition, as we limit the sample to high school graduates who responded to follow-up surveys eleven or more years after graduation in order to determine the ultimate effects of athletic participation on educational attainment and wages. For the NLSY, sample attrition and missing data for such specific variables as high school rank, demographic variables, and school size were equally important in reducing the sample size.[8] For the NLS-72, the loss of additional observations among men due to the failure of individuals in the initial survey to complete follow-up surveys was more important than missing data for specific variables.[9] We now consider the links between athletic participation, class rank, and postsecondary education. Employment and wage outcomes are subsequently discussed, at which time we are able to eliminate certain factors as dominant contributions to the athletic participation choice.

A. *Athletic Involvement, Class Rank, and Subsequent Educational Attainment*

According to our discussion in section II, athletic involvement will be associated with reduced high school rank and subsequent educational attainment if such participation signals a preference for the consumption of athletic events (factor (A)) or a high discount rate (factor (B)) among athletes. However, the results reported in columns (1), (2), (5), and (6) in table 2 are not what one would predict if factor (A) or (B) were dominant. Controlling for demographics and the education level of parents, athletic participants achieve essentially the same high school percentile rank in the NLS-72 sample as those not associated with athletics.[10] This lack of a significant relationship also holds for the NLSY sample of participants who were not intensely involved. However, those in the NLSY sample who were intensively involved in athletics actually achieved a better (lower) high school percentile class rank than others.

With respect to educational attainment, the results are again contrary to the predictions of factors (A) and (B). In fact, the results provide a clear contradiction of the predictions if factor (A) or (B) is dominant. In particular, men who participate in athletics achieve a level of education after high school that is 25% higher in the NLS-72 (table 2, column (4)) and 35% higher in the NLSY (table 2, column (10)). In both samples, the positive association between athletic involvement and subsequent educational attainment is even stronger if we focus on individuals whose athletic involvement was intensive. These findings suggest that factor (C) or (D) may be a more apt characterization of the choice of athletic participation (at least regarding the predictions with respect to class rank and subsequent educational attainment).

If we adopt the view of factor (C)—that athletic participation is more likely among those who are more capable—then adding variables that measure ability should eliminate any correlation between athletic participation in high school and high school rank. Specifically, the addition of ability measures should eliminate the findings in the NLSY data that those who were intensively involved in athletics achieved a better (lower) high school rank. For the NLSY, a measure of cognitive ability is drawn from the individual's percentile score on the armed forces qualification test (AFQT). Comparing columns (8) and (9) of table 2, one sees that the introduction of an ability variable reduces, but does not eliminate, the impact of intensive athletic involvement on high school rank found for the NLSY sample.

If we now control for ability and for the extent of human-capital acquisition in high school (as measured by high school rank), adopting the view of athletic participation as reflecting ability differences (factor (C)) would also imply no remaining link between athletic participation and subsequent educational attainment. Columns (6) and (12) in table 2 consider whether this is the case for the NLS-72 and NLSY data sets, respectively. Note that, for the NLS-72, a combined score from comprehensive tests over mathematics, verbal skills, and reading is used to obtain a measure of cognitive ability similar to that of the AFQT in the NLSY. The results reported indicate that athletic participation is associated with a greater postsecondary level of education for a given level of ability and high school rank. However, the inclusion of measures of ability and high school human-capital acquisition reduces but does not eliminate this link. These findings with respect to educational attainment—along with the results concerning high school rank—suggest that, although factor (C) may explain some of the correlation between athletic participation and human-capital acquisition—there remains a significant unexplained portion.

[8] For the NLSY, the original database consists of 12,686 observations. Restriction to men reduces the sample to 6,403. As the high school rank variable was asked in 1981, we focus only on those who had attended and completed high school by 1981. This reduces the sample to 3,639. Of these 3,639, 1,274 did not respond to the 1992 survey that was used to determine subsequent educational attainment, labor force participation, and earnings. Of the remaining 2,365, sixty did not provide information on their participation in athletics. Of those remaining, 308 did not provide demographic information on such factors as age, race, or parents' education, and another 497 did not provide information on school size or type. This leaves a sample size of 1,500. Finally, for 453, there is no information on class rank and/or ability. This explains the initial sample size of 1,047.

[9] For the NLS-72, the original database consists of 22,609 observations. Restriction to men drops the sample to 11,222. Focusing only on those who had attended and completed high school by 1973 reduces the sample to 11,214. Of these 11,214, 5,691 did not respond to the 1986 survey that was used to determine subsequent educational attainment, labor force participation, and earnings. Of the remaining 5,523, 395 did not provide information on their participation in athletics. Of those remaining, 1,496 did not provide demographic information on such factors as age, race, or parents' education, and another 165 did not provide information on school size and type. This leaves a sample size of 3,467. Finally, for 453, there is no information on class rank and/or ability. This explains the initial sample size of 3,014.

