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The Effect of Minimum Academic Requirements to Participate in Sports on High School Graduation*

Marian Vidal-Fernández

Abstract

During the 1970s, state interscholastic associations imposed rules requiring student athletes to pass a certain number of subjects in order to be allowed to participate in school sports. Using the NLSY together with a newly collected dataset on the stringency of the rules, I exploit variation in the rules across states to estimate their effects on high school graduation. I find that requiring students to pass one additional course is associated with a two-percentage-point increase in the likelihood of graduation. This result survives a number of robustness checks, including finding no effect for female students who at the time had limited access to interscholastic competitions.

KEYWORDS: minimum academic requirements, high school graduation, sports

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1 Introduction

Since 1970, high school dropout rates have increased steadily in the United States (Heckman and LaFontaine, 2007). In response to this adverse trend, education scholars and policy makers have shown increasing interest in the use of incentive schemes as a way to motivate better academic performance.¹ Most studies evaluating the impacts of these incentive structures find that although girls improve their performance in response to monetary or in-kind rewards, “carrots”, or positive incentives, do not have an impact on boys’ academic performance (e.g. Angrist, Lang, and Oreopoulos 2009, Angrist and Lavy 2009, and Bettinger 2010).

In this paper, I examine how “sticks”, or negative incentives, affect educational outcomes by focusing on the impact of minimum course requirements for participation in high school extracurricular sports.² In the 1970s, interscholastic associations across the country differed in the required number of subjects that students had to pass, i.e., 0, 2, 3, 4 or 5, to participate in interscholastic athletic competitions. By exploiting these cross-state variations in course requirements, I examine whether more stringent rules for athletic eligibility have any impact on high school graduation rates. In my analysis, I focus primarily on male students for two reasons. First, as aforementioned, the contemporary evidence on positive incentives suggests little or no effect on boys’ academic performance, raising the question of whether the same pattern holds for negative incentives. Second, female high school students had relatively limited access to high school athletics until the passage of Title IX in 1972, making them less likely to be affected by any additional requirements to play sports.

In theory, imposing minimum standards for athletes might increase or decrease high school graduation rates. On the one hand, academically marginal students who enjoy sports may be motivated to work harder to remain on the school team. On the other hand, some students may simply give up because the utility cost of the extra academic effort required exceeds the benefits of playing high school sports. If the second effect dominates the first, graduation rates might actually decline when a state adds an additional required course to the minimum

¹ Some examples of the scholarly literature include Angrist, Lang, and Oreopoulos 2009, Angrist and Lavy (2009), Berry (2009), Bettinger (2010), Fryer (2010), and Kremer et al. (2009).

² In a study of Canadian college students, Lindo et al. (2009) find that being placed on academic probation, in which the student must earn a GPA above a campus-set standard in the next term or be suspended from the university for one year, more than doubles the probability that Canadian males drop out of college, but no such discouragement effect is found for female college students. The main difference between their study and mine is that if students do not meet the requirements for participation in athletics, they can still stay in school without playing sports if they so choose.

academic standards, which would be clearly counter to the regulations' intended result.

This paper uses the National Longitudinal Survey of Youth 1979 (NLSY79) together with newly collected data on the stringency of minimum academic standards aimed at student athletes. I show that a one-subject increase in the minimum academic standard (for example, requiring students to pass four instead of three classes in order to participate in sports) is associated with a two-percentage-point increase in the probability of high school graduation for boys. To get a better idea of the magnitude of this effect, suppose that approximately 20% of boys are interested in athletics, and half of those students are academically challenged by the additional course requirement. Then, the implied effect for the affected students is a 10% increase in the likelihood of graduation, which is a plausible (but quite large) magnitude that is consistent with the effects found in Angrist and Lavy (2009) for matriculation awards for girls in Israel. A variety of tests, including the absence of an effect for girls, demonstrate the robustness of this main finding.

The results of this paper speak to two important issues in educational policy. First and foremost, they suggest that, under certain circumstances, imposing tougher academic requirements on male student athletes can have a positive net effect on academic performance. Admittedly, these findings are dependent on the precise nature of the requirements and the activity in question, and they do not imply that negative incentives have a positive influence on boys in general. Second, these findings suggest that minimum academic standards for high school athletes did not contribute to the steady rise in high school dropout rates in the U.S. since the 1970s despite an increase in the internal rate of return for high school graduation (Heckman and LaFontaine, 2007). The rate of return for high school graduation is currently at an all-time high in American history because high school graduation is, except in very few cases, a prerequisite for college attendance and the earnings premium for college graduation has skyrocketed since the 1970s. The findings of this paper indicate that whatever the factors driving the secular trend in dropout rates may be, the imposition of minimum academic requirements for athletics is probably not among them.

