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## Article

# Youth sports and the accumulation of human capital

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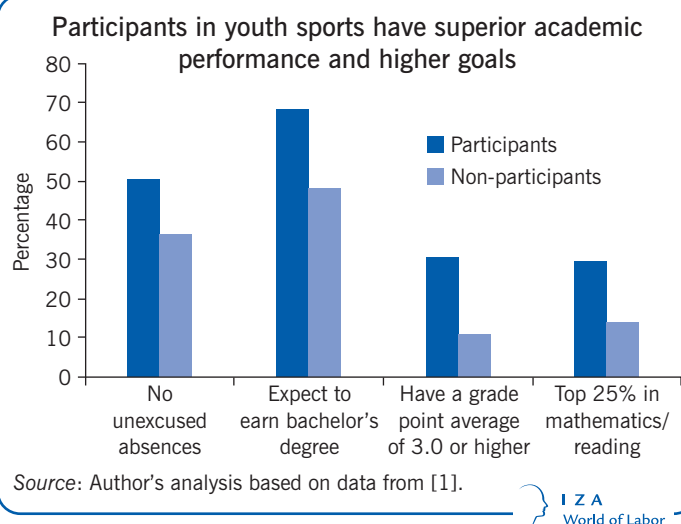
# Youth sports and the accumulation of human capital

## Positive contributions to cognitive and non-cognitive skills justify public support of youth sports

Keywords: sports, human capital, cognitive skills, non-cognitive skills

### ELEVATOR PITCH

In response to declining budgets, many school districts in the US have reduced funding for sports. In Europe, parents may respond to difficult economic times by spending less on sports clubs for their children. Such cuts are unwise if participating in sports is an investment good as well as a consumption good and adds to students' human capital. The value of sports is hard to measure because people who already possess the skills needed to succeed in school and beyond might be more likely to participate in sports. Most studies that account for this endogeneity find that participation in youth sports improves academic and labor market performance.



### KEY FINDINGS

#### Pros

- + Youth sports are an investment good as well as a consumption good.
- + Time spent in youth sports adds to cognitive skills, such as performance on standardized exams in school.
- + Time spent in youth sports adds to non-cognitive skills, such as self-discipline and the ability to work with others, which improve performance in the labor market.
- + Enhanced human capital improves performance in school and in the labor market.
- + Sports form part of a school district's or local government's core mission.

#### Cons

- Youth sports are strictly a consumption good that has no positive impact on performance elsewhere.
- Time spent away from academic studies diminishes students' cognitive skills, which worsens their performance in school.
- Time spent away from academic studies diminishes the accumulation of non-cognitive skills that are valued by employers.
- Participating in youth sports worsens performance in school and the labor market.
- Funding youth sports is a waste of public resources.

### AUTHOR'S MAIN MESSAGE

The economic value of youth sports depends on whether participants do better in school and at work than non-participants. It is hard to test for such impacts because sports could be either a cause or a result of greater cognitive and non-cognitive skills. This endogeneity necessitates sophisticated methods of analysis. Most evidence supports the hypothesis that sports improve cognitive and non-cognitive skills. These findings justify continued support of sports by US school districts. They also suggest that European schools might want to expand their sports programs beyond basic fitness activities or that European governments might want to subsidize private sports clubs.

## MOTIVATION

The recession of 2008–2009 has had a lingering impact on the budgets of school districts in the US. Tight funding has led many districts to cut programs that are not considered essential to their education mission. Sports, along with such extracurricular activities as art and music, have come under particular pressure. School districts justify these cuts by arguing that sports are entertainment, a consumption good that they can no longer afford to provide. Opponents of the cuts claim that these programs augment a variety of skills that enhance student performance and increase the likelihood that students will succeed later in life. The debate thus centers on whether participating in sports increases the participants' human capital—the cognitive and non-cognitive skills needed to succeed in school and beyond.