[10] In constructing the parent education level, we use the higher of either the father's or mother's reported level of education.

TABLE 2.—THE EFFECT OF ATHLETIC INVOLVEMENT IN HIGH SCHOOL ON PERCENTILE HIGH SCHOOL RANK AND SUBSEQUENT NUMBER OF YEARS OF FORMAL EDUCATION* FOR MEN

		NLS-72							NLSY					
		High School Rank (log)			Education Beyond High School (log)				High School Rank (log)			Education Beyond High School (log)		
Independent Variable	Sample Mean	(1)	(2)	(3)	(4)	(5)	(6)	Sample Mean	(7)	(8)	(9)	(10)	(11)	(12)
Individual active participant in athletics	0.632	−0.061	−0.080	−0.047	0.220	0.185	0.162	0.575	−0.153	−0.040	0.040	0.302	0.198	0.138
		(1.18)	(1.46)	(0.88)	(8.74)	(6.97)	(6.30)		(2.42)	(0.57)	(0.60)	(6.80)	(4.05)	(3.18)
Individual athletic involvement is intensive	0.163		0.075	0.079		0.136	0.141	0.213		−0.307	−0.235		0.281	0.172
			(1.05)	(1.13)		(3.93)	(4.22)			(3.67)	(2.95)		(4.80)	(3.31)
Individual is African-American	0.050	−0.090	−0.094	−0.276	−0.011	−0.017	0.062	0.214	0.019	0.010	−0.362	0.044	0.052	0.298
		(0.78)	(0.80)	(2.36)	(0.20)	(0.30)	(1.11)		(0.24)	(0.13)	(4.43)	(0.80)	(0.96)	(5.56)
Individual is Other	0.079	−0.108	−0.111	−0.147	−0.099	−0.104	−0.097	0.027	0.134	0.125	0.037	−0.031	−0.023	0.059
		(1.15)	(1.18)	(1.58)	(2.16)	(2.27)	(2.19)		(0.70)	(0.65)	(0.21)	(0.23)	(0.17)	(0.50)
Parent level of education, high school	0.361	−0.078	−0.078	−0.034	0.254	0.255	0.227	0.436	−0.142	−0.135	0.020	0.124	0.117	−0.011
		(0.98)	(0.98)	(0.43)	(6.56)	(6.59)	(6.07)		(1.65)	(1.57)	(0.24)	(2.04)	(1.95)	(0.21)
Parent level of education, some college	0.219	−0.258	−0.260	−0.182	0.532	0.527	0.464	0.152	−0.296	−0.287	−0.060	0.441	0.433	0.226
		(2.99)	(3.02)	(2.13)	(12.65)	(12.56)	(11.41)		(2.75)	(2.69)	(0.58)	(5.84)	(5.79)	(3.37)
Parent level of education, college degree	0.150	−0.427	−0.429	−0.352	0.696	0.693	0.615	0.133	−0.325	−0.293	0.022	0.692	0.663	0.397
		(4.51)	(4.53)	(3.74)	(15.06)	(15.03)	(13.74)		(2.86)	(2.59)	(0.20)	(8.66)	(8.36)	(5.50)
Parent level of education, graduate degree	0.129	−0.429	−0.430	−0.361	0.743	0.740	0.665	0.094	−0.729	−0.703	−0.371	0.855	0.831	0.471
		(4.39)	(4.41)	(3.73)	(15.59)	(15.56)	(14.44)		(5.71)	(5.54)	(2.99)	(9.52)	(9.34)	(5.81)
Individual resided in central city**	0.232	−0.139	−0.139	−0.138	0.062	0.062	0.048	0.417	−0.065	−0.054	−0.051	0.148	0.137	0.124
		(2.36)	(2.36)	(2.37)	(2.15)	(2.15)	(1.72)		(1.03)	(0.86)	(0.85)	(3.32)	(3.12)	(3.21)
Log of cognitive ability test	3.917			−1.138			0.548	3.864			−0.529			0.346
				(8.59)			(8.61)				(10.90)			(10.41)
Log of high school rank (percentile)	3.146						−0.097	2.240						−0.203
							(11.17)							(10.04)
Constant		3.434	3.435	7.828	0.565	0.567	−1.215		2.566	2.552	4.441	0.277	0.289	−0.430
		(44.70)	(44.71)	(15.14)	(15.06)	(15.15)	(4.77)		(29.85)	(29.85)	(23.22)	(4.58)	(4.82)	(2.81)
Log of education beyond high school	1.119							0.813						
Number of observations		3014	3014	3014	3014	3014	3014		1047	1047	1047	1047	1047	1047
Adjusted R^2		0.02	0.02	0.04	0.16	0.16	0.23		0.05	0.06	0.16	0.20	0.21	0.39

* To 1985 for NLS-72; to 1992 for NLSY.
** 1972 for NLS-72; 1979 for NLSY.
Absolute value of *t*-statistic in parenthesis.