2 Conceptual Sports Study Framework

Setting minimum academic requirements to participate in sports can, in theory, have heterogeneous and ambiguous³ effects on student achievement. While the intention of setting minimum academic requirements is to improve the academic

³ See Costrell (1994) and Betts and Costrell (2001) for a model of the effects of minimum GPA requirements on high school graduation.

performance of marginal students who have a strong preference for participating in athletics, a stricter rule could have unintended effects. An athlete on the margin will compare the utility of making an extra academic effort to meet the requirement and stay on the team with the utility of his outside option.

If the latter option is more attractive, he might decide to drop out if sports were the only reason that kept him in school in the first place.

Therefore, the effect of the strictness of the rule on high school graduation depends on whether the intended positive effect outweighs any unintended negative effects.

Because rules for minimum academic performance did not change during the time frame of this study, identification is entirely cross-sectional. Thus, it is hard to isolate the effect of having a stricter rule from other factors that vary at the state level and affect high school graduation rates too. Therefore, it is important to consider additional predictions for particular subgroups of the population to support the results. If such predictions are confirmed, it will be harder to argue that there exist unobserved variables at the state level that bias the results in the same direction as the rule for every subgroup.

The first prediction is that any effect of the rules should be concentrated on students with a strong preference for athletics. To test this, I conduct separate analyses for athletes and non-athletes. Similarly, the rules should not bind for student athletes whose academic performance is strong. To test this second prediction, I include an interaction term between the minimum academic requirement and the Armed Forces Qualification Test (AFQT), a widely used proxy for academic ability. The coefficient on this interaction term is expected to be negative. The third and last prediction is that, because during this time period girls did not have the same athletics opportunities as boys, they were much less likely than boys to participate in athletics. Therefore, we should expect no effect of minimum academic performance standards on girls.

3 Data

3.1 Interscholastic Associations' Rules

Until 1984, no state had enacted legislation limiting participation in extra-curricular activities. These laws are now commonly referred to as “No Pass, No Play” (NPNP) laws. However, most high school interscholastic associations across the country had pre-existing eligibility requirements for high school athletes specifying age, school transfers, and minimum credits passed to be allowed to begin or to continue playing team or individual sports. Schools were required to abide by these rules to participate in interscholastic competitions.

According to with representatives of the interscholastic associations, these rules were strictly enforced. In this paper, I use interscholastic association rules for several reasons.

NPNP laws and interscholastic association rules differ in their scopes and requirements. First, NPNP laws apply to athletic participation and other extracurricular activities, such as drama and school clubs, while rules from interscholastic associations regulate only sports eligibility and, in some cases, cheerleading. Second, after the 1980s, NPNP laws incorporated more complex rules based on minimum GPA and maximum failing grade requirements, making them more difficult to compare across states. Third and most importantly, NPNP laws were accompanied by other education reforms that were introduced during the 1980s. For example, the Texas “Educational Opportunity Act of 1984” included several reforms apart from NPNP that changed pay raises and training for teachers and introduced an exit exam that students were required to pass to earn a high school diploma.⁴ Because many educational reforms were concentrated in the 1980s, we should expect interscholastic association rules in the 1970s to be less correlated with other state-level reforms that may have changed student behavior and performance.

The individuals in my sample started high school in the 1970s, and I use the interscholastic association rules that were in effect at age 14 as they entered high school as a measure of minimum academic requirements for athletes. Data were obtained by contacting all interscholastic athletic associations across the country by e-mail, regular mail, fax, and telephone, and requesting copies of sections of old handbooks that described the eligibility rules.⁵ Out of the fifty states and one district contacted, forty-eight provided the required information: California, Arkansas, and Hawaii stated that they had either lost their handbooks or did not keep any records of historical by-laws.

The relevant rule for each individual is the minimum number of courses pass in order to participate in sports as of the year when individuals reach age 14 and are presumed ready to start high school. Table 1 summarizes the rules by state.