Aside from basic fitness activities, European schools do not provide the same wide array of sports programs as US schools. To play sports, European students must join private sports clubs, many of which sponsor professional teams in football and other sports. If participation in sports increases human capital, it benefits both the individual and the overall economy. It is then in the public interest to promote sport participation, such as by subsidizing membership or offering increased sports opportunities in school.

At first, the debate over the value of sports programs appears easy to resolve. If, after controlling for demographic factors and socio-economic background, students who participate in sports perform better in school and go on to generate higher earnings in the labor market, then sports programs have a value beyond pure entertainment. If participating in sports does not enhance performance elsewhere, then it is a luxury that schools and governments need not fund. Unfortunately, the question of the value of sports is not so easily answered. Specifically, the estimation is complicated by the fact that participating in sports might be endogenous: sports can be both a cause and a consequence of higher cognitive and non-cognitive skills. Determining the impact of sports on human capital thus depends on correctly accounting for this endogeneity problem. To date, the value of sports has been rigorously studied in only a limited number of countries, mainly the US or Germany, with a smaller number of studies for the UK.

## DISCUSSION OF PROS AND CONS

*Four years of football...breed in the average man more of the ingredients of success in life than almost any academic course he takes. (Knute Rockne, legendary Notre Dame football coach)*

Seldom has Coach Rockne's claim seemed less true than today. US interscholastic and intercollegiate sports appear increasingly to be a diversion from scholarship, a form of entertainment in which those who provide the entertainment are athletes first and students second. Star athletes are ill-prepared for college, and many of them rationally invest in few skills other than those related to sports. In the US, this is true particularly for young black men, who expect little return to investments in traditional skills and therefore choose to invest in sports skills. As a result, the graduation rates of black male athletes lag—often badly—behind those of white male athletes. This gap has led some observers to claim that participating in sports actually impedes the development of skills needed to succeed in life [2].

While intercollegiate sports, particularly (American) football and men's basketball, receive the most attention in the economic literature, they represent a small portion of overall

participation in sports. Only about 6% of high school football players and 3–4% of male and female basketball players compete on varsity teams accredited by the National Collegiate Athletic Association [3]. If participating in sports affects the acquisition of human capital, its impact should be greatest at the primary and secondary school level, where far more students take part in sports. Thus, most of this paper examines the impact of sports on students in elementary school and high school.

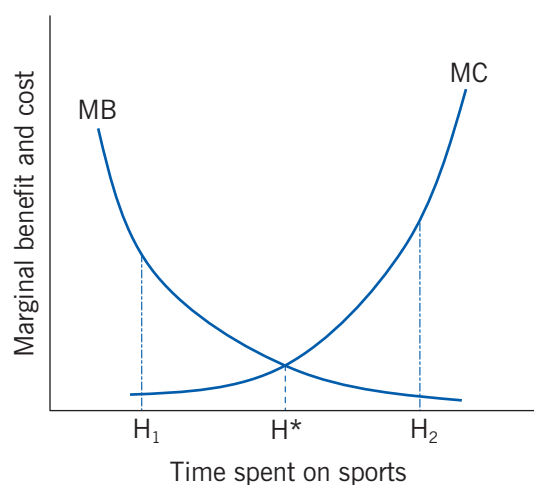
The relationship between sports and academic performance has become more important for policymakers and academic economists in the wake of the 2008–2009 recession. In the US, the pressure on local school budgets led many school districts to reduce or eliminate extracurricular programs, especially those in sports, art, and music, which many do not consider to be part of a school’s “core” offerings. Advocates of these activities claim that the cuts are unwise, as the programs enhance students’ overall education and improve performance in the core academic areas.

### A simple model of participation in sports and human capital accumulation

The debate over the value of sports comes down to whether participation in sports is a consumption good or an investment good. If sports are a consumption good, then time spent on sports has no direct impact on students’ academic performance—or possibly a negative effect if time spent on sports reduces time spent studying, so that academic performance suffers. If sports are an investment good, then time spent on sports improves academic performance.