TABLE 3.—THE EFFECT OF ATHLETIC INVOLVEMENT IN HIGH SCHOOL ON EMPLOYMENT* FOR MEN (PROBIT MODEL)

	NLS-72				NLSY			
Independent Variable	(1) Coefficient	(2) Coefficient	(3) Coefficient	(4) Coefficient	(5) Coefficient	(6) Coefficient	(7) Coefficient	(8) Coefficient
Individual active participant in athletics	0.003 (0.06)	0.016 (0.28)	0.007 (0.12)	0.020 (0.35)	0.061 (0.60)	0.087 (0.76)	0.085 (0.73)	0.097 (0.83)
Individual athletic involvement is intensive (most active organization (NLSY) or leader (NLS-72)		−0.047 (0.66)	−0.048 (0.67)	−0.038 (0.53)		−0.068 (0.50)	−0.070 (0.51)	−0.106 (0.75)
Individual is African-American	−0.218 (1.96)	−0.216 (1.94)	−0.170 (1.49)	−0.170 (1.49)	−0.815 (7.36)	−0.819 (7.37)	−0.811 (6.28)	−0.850 (6.41)
Individual is Other	−0.215 (2.40)	−0.214 (2.39)	−0.204 (2.27)	−0.213 (2.36)	−0.107 (0.33)	−0.113 (0.35)	−0.110 (0.34)	−0.102 (0.31)
Individual resided in central city**	−0.041 (0.78)	−0.042 (0.79)	−0.048 (0.91)	−0.032 (0.60)	0.228 (2.15)	0.229 (2.16)	0.228 (2.16)	0.240 (2.24)
Log of age of individual*	−0.065 (0.04)	−0.071 (0.05)	0.339 (0.23)	−0.187 (0.12)	0.828 (0.86)	0.829 (0.86)	0.826 (0.86)	0.978 (1.01)
Log of cognitive ability test			0.271 (2.02)	0.332 (2.40)			0.010 (0.13)	−0.045 (0.51)
Log of high school rank (percentile)				0.015 (0.78)				−0.124 (1.97)
Log of number of years of education completed beyond high school				−0.064 (1.67)				−0.008 (0.10)
Constant	0.947 (0.19)	0.968 (0.19)	−1.498 (0.28)	0.089 (0.02)	−1.646 (0.50)	−1.648 (0.50)	−1.674 (0.50)	−1.690 (0.51)
Number of observations	3014	3014	3014	3014	1047	1047	1047	1047
LR χ^2	9.99	10.43	14.49	18.59	55.75	55.99	56.01	60.39

* 1985 for NLS-72; 1992 for NLSY.
** 1979 for NLS-72; 1992 for NLSY.
Absolute value of z-statistic in parenthesis.
Private high school predicts success perfectly for NLS-72.

This unexplained contribution to high school rank and educational attainment could be attributed to the role of athletic participation as a signal of an individual's industriousness (factor (D)), a characteristic for which we do not have controls. Or, as is discussed later, it could signal a ''training'' role for athletic participation, one in which athletic participation instills traits that enhance the value of an individual's concurrent and subsequent acquisition of human capital.

B. Athletic Involvement, Employment, and Wages

Table 1 provides predictions, not only with regard to links between athletic participation and the acquisition of human capital, but also with regard to links between athletic involvement and the subsequent likelihood of employment and wages earned. To test the predictions regarding employment, we construct for both the NLS-72 and NLSY samples a variable indicating whether the respondent is with a job at a point in time. For the NLSY, this is February of 1992, an average of approximately 11.3 years following high school graduation. For the NLS-72, this is February of 1985, approximately 12.6 years following high school graduation. We also construct from each of the two data sets a measure of the weekly wage earned during employment in either 1992 (NLSY) or 1985 (NLS-72). This weekly wage is constructed from information on annual income that year and on the number of weeks the individual worked that year.[11]

The results reported in table 3 regarding employment indicate that men are no more likely to be employed if they participated in high school athletics. This holds for a variety of specifications, and suggests that there does not appear to be clear support for any of the propositions listed in table 1 with regard to the likelihood of employment. However, our findings with regard to compensation are significant. Participation in high school athletics is clearly associated with a higher wage for those who are employed. In fact, the wage for males who participated in athletic activities in high school is 12% higher in the NLS-72 (table 4, column (1)) and 32% higher in the NLSY (table 4, column (5)). These findings, along with the prior direct link between athletic involvement and educational attainment, provide further evidence that factors (C) or (D) may be more apt characterizations of the choice of athletic participation than are factors (A) or (B).

Recall that, for factor (C), athletic participation is more likely among those who are more able, for such individuals

[11] Similar results hold for either data set if we use the wage from the current or most recent position.