⁴ Other states that also enforced NPNP laws during the 1980s are West Virginia, Georgia, and South Carolina.

⁵ Collected documentation is available from the author by request.

Table 1: Minimum Number of Courses with a Passing Grade Required to Participate in Athletics by State (1970-1979)

Alabama	3	Maine	4	Ohio	3
Alaska	4	Maryland	4	Oklahoma	5
Arizona	4	Massachusetts	4	Oregon	4
Colorado ¹	0	Michigan	4	Pennsylvania	3
Connecticut	3	Minnesota	5	South Carolina	3
Delaware	3	Mississippi	5	South Dakota	3
DC	4	Missouri	2	Rhode Island	3
Florida	4	Montana	3	Tennessee	4
Georgia	3	Nebraska	3	Texas	3
Idaho	3	Nevada	3	Utah	5
Illinois	3	New Hampshire	3	Vermont	0
Indiana	4	New Jersey	3	Virginia	4
Iowa	3	New Mexico	3	Washington ²	3
Kansas	4	New York	0	West Virginia	3
Kentucky	3	North Carolina	3	Wisconsin	3
Louisiana	3	North Dakota	4	Wyoming	3

¹ The minimum requirement changed from 0 to 3 in 1979.

² The minimum requirement changed from 3 to 0 in 1978 and back to 3 in 1979.

Out of the forty-eight states that responded, two never had a minimum academic requirement; one required students to pass two subjects; twenty-five required 15 credits, equivalent to three courses per semester; and thirteen required 20 credits (four courses). Three states required students to pass five courses during the previous grading period. Two states did not exactly fit into any of the categories. One required athletes to pass seven courses per year, which is equivalent to 3.5 subjects per semester, and the other required to pass four courses with an average grade of 70. I included the former state in the four-course requirement group and the latter in the five-course group. Assigning them to lower categories or assigning non-integer requirements between three and four and four and five, respectively, does not modify the results. Finally, two states changed their requirements during the 1970s, in each case only one year in the sample decade being affected: Colorado moved from no requirement to requiring three courses in 1979, while Washington switched from three courses to zero in

1978 and back to three in 1979.⁶ Seven states provided information for some but not all years of interest. Because there were almost no changes among the rest of the states during this period, I assumed that academic requirements were constant in these states throughout the 1970s.

3.2 Athletic Participation

The NLSY79 dataset consists of 12,686 boys and girls who were between 14 and 21 years old at the time of the survey. Subjects were first interviewed in 1979, and periodic surveys of these individuals have been conducted since. The NLSY79 collects extensive background information as well as AFQT scores, education attainment and information on wages. In addition, the NLSYGeocode supplement includes a set of retrospective questions asked in 1979 about the individual's state of residence at age 14. Because all individuals in the sample started high school in the 1970s, I matched them to the corresponding rule in their state of residence when they were 14 years old and entering high school.

Furthermore, a battery of questions about participation in extracurricular activities was asked retrospectively in 1984. Individuals are considered athletes if they stated that they participated in athletics, cheerleading, or pep club.⁷ An additional question gets at the intensity of the activity.

I use a broad definition of athletes in the regressions conditioning on athletic status to test whether athletes are more affected by minimum academic requirements than their counterparts. Note, however, that because the strictness of the rule might affect selection into athletics, the main conclusions are based on regressions using the whole sample. The reason is that requiring a higher number of courses can make academically weaker students ineligible to play. Therefore, the stricter the requirement, the better academic outcomes for athletes (and the worse for non-athletes), regardless of whether the rule has any impact on study effort. Thus, by using a broader definition of athletes, I expect to include in the athletic category some of the academically weaker students who have a preference for sports and might have played only one or a few semesters, but had to drop off the team after not meeting the requirement in the following term. As a result, I expect to get results less tainted by selection in the regressions conditioning on athletic status.⁸

⁶ Exclusion of these two states does not change the main results.

⁷ I cannot differentiate between these categories and the type of sport in which each student was involved.

⁸ Using a more restrictive definition of athletes does not change the main conclusions, but, as expected, it yields a stronger positive coefficient on intensive athletes. Results available upon request.