Consider a simple model of sports as a pure consumption good. Students enjoy time spent playing sports ( $H$ ), but sports have no impact on their future earnings. In contrast, time spent in academic activities brings no inherent happiness (students do not enjoy studying), but it increases lifetime earnings, which adds to their happiness later in life. Assume that students spend all their time in either of these two activities. An additional hour spent on sport brings the benefit of added happiness but comes at the cost of forgone future earnings. Figure 1 illustrates the benefits and costs of an extra (marginal) hour on sports with marginal benefit and marginal cost curves. The marginal benefit curve (MB)

Figure 1. Determining the optimal amount of time to spend on sport



Source: Author's own illustration.

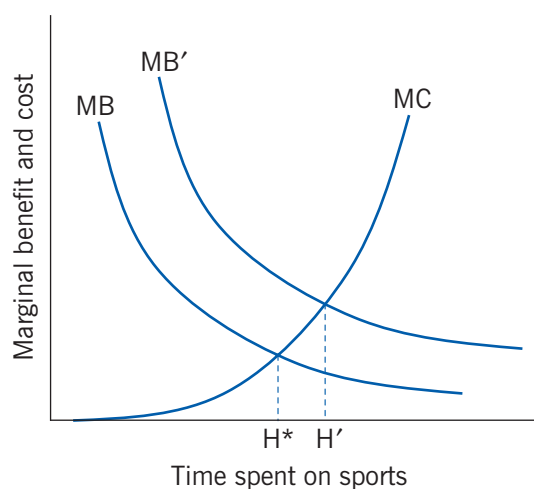
is downward sloping, reflecting the assumption that, although people enjoy sports, each additional hour spent participating in sport brings less added pleasure than the previous hour did, as people eventually become bored doing the same thing. Similarly, the marginal cost curve (MC) is upward-sloping because the impact of lost future income rises as the level of future income falls.

The optimal level of income occurs at  $H^*$ , where the marginal benefit and marginal cost curves meet. At  $H^*$ , the extra happiness of one more hour of sports equals the lost happiness from lower future income. To see why, consider a point like  $H_1$  in Figure 1. At  $H_1$ , the marginal benefit (the added happiness from spending one more hour participating in sports) exceeds the marginal cost (the harm caused by forgone earnings). The student becomes happier by spending more time on sports and less time studying. Precisely the opposite is true at point  $H_2$ , where the cost of another hour participating in sport exceeds the benefit.

Now consider a model in which sport is no longer a pure consumption good. Instead, sport can also add to students' cognitive skills, such as by improving their grades or their performance on standardized tests, and to their non-cognitive skills, such as by improving their self-discipline or their ability to work in teams. If participating in sports increases such human capital, the benefits of an additional hour spent on sports include higher future income as well as current enjoyment. This shifts the marginal benefit curve upward from MB to MB', as shown in Figure 2. As a result of this shift, at  $H^*$  the marginal benefit of an added hour spent on sports is now greater than the marginal cost. The marginal benefit and marginal cost curves now intersect farther to the right, and the optimal amount of time spent on sports shifts from  $H^*$  to  $H'$ .

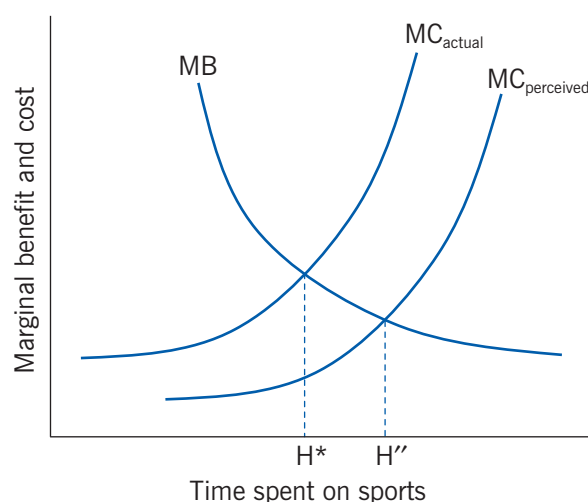
Some researchers are particularly concerned that young black men in the US spend too much time on sports and too little time studying, because the perceived value of studying is very low [2]. Figure 3 shows that if young black men underestimate the value of schoolwork, the perceived marginal cost curve lies below the actual marginal cost curve. This, in turn causes young black men to spend  $H''$  hours participating in sports when they should spend  $H^*$ .