TABLE 4.—THE EFFECT OF ATHLETIC INVOLVEMENT IN HIGH SCHOOL ON (LOG) WEEKLY WAGES* FOR MEN

	NLS-72					NLSY				
Independent Variable	Sample Mean	(1) Coefficient	(2) Coefficient	(3) Coefficient	(4) Coefficient	Sample Mean	(5) Coefficient	(6) Coefficient	(7) Coefficient	(8) Coefficient
Individual active participant in athletics	0.629	0.110 (4.28)	0.088 (3.21)	0.080 (2.95)	0.052 (1.92)	0.582	0.279 (6.25)	0.223 (4.49)	0.178 (3.64)	0.156 (3.20)
Individual athletic involvement is intensive	0.162		0.087 (2.43)	0.085 (2.40)	0.073 (2.07)	0.215		0.151 (2.55)	0.111 (1.90)	0.073 (1.26)
Individual is African-American	0.046	−0.306 (5.10)	−0.310 (5.18)	−0.272 (4.48)	−0.267 (4.43)	0.193	−0.339 (5.98)	−0.337 (5.94)	−0.148 (2.36)	−0.212 (3.35)
Individual is Other	0.073	−0.051 (1.06)	−0.056 (1.15)	−0.048 (0.99)	−0.024 (0.51)	0.029	−0.187 (1.43)	−0.183 (1.40)	−0.098 (0.77)	−0.093 (0.74)
Individual resided in central city**	0.332	0.127 (4.81)	0.127 (4.80)	0.122 (4.62)	0.091 (3.44)	0.416	0.050 (1.11)	0.049 (1.08)	0.042 (0.94)	0.009 (0.20)
Log of age of individual*	3.441	−2.132 (2.81)	−2.090 (2.76)	−1.766 (2.32)	−0.826 (1.08)	3.450	0.210 (0.50)	0.242 (0.58)	0.186 (0.45)	0.205 (0.50)
Log of tenure at current job*	0.512	−0.444 (17.96)	−0.444 (18.00)	−0.441 (17.91)	−0.422 (17.26)	1.607	0.190 (6.33)	0.193 (6.42)	0.190 (6.48)	0.200 (6.81)
Log of cognitive ability test	3.923			0.232 (3.36)	0.106 (1.52)	3.908			0.227 (6.45)	0.131 (3.26)
Log of high school rank (percentile)	3.135				−0.038 (3.99)	2.225				−0.023 (0.97)
Log of number of years of education completed beyond high school	1.126				0.120 (6.37)	0.841				0.148 (4.41)
Constant		13.818 (5.29)	13.671 (5.24)	11.651 (4.36)	8.911 (3.35)		5.220 (3.61)	5.106 (3.54)	4.415 (3.12)	4.685 (3.35)
Log of weekly wages	6.346					6.364				
Number of observations		2410	2410	2410	2410		891	891	891	891
Adjusted ***R***-squared		0.14	0.15	0.17	0.17		0.12	0.13	0.17	0.19

* 1985 for NLS-72; 1992 for NLSY.
** 1979 for NLS-72; 1992 for NLSY.
Absolute value of *t*-statistic in parenthesis.

face a lower marginal cost to the time allotted to athletic activities. If this is the case, and if we control for ability and for the extent of human-capital acquisition in high school (as measured by high school rank) and beyond (as measured by educational attainment), then athletic participation should not be correlated with either labor force participation or subsequent wages. However, comparisons of column (2) with column (4) of table 4 and column (6) with column (8) of table 4 indicate that, while inclusion of such variables does reduce the link between athletic participation and wages, it remains the case for both data sets that wages are higher for men who had participated in high school athletics. Further, there is some evidence, especially in the NLS-72 sample, that this impact of athletic involvement on wages increases with the intensity of the involvement.[12]

C. *Reexamining the Effect of Athletic Participation: An Instrumental Approach*

At this point, we have found that athletic participants have higher subsequent educational attainment and higher wages.

[12] These results hold even if one controls for parents' education or income, suggesting that athletic involvement is not a proxy for family resources or background. Also, pooling the wage data that is available in the NLSY for other years (1990 and 1995) with the reported year of 1992 and estimating a random-effects model suggests that there is no significant change in the impact of athletic participation as one moves further from graduation date.