Before the passage of Title IX, which was a 1972 amendment to the 1964 Civil Rights Act that required schools to provide the same athletic opportunities for girls as for boys by 1979, very few girls participated in high school sports. Because only the youngest girls in the sample may have had equal access to athletics as boys, girls are not included in the main analysis. Instead, I use graduation of girls to check the interpretation of the results. If the correlation between high school graduation and the strictness of the rule is due to omitted variable bias and I find a positive (or negative) effect on boys, I should expect a similar coefficient for girls.

Of the 12,686 individuals in the NLSY sample, 6,283 are girls, 820 have missing information about the minimum academic rules enforced in their states, and 242 did not provide information on their state of residence or were not living in the United States at age 14. Among the 5,341 remaining male respondents, 354 did not take the AFQT, and 1,041 did not provide information on background variables such as parents' education, family income, and whether they lived in an urban area at age 14. This leaves us with a sample of 3,946 boys: 1,768 athletes and 2,178 non-athletes.

3.3 Sample Characteristics

Table 2 shows a summary of the sample characteristics for male athletes, male non-athletes, and the entire sample of boys. Following Neal and Johnson (1996), I use age-standardized AFQT scores with a zero mean and a standard deviation of one. The average AFQT is slightly above zero for the sample. However, part of this difference is driven by the selection of males, as females tended to score slightly worse than boys during the study period.

The overall graduation rate⁹ in the sample is approximately 75%, which is close to the Heckman and LaFontaine (2007) estimate. However, on average, athletes are 15% more likely to graduate than their counterparts. As expected, part of this difference in graduation rates is accompanied by an even greater divergence in AFQT scores between athletes and non-athletes. Hence, in accordance with previous research (Barron et al. 2000, Lechner 2008, Lipscomb

⁹ Following Heckman and LaFontaine (2007), I define a graduate as a student who either completed high school before turning nineteen or passed a General Educational Development (GED) examination and went to college by age nineteen. To construct the graduation variable, I use a set of variables (highest grade completed and type of high school diploma) from subsequent panels to pin down graduation rates for the younger cohorts. For the older cohorts, I use a 1979 item that asks the same questions retrospectively. Given the limitations of the data, I do not know if, for the younger cohorts, the requirements remained constant until their graduation by the early 1980s. Results are robust to restricting the sample to cohorts that were younger than 17 by 1980 and lived in states where the requirements did not change during the 1970s.

2001, and Stevenson 2010), we see that higher-aptitude individuals with better background variables self-select into sports.

To demonstrate that higher ability is also associated with better background variables, athletes' parents' highest grade completed is, on average, more than a year higher than for non-athletes' parents. In addition, athletes had higher total family income in 1979. Blacks are not as underrepresented within the athlete subpopulation as Hispanics, who only make up 3% of athletes. All of the aforementioned differences between athletes and non-athletes are significantly different from zero. However, there does not seem to be a difference in the proportion of individuals living in urban areas between athletes and non-athletes.

The top panel of Table 3 examines these characteristics, broken down by the strictness of the minimum course rules. First, it is important to note that the proportion of athletes and the rule do not follow a clear pattern, hinting that it is unlikely that the rule solely displaces less academically capable athletes. In fact, there are 15% more athletes in states with more requirements than in the states without any rules.

Table 2: Descriptive Statistics: Boys

	Athletes	Non-Athletes	All
High school graduate	0.863 (0.34)	0.651 (0.47)	0.754 (0.43)
AFQT	0.380 (0.94)	-0.208 (1.01)	0.076 (1.02)
Black	0.125 (0.33)	0.149 (0.36)	0.137 (0.34)
Hispanic	0.030 (0.18)	0.059 (0.24)	0.046 (0.21)
Parents' highest grade completed	13.23 (2.89)	11.93 (2.90)	12.56 (2.97)
Total family income in 1979	22,501 (15,342)	18,152 (13,207)	20,258 (14,443)
Living in a metropolitan area at age 14	0.774 (0.42)	0.771 (0.42)	0.770 (0.42)
Number of observations	1,768	2,178	3,946

Weighted means. Standard deviations in parenthesis.

AFQT is age-standardized with 0 mean and standard deviation of 1 prior to weighting

To isolate the impact of the interscholastic academic requirements on graduation rates, I compare similar groups of individuals across states. From Table 3, there seems to be no clear pattern in the relationship between individual

characteristics and the strictness of the rule, but there are some notable differences. States under the strictest requirements (Column 5) have athletes with overall better background characteristics than other groups.¹⁰ For the remaining groups, there seems to be no clear trend across groups facing varying course requirements. For example, students in states requiring that two courses to be passed have lower dropout rates than do students in states requiring that zero or four courses be passed.