Figure 2. The optimal amount of time spent on sports rises when sports add to human capital



Source: Author's own illustration.

Figure 3. Understating the value of schooling leads people to spend too much time on sports



Source: Author's own illustration.

However, an empirical analysis of time use by high school students finds that young black men who are varsity athletes spend no less time studying than do otherwise identical black men who are not varsity athletes. The same is true for all young women. Only young white men who play basketball and (American) football study less because of their participation in sports [4]. These results suggest that time spent on sports generally comes at the expense of leisure time rather than study time. The results do not, however, establish whether participating in sports enhances learning.

### Estimating the impact of sports participation on human capital accumulation

At first it appears that it would be easy to use these theoretical insights to devise a test of the relationship between sports participation and the skills that promote success in school and the labor market. One could posit a simple linear relationship between a measure of success, such as standardized test scores or hourly earnings, and explanatory variables, such as race, parent education, and socio-economic status, as well as an explanatory variable that captures sports participation. If in estimating such an equation, participation in sports adds to human capital, then the coefficient would be positive and statistically significant. If sports are a consumption good that has no impact on other skills, however, then the coefficient would be statistically insignificant. If sports divert a student's time and energy from investment in other skills, the coefficient could be negative and statistically significant.

The earliest attempt to estimate such an equation examines the impact of playing a varsity intercollegiate sport on the likelihood of graduating from college and on the size of a student's future earnings [5]. It does so by adding to a set of demographic and socio-economic control variables a variable that indicates whether a college graduate played a varsity sport in college. The results suggest that varsity athletes are more likely to graduate from college and to have higher earnings than are other students. However, this simple specification might misstate the relationship between sports participation and human capital. If academically gifted individuals are more likely to participate in sports, then the

causation could run the opposite way or in both directions at once, a problem known as simultaneity bias. (Some researchers believe the problem is one of “self-selection,” in which people who engage in an activity differ in some unobservable way from people who do not, but the implications and the remedies are the same regardless of what label is applied.) Simultaneity bias could lead researchers to mistakenly attribute higher grades or wages to engagement in sports when the higher grades and wages would have occurred regardless of the student’s participation in sport.

In theory, the solution to simultaneity bias is clear: replace sports participation with a variable that is highly correlated with sports participation but is otherwise uncorrelated with the measure of success in school or the labor market—an instrumental variable. Because the instrumental variable is highly correlated with sports participation, the two variables should have a very similar impact on success in school or the labor market. In addition, because the instrument is not otherwise correlated with success in school or the labor market, causation no longer flows in both directions, and simultaneity is not a problem.

While using instrumental variables is easy in theory, it can be difficult in practice to find variables that are correlated with sports participation but not with any measure of success in school or the labor market. The study of how sports affect human capital is thus also a study in the proper use of instrumental variables. Multiple attempts have been made to find an appropriate instrument for participation in sports and to use it to test for the impact of sports on human capital accumulation.

### Using instrumental variables to study the impact of sport

Some economists have posited that the height of an individual at age 16 is a good instrumental variable for participation in sports [6], [7]. They base their claim on a study showing that height at that age is a good predictor of participation in sports [8] and on the assumption that tall teenagers are no smarter or more successful later in life than short teenagers. The results of studies that use height as an instrument for participation in sports are inconclusive. One famous study set in the US finds that participating in high school sports has a highly uneven impact on later success [6]. The impact varies with the measure of success used (attending college, lifetime earnings) and with the demographic subgroup examined. Specifically, participation in sports appears to increase the human capital accumulation of black men and white women but does little for white men and black women. A more recent study set in Germany that also uses height as an instrument for participation in sports finds a uniformly positive impact of sports on a variety of measures of cognitive and non-cognitive skills [7].