TABLE 5.—TWO-STAGE LEAST SQUARES—THE EFFECT OF ATHLETIC INVOLVEMENT IN HIGH SCHOOL ON (LOG) EDUCATION BEYOND HIGH SCHOOL AND (LOG) WEEKLY WAGES* FOR MEN

	NLS-72				NLSY			
	Education Beyond High School (log)		Weekly Wage (log)		Education Beyond High School (log)		Weekly Wage (log)	
Independent Variable	(1) Coefficient	(2) Coefficient	(3) Coefficient	(4) Coefficient	(5) Coefficient	(6) Coefficient	(7) Coefficient	(8) Coefficient
Individual active participant in athletics	3.549 (12.48)	2.266 (4.26)	−0.024 (0.18)	0.389 (1.69)	2.353 (8.39)	0.578 (1.07)	0.011 (0.06)	−0.203 (0.77)
Individual athletic involvement is intensive		2.561 (2.82)		−0.922 (2.41)		2.842 (4.02)		0.402 (1.10)
Individual is African-American	−0.401 (2.30)	−0.489 (2.84)	−0.254 (4.13)	−0.217 (2.99)	−0.151 (1.15)	−0.067 (0.46)	−0.186 (2.69)	−0.176 (2.47)
Individual is Other	−0.041 (0.30)	−0.201 (1.39)	−0.022 (0.45)	0.036 (0.61)	−0.430 (1.73)	−0.279 (1.01)	−0.062 (0.47)	−0.047 (0.35)
Individual resided in central city**	0.137 (1.83)	0.133 (1.82)	0.089 (3.37)	0.089 (2.92)	0.413 (4.68)	0.319 (3.18)	−0.013 (0.26)	−0.020 (0.39)
Log of age of individual*	−3.127 (1.43)	−2.432 (1.14)	−0.853 (1.12)	−1.060 (1.20)	0.198 (0.25)	0.786 (0.90)	0.197 (0.48)	0.283 (0.66)
Log of tenure at current job*	−0.244 (3.47)	−0.242 (3.54)	−0.417 (16.50)	−0.414 (14.22)	−0.064 (1.14)	−0.028 (0.44)	0.197 (6.67)	0.201 (6.58)
Log of cognitive ability test	−0.133 (0.64)	−0.070 (0.35)	0.120 (1.65)	0.099 (1.18)	0.114 (1.38)	0.096 (1.06)	0.148 (3.42)	0.147 (3.31)
Log of high school rank (percentile)	−0.073 (2.75)	−0.094 (3.49)	−0.037 (3.86)	−0.028 (2.44)	−0.178 (4.08)	−0.112 (2.20)	−0.023 (0.95)	−0.016 (0.64)
Log of number of years of education completed beyond high school*			0.135 (5.41)	0.148 (5.08)			0.174 (4.41)	0.158 (3.68)
Constant	10.511 (1.38)	8.346 (1.12)	8.987 (3.37)	9.622 (3.12)	−1.288 (0.48)	−3.014 (1.01)	4.730 (3.36)	4.466 (3.05)
Log of education/weekly wages	1.126	1.126	6.346	6.346	.841	.841	6.364	6.364
Number of observations	2410	2410	2410	2410	891	891	891	891
$F(k, n-k-1)$	27.66	26.92	54.33	37.41	24.26	19.50	20.67	17.78

First stage for NLS-72 includes exogenous variables private school, school enrollment, and measures of health, family income, and location (central city) at the time the individual was a high school student.
First stage for NLSY includes exogenous variables private school, school enrollment, and measures of health, family income, and location (central city) at the time the individual was a high school student. In addition, for the NLSY, we can include information on the individual's height and weight.
* 1985 for NLS-72; 1992 for NLSY.
** 1979 for NLS-72; 1992 for NLSY.
Absolute value of t-statistic in parenthesis.

These findings rule out factors (A) (consumption value of athletics) and (B) (high discount rate) as determinants of athletic participation that also explain subsequent educational attainment and wages. There is some evidence that part of the increase in educational attainment and wages that accompanies athletic involvement can be attributed to factor (C) (ability). However, a portion remains unexplained.

Before playing up the relevance of our fourth factor, (D) (athletic participation as a signal of industriousness), or of the possibility of a training role for athletics, we should consider one important issue as a possible explanation for our findings: the potential for our prior findings relating athletic participation to education and wages to reflect the fact that traditional test scores and high school rank do not fully capture an individual's ability. In such a case, athletic participation is a regressor correlated with the error term, and it would be erroneous to claim that the positive impact of athletic participation on subsequent educational attainment and wages while "controlling" for ability rules out factor (C) (ability differences) as the reason for the athletic participation effects. To correct for such a problem, we adopt a special case of the instrumental-variable technique, namely two-stage least squares.

To implement two-stage least squares, we first must identify a set of instruments, namely exogenous variables that are correlated with athletic participation. One natural variable to adopt is the size of the high school, for this clearly affects the opportunities for an individual to participate in athletics. This variable is available in both the NLSY and the NLS-72. Other exogenous variables that can affect participation in high school athletics are the income of parents, the health of the student, and whether the school attended is a private school. To further control for possible school-resource endowment effects on athletic opportunities (and thus the athletic participation decision), we use library-books-per-student and the faculty-to-student ratio as additional instruments. In addition, for the NLSY data, we have the height and weight of the individual in high school.