Because, athletic eligibility rules might still be related to school quality, the bottom panel of Table 3 depicts state-level controls included in the regressions. Similar to individual characteristics, state-level school quality proxies do not follow a systematic pattern across groups with varying course requirements. For many of the variables, the groups are statistically indistinguishable from each other. Furthermore, states with the lowest course requirement have one of the highest graduation rates, lowest pupil-to-staff ratios, and highest expenditures per pupil. Although it seems unlikely that results are being driven by the relationship between unobserved state-level school quality and rule stringency, controls for time-varying, state-level variables are included in some of the models.

4 Minimum Academic Requirements and High School Graduation

The conceptual framework described earlier in the paper motivates the empirical approach. The number of subjects that an individual passed is not observable. Therefore, I use a latent variable linear probability model. The observed variable is a dummy equal to 1 if the individual earned a high school degree and zero otherwise.

Because I cannot reject the null hypothesis that the effect of the rule enters linearly, the following regressions provide us with a unique average marginal effect that is easier to interpret.¹¹ Standard errors are clustered at the state level.

¹⁰ Excluding each of the groups of states from the regressions does not change the main results.

¹¹ Section 5 discusses alternative specifications.

Table 3: Descriptive Statistics by Rule: Boys

Minimum number of subjects	0	2	3	4	5
High school graduate	0.718 (0.45)	0.800 (0.40)	0.761 (0.43)	0.730 (0.44)	0.860 (0.35)
AFQT	0.159 (1.00)	0.178 (1.08)	0.048 (1.04)	0.046 (1.00)	0.280 (0.94)
Black	0.133 (0.34)	0.156 (0.36)	0.155 (0.36)	0.117 (0.32)	0.068 (0.25)
Hispanic	0.104 (0.30)	0.020 (0.13)	0.045 (0.21)	0.029 (0.17)	0.037 (0.19)
Parents' highest grade completed	12.79 (3.04)	12.40 (3.11)	12.49 (3.01)	12.53 (2.8)	13.05 (3.04)
Total family income in 1979	21, 123 (14,982)	17,641 (10,334)	20,088 (14,478)	20,458 (13,973)	20,363 (16,836)
Living in a metropolitan area at age 14	0.834 (0.37)	0.794 (0.41)	0.765 (0.42)	0.781 (0.41)	0.666 (0.47)
High school graduation rate at age 18	0.801 (0.03)	0.790 (0.40)	0.781 (0.08)	0.747 (0.07)	0.844 (0.10)
Pupils/staff	10.91 (0.56)	11.00 (0.94)	12.21 (1.92)	11.38 (1.13)	11.51 (1.12)
Expenditures per pupil	5,936 (1,204)	3,520 (245)	3,920 (805)	4,173 (895)	3,986 (811)
Real GDP per capita	8,908 (1,845)	7,699 (1,692)	7,690 (1,823)	8,013 (2,683)	7,357 (1,908)
Unemployment rate at age 16	7.48 (1.66)	5.91 (1.23)	6.69 (1.71)	7.61 (2.49)	5.24 (1.08)
Number of observations	455	117	2,147	1,002	225
Proportion of athletes	0.402	0.504	0.468	0.403	0.524

Weighted means. Standard deviations in parentheses.

AFQT is age-standardized with mean 0 and standard deviation of 1 prior to weighting.

Expenditures are in 1996 dollars.

^{1,2,3} NCES (1998) and Warren (2005).

⁴ Bureau of Economic Analysis and Bureau of Labor Statistics.

⁵ Bureau of Labor Statistics and U.S. Department of Labor (1975).

Identification is achieved using cross-state variation in minimum course requirements for athletic eligibility. We should be concerned for the existence of any unobserved state characteristics that are positively correlated with graduation rates and also correlated with rule strictness. If states in which the rules are stricter tend to have higher (lower) graduation rates due to systematic, unobserved characteristics across states, then the reported coefficients would overestimate (underestimate) the effects of the rule. I cannot introduce state controls because only 2 out of 32 states changed their eligibility rules over time, and both did so during only one year. Therefore, identification in regressions with state fixed

effects would be entirely driven by these 2 states. I try to control for state-level unobserved characteristics by including nine regional dummies and state-level time-varying educational quality controls described above.