One reason for these uneven findings is that height might not be a good instrument for participation in sports. Recent research has shown that height is correlated with cognitive ability and hence with academic and labor market outcomes [9]. If so, then height, too, suffers from simultaneity and is not a valid instrument for participation in sports.

Several studies have used other instruments for participation in sports. For example, the enactment of Title IX in 1972 provides a unique “natural experiment” that allows researchers to create an instrument for sports participation. Title IX extended the 1964 US Civil Rights Act by outlawing discrimination against girls and women participating in “any



educational program or activity receiving federal assistance.” While the scope of Title IX was far wider than school sports, Title IX is best known for its impact on interscholastic and intercollegiate sports. Within six years of Title IX’s implementation, the participation rate of girls in high school sports rose from 3.7% to 25%, though participation varied widely by state.

Because Title IX effectively mandates that girls’ sports opportunities be equivalent to those available to boys, the resulting growth of girls’ participation in interscholastic sports depended on the participation rate of boys prior to the enactment of Title IX. States that had higher participation rates for boys would naturally have higher participation targets for girls and therefore a greater increase in girls’ participation rates after Title IX was implemented. The variation in boys’ participation rates, in turn, stemmed from the size of high schools (bigger schools have lower participation rates), which varied systematically by state. Because boys’ participation in sports prior to Title IX is highly correlated with girls’ participation after Title IX and is not likely to be correlated with the dependent variable (in the study discussed here, measures of high school completion and college attendance and completion), it might make a strong instrument for girls’ participation in sports. An estimation using boys’ participation in sports as an instrument results in a small but statistically significant impact of participation in sports on later schooling [10].

Studies of sports and human capital in Germany often use different instruments, as the nature of participation in sports differs from that in the US. In Germany, all students take gym class, but formal participation in sports takes place in local sports clubs rather than in school. If sports contribute to academic achievement, then sports clubs provide the economy with a more highly-skilled workforce, a benefit that is not fully captured by the greater happiness and higher earnings of the participant. This, in turn, provides a justification for governments to support membership in sports clubs.

Since youth sports activity takes place in sports clubs rather than in schools, many of the instruments used in German studies focus on access to sports clubs. For example, if the likelihood of joining a sports club increases as the ease of access to the club rises, then the distance of a child’s residence from the nearest sports club could be a strong instrument for participating in sports. Unfortunately, the results of these studies seem to depend on the precise dependent variable and instrument chosen. One study uses city size as an instrument for participation under the assumption that larger cities provide more sports clubs, which are then easier to visit. It finds that participation in sports improves academic outcomes, as measured by the quality of the secondary school the student completes. (The best German students attend *gymnasium*, weak students attend *realschule*, still weaker students attend *hauptschule*.) The study also finds that participation in sports increases the likelihood that students receive professional degrees after attending secondary school [7].

Another study using a dummy variable (a variable that takes a value of zero or one to indicate the absence or presence of some categorical effect that may affect the outcome) for the actual distance of a household from the nearest sports center comes to a very different conclusion. This dummy variable indicates whether the family lives within 2.5 kilometers of a sports center as an instrument for regular participation in sports [11]. The study finds no statistically significant effect for this indicator variable either on grades, which reflect cognitive skills, or on behaviors and attitudes, which reflect non-cognitive skills.



## Using panel data to study the impact of sports

Applying instrumental variables to cross-sectional data is not the only way to cope with the endogeneity problem. Several studies use panel data (data sets that follow the same cross-section of individuals over time) to isolate the impact of participation in sports. Because panel data track individuals over time, these studies can identify changes in participation in sports and test whether those changes affect academic achievement. One US study finds that switching from non-participation in interscholastic sports to participation increases standardized test scores in mathematics and science by about two percentage points [12].