Other instruments are drawn from characteristics of the geographical area in which the school is located.[13] These

[13] These instruments come from 1970 county census data merged with the NLS-72 and 1980 county census data merged with the NLSY data set.

variables are the county's mean family income (to proxy for school-resource endowment), the proportion of families headed by women (to account for the potentially different levels of encouragement to pursue athletics received by the male student at home), and mobility measures such as the proportion of families who have lived in the same county for the five years prior to the census, the proportion of families who have lived in the same city for the five years prior to the census, and the proportion of families who have lived in the same house for the five years prior to the census. The mobility measures are to capture the role of school-system attachment on athletic involvement.

Table 5 provides the results of two-stage, least-squares models for both the acquisition of additional education beyond high school and subsequent wages. We continue to find a significant effect of athletic participation on subsequent educational attainment, with the link stronger the more intensive the athletic involvement. However, the results do not indicate a role for athletic participation in explaining wage differences. The weight we attach to these findings, however, depends to a large extent in our confidence in obtaining good instruments for athletic participation.

D. *Other Evidence of the Effect of Athletic Participation on Compensation Method*

We now consider the link between athletic participation and the method of compensation. If athletic participation's effect on wages arises due to its role as a signal for underlying differences in ability (factor (C)) or in the value of leisure (factor (D)), then athletic participation should also affect the type of compensation package that individuals seek. In particular, individuals who have high ability or a low value of leisure will have a preference for compensation packages that directly link pay to performance.

In 1990, the NLSY included a set of questions regarding whether earnings are based on job performance (piece rate, commissions, bonuses, and/or tips).[14] Approximately 30% of the individuals identified their compensation as based on job performance. As table 6 indicates, one of the few variables that explains whether compensation is based on job performance is whether an individual had participated in athletics. Those that had were more likely to have matched with positions in which direct measures of performance were important in determining wages. This offers further support for both factor (C) and (D) as explanations for the correlation between athletic participation and subsequent educational attainment and wages.

TABLE 6.—THE EFFECT OF ATHLETIC INVOLVEMENT IN HIGH SCHOOL ON LIKELIHOOD OF HOLDING PERFORMANCE-LINKED COMPENSATION FOR EMPLOYMENT* (PROBIT MODEL)

	NLSY			
Independent Variable	(1) Coefficient	(2) Coefficient	(3) Coefficient	(4) Coefficient
Individual active participant in athletics	0.276 (2.93)	0.293 (2.81)	0.304 (2.88)	0.285 (2.68)
Individual athletic involvement is intensive		−0.047 (0.37)	−0.038 (0.31)	−0.070 (0.55)
Individual is African-American	−0.190 (1.60)	−0.191 (1.61)	−0.234 (1.75)	−0.252 (1.83)
Individual is Other	−0.255 (0.85)	−0.255 (0.85)	−0.269 (0.89)	−0.275 (0.90)
Individual resided in central city	0.109 (1.15)	0.111 (1.17)	0.113 (1.20)	0.096 (1.01)
Log of age of individual*	−0.290 (0.35)	−0.295 (0.36)	−0.288 (0.35)	−0.388 (0.46)
Log of tenure at current job*	0.102 (1.56)	0.101 (1.54)	0.101 (1.54)	0.120 (1.82)
Log of cognitive ability test			−0.052 (0.71)	−0.082 (0.96)
Log of high school rank (percentile)				0.093 (1.74)
Log of number of years of education completed beyond high school*				0.160 (2.15)
Constant	0.070 (0.03)	0.091 (0.03)	0.269 (0.10)	0.380 (0.13)
Number of observations	858	858	858	858
LR χ^2	14.12	14.26	14.76	20.83

* 1990 NLSY.
Absolute value of *t*-statistic in parenthesis.

E. *Athletic Participation as Training*

At this point, our findings provide some support for the view that those who participate in athletics are different in ability and/or value of leisure ("work ethic"), and that these differences are reflected in subsequent higher educational attainment, higher wages for a given level of education, and placement in positions in which wages are more likely to be linked to individual job performance. An alternative approach is to argue that individuals who participate in athletics differ not in their inherent abilities or values of leisure, but in their exposure to the training provided by athletic participation. That is, the correlation between education, wages, and high school athletic participation could reflect a direct contribution of athletic participation to the value of an individual's concurrent and subsequent acquisition of human capital. In the context of the above model, one could interpret this as implying that the parameter k in the human-capital function contained in equation (3) depends directly on athletic participation.

Two items are of note with regard to these census data. First, the NLS-72 does not provide information on the location of private schools, so adjustments had to be made for these missing values in our estimation. Second, the NLSY standard survey does not include county identifiers. (These can be obtained only after completing a Bureau of Labor Statistics nondisclosure affidavit and a standard letter of agreement. Final approval rests with the Commissioner of the BLS.)

[14] Note that this question is from the survey two years prior to the year used for the wage and educational-attainment analysis. Also, the job performance measure does not include the self-employed. This explains the differences in sample sizes between table 6 and earlier tables.