To test for the three predictions outlined in Section 2, I will analyze the impact of minimum course requirements on graduation rates for the entire male sample, then separately for male athletes, male non-athletes, and girls.

Table 4 presents the estimates of the likelihood of high school graduation for boys using several different specifications. The top panel shows the effect on the entire male sample of both athletes and non-athletes. Overall, an increase of one course in the minimum requirement for athletic participation significantly increases the probability of high school graduation by two percentage points. In all specifications, the signs of the coefficients of the individual controls are as expected, and AFQT is the most powerful explanatory variable. Parents' education and income also contribute to better outcomes, while living in an urban area at age 14 is only slightly associated with worse outcomes. Conditional on AFQT, blacks are more likely to graduate (Lang and Manove, 2006), and the opposite is true for Hispanics.

Addition of further time-varying state-level controls has little effect. Columns (3) and (4) include graduation rate at the state level at age 18,¹² the log expenditure per student, the pupil-to-staff ratio, the log of real GDP per capita, and the unemployment rate at age 16. For these alternative specifications, the coefficient of interest is not significantly different from the values in columns (1) and (2).¹³ According to the first prediction at the end of Section 2, when I split the sample, I should expect to see that the laws are positively associated with graduation rates for athletes, but not for non-athletes if the positive relationship between the minimum course requirement and graduation is being driven by the intended effect. As we can see in the preferred specification in Column (4), the coefficient on rule for athletes is almost four times larger than for non-athletes. Moreover, in all specifications, the coefficient on the rule variable is statistically significant for athletes while not significant for non-athletes.

The estimated coefficients on the interaction term between the rule variable and AFQT score also suggest a real effect of the policy. Consistent with the second prediction, this coefficient is negative and statistically significant for athletes only. The interpretation is that the minimum course rules are only binding for weaker students.

¹² Results do not change when adding lagged graduation rates instead of current ones.

¹³ This is not surprising given that the state-level controls are mostly insignificant. Unfortunately, better proxies for state-level educational policies are not available.

By the end of the 1970s, girls gained equal opportunities to participate in high school athletics in compliance with Title IX of the Education Amendment of 1972. In particular, during the early 1970s, the female high school sports participation rate was less than 5% and increased steadily up to 25% by 1979.¹⁴ Although this might seem like a large increase, boys' participation rates were around 50% throughout the 1970s. Moreover, after coming into effect in 1978, the enforcement of Title IX continued to be empowered by Congress in 1987 and the Supreme Court in 1992, increasing female participation to 35% by the early 1990s.¹⁵ There are no significant gender differences in the proportion of athletes in the sample. However, from the NLSY question, it is not possible to distinguish between athletics and cheerleading and pep squads, where girls tend to be overrepresented. Because cheerleading is not always a competitive sport, some interscholastic associations do not govern it,¹⁶ or if they do, they consider it an activity together with dance, drama, forensics, speech or music.

For all of these reasons, academic requirements for athletic eligibility would have applied much less to girls at the time, and we should expect the effects to be stronger for males than for females. If it is true that states with stricter rules have other unobservable characteristics associated with higher graduation rates, we should expect a positive rule coefficient for girls as well as for boys. Finding no impact of the rule on girls' high school graduation rates provides support for the claim that the positive relationship between the rules and graduation rates is causal rather than a mere spurious correlation.

¹⁴ See Stevenson (2010).

¹⁵ See Stevenson (2007).

¹⁶ In particular, out of the 50 states analyzed, 23 do not govern cheerleading and 4 consider it an activity instead of a sport.