A study using German panel data focuses on much younger students than the other studies do [11]. Rather than examine the impact of a high school or college student's participation in sports, it tests the impact of participation in sports in kindergarten and primary school on human capital accumulation. The study focuses on such young children because it starts from the assumption that many skills are implanted early in life, as found in studies of early childhood intervention programs such as the US Head Start learning program for preschool children from low-income families (see, for example, [13]). By this assumption, studies of the impact of sports participation by high school or college students on academic or labor market performance could understate the value of sports because students who do not participate at that stage might still benefit from having accumulated human capital because of earlier participation in sport.

Specifically, the study asks whether participating in a sports club between the ages of three and ten leads to better grades, reflecting greater cognitive skills, and to improved behaviors and attitudes, reflecting greater non-cognitive skills. It defines participation in sports as attending a sports club an average of at least once a week. The estimation shows that regular participation in sports leads to better grades, fewer emotional and peer problems, better overall health, and a stronger sense of well-being [11]. In general, studies using panel data consistently support the hypothesis that participating in sports helps youths build human capital. This finding holds for both cognitive and non-cognitive skills.

## LIMITATIONS AND GAPS

While studies generally support the hypothesis that participating in sports enhances the accumulation of human capital, this finding is not universal. Study conclusions differ for several reasons. First, studies focus on different forms of human capital and different ways of acquiring it. Participation in sports could very well enhance some skills or encourage some behaviors and have no impact on others. It is therefore inappropriate to generalize specific findings and claim that participation in sports always does or does not aid in the accumulation of human capital. Second, the studies use data from a variety of demographic groups. The impact of sports could very well differ by age, gender, or race. Studies that differ for these reasons do not necessarily disagree on the inherent value of sports. They simply point out that its effect could vary across different segments of the population. A meta-study that categorizes how sports affect different forms of human capital for different demographic groups would be of great value in clarifying the impact of sports.

A related problem is the limited number of countries in which studies of the value of sports have taken place. Most of the studies have used data for the US or Germany. A smaller literature reaches similar conclusions for youth in the UK. Only when similar studies use

data for other countries will it be possible to determine whether the conclusions reached here are truly generalizable.

A more basic problem stems from the fact that the disagreement over the role of sports is particularly strong in the studies that use instrumental variables to identify the role of sports. The difficulty here is that it can be very hard to find valid instruments—instruments that are highly correlated with sports participation but are not correlated with the dependent variable under study. Many studies simply assume that they are employing an appropriate instrument and do not apply one of several possible tests for the quality of the instrument (such as the Hausman-Wu test). Studies that employ instrumental variables must do a better job of establishing the validity of the instruments they use.

## SUMMARY AND POLICY ADVICE

With school districts in the US and state and local governments in Germany experiencing continuing fiscal stress, programs that are not viewed as part of their core mission have come under increased scrutiny. Justifying the sustained funding of sports programs depends on whether participation in sports contributes to human capital, specifically to cognitive and non-cognitive skills that improve performance in school or the labor market.

Establishing the impact of sports on school performance and later earnings is complicated. The direction of causality between academic performance and participation in sports is not clear, which means that standard estimation techniques could result in biased estimates. Instead, researchers must use either instrumental variables or panel data. The validity of instrumental variable estimation depends on the validity of the instruments chosen.

Most, but not all, evidence indicates that participating in sports improves school performance and later labor market performance. These results support continuing funding of sport. Perhaps most interesting is the finding that sports improve non-cognitive skills very early in life. If participation in sports at such an early age has a long-term effect on human capital accumulation, then public support of sports is particularly important for young children. This suggests that cutting back on the funding of sports in US schools is short-sighted. These cuts will result in a workforce with weaker cognitive and non-cognitive skills. The existence of a similar link between sports activity and human capital in Germany suggests that the government should consider subsidizing participation in sports clubs.

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## Competing interests

The IZA World of Labor project is committed to the *IZA Guiding Principles of Research Integrity*. The author declares to have observed these principles.

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