TABLE 7.—THE EFFECT OF ATHLETIC INVOLVEMENT IN HIGH SCHOOL ON LIKELIHOOD OF BECOMING A SUPERVISOR* FOR MEN (PROBIT MODEL)

	NLS-72				NLSY			
Independent Variable	(1) Coefficient	(2) Coefficient	(3) Coefficient	(4) Coefficient	(5) Coefficient	(6) Coefficient	(7) Coefficient	(8) Coefficient
Individual active participant in athletics	0.092	0.041	0.026	0.005	0.123	0.091	0.055	0.024
	(1.68)	(0.70)	(0.45)	(0.08)	(1.38)	(0.91)	(0.55)	(0.24)
Individual athletic involvement is intensive		0.198	0.197	0.175		0.088	0.061	−0.006
		(2.62)	(2.61)	(2.30)		(0.72)	(0.49)	(0.05)
Individual is African-American	−0.028	−0.038	0.038	0.051	−0.352	−0.350	−0.210	−0.314
	(0.21)	(0.29)	(0.28)	(0.38)	(3.14)	(3.13)	(1.67)	(2.42)
Individual is Other	0.057	0.052	0.074	0.097	−0.157	−0.157	−0.109	−0.101
	(0.56)	(0.51)	(0.73)	(0.95)	(0.58)	(0.58)	(0.40)	(0.37)
Individual resided in central city**	0.015	0.018	0.011	0.006	0.113	0.110	0.099	0.058
	(0.27)	(0.32)	(0.20)	(0.11)	(1.26)	(1.22)	(1.09)	(0.64)
Log of age of individual*	−2.015	−2.023	−1.425	−0.836	1.048	1.061	1.014	1.070
	(1.53)	(1.53)	(1.07)	(0.62)	(1.34)	(1.35)	(1.29)	(1.35)
Log of tenure at current job*	0.105	0.108	0.108	0.115	0.245	0.247	0.248	0.263
	(6.39)	(6.51)	(6.53)	(6.85)	(3.89)	(3.92)	(3.92)	(4.11)
Log of cognitive ability test			0.463	0.407			0.179	0.034
			(3.11)	(2.68)			(2.49)	(0.41)
Log of high school rank (percentile)				0.024				−0.029
				(1.17)				(0.57)
Log of number of years of education completed beyond high school				0.141				0.243
				(2.89)				(3.42)
Constant	6.321	6.345	2.605	0.762	−3.999	−4.047	−4.583	−4.293
	(1.49)	(1.49)	(0.59)	(0.17)	(1.51)	(1.53)	(1.73)	(1.61)
Number of observations	2303	2303	2303	2303	834	834	834	834
LR χ^2	44.75	51.62	61.38	69.99	32.20	32.72	38.95	53.51

* 1979 for NLS-72; 1990 for NLSY.
** 1972 for NLS-72; 1979 for NLSY.
Absolute value of z-statistic in parenthesis.

Let us now assume that $\boldsymbol{k}(\boldsymbol{T_a})$, with $\boldsymbol{k}' > 0$. Introducing such a possibility is consistent with the view that, in addition to the ''fun'' or consumption aspect of athletic participation, athletics provides individuals with training, such as the discipline to set goals and meet them and successful methods for interacting with others in team production settings. Doing so introduces a ''training'' effect of athletic participation that will lead to higher wages both directly by increasing worker productivity and indirectly by encouraging the acquisition of additional education if such training is complementary to human-capital acquisition through education.

We consider two ''tests'' for a potential training effect of athletic participation. If athletic participation enhances the human capital in an individual by enhancing an individual's capability to work with others, then one would expect such training to be particularly useful for supervisors. Table 7 estimates a discrete-choice model of the probability of being a supervisor.[15] The results only weakly support this view. For only one sample, the NLS-72, is athletic participation linked to the likelihood of being a supervisor, and this is true only for those who indicated that their participation was intensive, specifically that their athletic participation included being a leader. While it may be that the leadership training gained in athletics leads to supervisory positions, it is also possible that those who are inherent leaders reveal that both on the field and in the work place.

A second test of the potential training effects of athletic participation is to see if athletic participation differs from other extracurricular activities in terms of its effect on wages and educational attainment. This test presumes that individuals of high ability and low value of leisure would be more likely to participate in a variety of extracurricular activities. In such a case, if athletic participation has a greater influence on wages and educational attainment while controlling for the degree of involvement in other extracurricular activities, then that suggests a training element to athletic participation. Table 8 reports the results for both educational attainment and wages. A new variable is included in these regressions indicating the total number of extracurricular activities an individual participated in, including school-sponsored hobby or subject-matter club; student council or government; staff of year books, school newspapers, and magazines; the performing arts, including band, drama, and orchestra; and athletics.

The results reported in table 8 indicate that, controlling for the total level of participation in extracurricular activities, participation in athletics continues to have a significant effect on subsequent educational attainment and wages, with the effect typically being larger the more intensive the

[15] The information on supervision is taken from questions asked during the 1979 NLS-72 survey and the 1990 NLSY survey.

TABLE 8.—THE EFFECT OF ATHLETIC INVOLVEMENT IN HIGH SCHOOL AND OTHER EXTRACURRICULAR ACTIVITIES ON EDUCATIONAL ATTAINMENT AND WEEKLY WAGES FOR MEN

	NLS-72		NLSY	
Independent Variable	Education Beyond High School (log) (1) Coefficient	Weekly Wage (log) (2) Coefficient	Education Beyond High School (log) (3) Coefficient	Weekly Wage (log) (4) Coefficient
Individual active participant in athletics	0.056	0.041	0.006	0.138
	(1.89)	(1.32)	(0.13)	(2.51)
Individual athletic involvement is intensive	0.113	0.070	0.099	0.063
	(3.41)	(1.98)	(1.87)	(1.06)
Number of extracurricular activities individual active participant*	0.083	0.009	0.126	0.018
	(7.17)	(0.70)	(5.53)	(0.69)
Individual is African-American	0.041	−0.268	0.288	−0.210
	(0.74)	(4.45)	(5.46)	(3.32)
Individual is Other	−0.100	−0.024	0.052	−0.094
	(2.29)	(0.50)	(0.45)	(0.74)
Parent level of education, high school	0.225		−0.022	
	(6.06)		(0.42)	
Parent level of education, some college	0.452		0.220	
	(11.21)		(3.33)	
Parent level of education, college degree	0.602		0.356	
	(13.55)		(4.97)	
Parent level of education, graduate degree	0.639		0.428	
	(13.95)		(5.33)	
Individual resided in central city**	0.054	0.091	0.117	0.007
	(1.97)	(3.46)	(3.06)	(0.16)
Log of age of individual		−0.824		0.186
		(1.08)		(0.46)
Log of tenure at current job		−0.423		0.201
		(17.27)		(6.84)
Log of cognitive ability test	0.532	0.105	0.338	0.131
	(8.43)	(1.50)	(10.29)	(3.26)
Log of high school rank (percentile)	−0.093	−0.037	−0.178	−0.020
	(10.76)	(3.95)	(8.74)	(0.83)
Log of number of years of education completed beyond high school		0.118		0.144
		(6.19)		(4.22)
Constant	−1.226	8.905	−0.487	4.735
	(4.86)	(3.35)	(3.22)	(3.38)
Number of observations	3014	2410	1047	891
Adjusted R-squared	0.24	0.17	0.41	0.19

* Activities are school-sponsored hobby or subject-matter clubs such as photography, history; student council or government; staff of year books, school newspapers, magazines; participant in the performing arts, including band, drama, orchestra; and participant in athletics.
** Education: 1972 for NLS-72; 1979 for NLSY.
Wages: 1979 for NLS-72; 1992 for NLSY.
Absolute value of t-statistic in parenthesis.

involvement. This finding supports the idea that athletic participation may not merely reflect underlying differences in individuals in terms of ability or value of leisure, as such differences would presumably be captured by participation in extracurricular activities per se, and not athletics in particular. These findings support the potential for athletic participation to provide training.

IV. Discussion and Concluding Remarks

Our findings cast doubt on at least some characterizations of the athletic participation decision that rely solely on a simple allocation-of-time framework. The time devoted to athletics does not result in the acquisition of less human capital and lower subsequent wages, as would be the case if the only role for athletic participation is as a signal of those who place a high value on the consumption of athletics or have a high discount rate. This does not imply, however, that the wage premium earned by athletes means that athletic participation directly enhances an individual's productivity. Instead, we find some evidence that athletic participation may act as one of several signals of individuals with greater ability or of individuals with a lower value of leisure. In either case, such individuals are more productive independent of their prior participation in athletics.

Alternatively, one could argue that test scores adequately capture ability differences across individuals and/or that our two-stage, least-squares analysis is not entirely successful in identifying exogenous variables that are highly correlated with athletic participation. Further, one could argue that athletic involvement is not an important signal of differences in industriousness. If one accepts such arguments, then this paper has presented evidence supportive of a human-capital enhancement model of athletic participation. Taking this view, the reason we find that former high school athletes fare better in the labor market than their non-athlete counterparts is that athletic involvement enhances productivity. Among

the factors supporting this view is that educational attainment and wages remain directly linked to athletic participation even when controlling for ability. Further, we find that athletic participation contributes to productivity beyond that of other extracurricular activities; wages are higher by between 4.2% (NLS-72) and 14.8% (NLSY) if athletic participation in high school is chosen in place of other extracurricular activities.[16] Finally, we find no evidence of any negative effect of athletics in terms of labor market outcomes or educational attainment.

[16] These figures derive from the results reported in table 8 with regard to overall participation in athletics.

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