Table 4: Effect of Minimum Academic Requirements on High School Graduation: Boys

High school graduate=1	(1)	(2)	(3)	(4)
		All		
Rule	0.021** (0.008)	0.021** (0.009)	0.020*** (0.007)	0.020*** (0.007)
AFQT	0.181*** (0.010)	0.186*** (0.018)	0.181*** (0.010)	0.188*** (0.018)
AFQT*Rule		-0.002 (0.005)		-0.003 (0.005)
Black	0.122*** (0.029)	0.122*** (0.029)	0.123*** (0.029)	0.123*** (0.028)
Hispanic	-0.013 (0.032)	-0.013 (0.032)	-0.008 (0.033)	-0.007 (0.033)
Parents' highest grade completed	0.013*** (0.003)	0.013*** (0.003)	0.014*** (0.003)	0.014*** (0.003)
Log (total family income in 1979)	0.048*** (0.008)	0.048*** (0.008)	0.048*** (0.008)	0.048*** (0.008)
Living in a metropolitan area at age 14	-0.035* (0.020)	-0.035* (0.019)	-0.030 (0.019)	-0.030 (0.019)
High school graduation rate at age 18			0.217 (0.251)	0.220 (0.252)
Pupils/staff			0.013*** (0.005)	0.013*** (0.005)
Log (expenditures per pupil)			-0.091 (0.067)	-0.091 (0.067)
Log (real GDP per capita)			0.058 (0.082)	0.056 (0.081)
Unemployment rate at age 16			-0.003 (0.005)	-0.003 (0.005)
Number of observations	3,946	3,946	3,946	3,946
R-squared adj.	0.26	0.26	0.26	0.26
		Athletes		
Rule	0.029*** (0.006)	0.033*** (0.007)	0.026*** (0.006)	0.031*** (0.007)
AFQT*Rule		-0.012** (0.006)		-0.013** (0.006)
Number of observations	1,768	1,768	1,768	1,768
R-squared adj.	0.17	0.17	0.17	0.18
		Non Athletes		
Rule	0.014 (0.011)	0.015 (0.011)	0.012 (0.010)	0.007 (0.008)
AFQT*Rule		0.003 (0.004)		0.003 (0.005)
Number of observations	2,178	2,178	2,178	2,178
R-squared adj.	0.27	0.26	0.27	0.26

Weighted linear probability models. Errors clustered at the state level. AFQT is age-standardized with mean 0 and standard deviation of 1 prior to weighting. All include cohort and geographical division dummies. Athletes and non-athletes models have the same controls as the full sample.

Table 5 depicts results for girls. We can see that the rule coefficient for females is never significant and is near zero in all specifications, which supports the hypothesis that the rule is not endogenous to graduation rates and is consistent with the third prediction in Section 2. The coefficients on the control variables have the same signs and similar magnitudes for girls as for boys. Coefficients on the rule do not significantly change across specifications. These results hold when dividing the sample into girls participating in sports, cheerleading or pep clubs and their non-participating counterparts. Admittedly, there is still the possibility that there is some unobserved state characteristic that is positively associated with both the rule and graduation rates and affects boys and girls differently. However, the finding that there is a zero effect of the athletic eligibility rule for girls adds robustness to the main result.

5 Non-linear Specifications

In the models analyzed up to now, the rule enters linearly. I have argued that a unique point estimate is easier to interpret, that I cannot reject the null hypothesis that the effect of the rule enters linearly, and that linearity gives us a few extra degrees of freedom. However, because there is little variation in the requirements, it may be valuable to know whether the incremental effect on high school graduation rates of requiring 4 courses to be passed instead of 3 is larger than that of requiring 2 courses to be passed instead of 0. Moreover, the average effect may be driven by a particular set of states with a given requirement.

In Table 6, we see that when entering the rule categorically, the effect is increasing in the rule strictness for the whole sample. These results support that the main estimates are not driven by any particular group of states.¹⁷ It is important to note that the effect for the individuals under the stricter rule is relatively larger than for their counterparts under less demanding rules.

¹⁷ Because there is only one state with no requirement it has been pooled with the omitted category 2.

**Table 5: Effect of Minimum Academic Requirements on High School Graduation:
Girls**

High school graduate=1	(1)	(2)	(3)	(4)
Rule	0.004 (0.006)	0.004 (0.006)	0.002 (0.006)	0.002 (0.006)
AFQT	0.151*** (0.011)	0.169*** (0.016)	0.151*** (0.011)	0.169*** (0.016)
AFQT x Rule		-0.006 (0.004)		-0.006 (0.004)
Black	0.102*** (0.023)	0.102*** (0.023)	0.101*** (0.023)	0.102*** (0.023)
Hispanic	-0.007 (0.025)	-0.004 (0.026)	-0.002 (0.024)	0.001 (0.025)
Parents' highest grade completed	0.012*** (0.002)	0.012*** (0.003)	0.012*** (0.002)	0.012*** (0.003)
Log (total family income in 1979)	0.050*** (0.008)	0.050*** (0.007)	0.050*** (0.007)	0.050*** (0.007)
Living in a metropolitan area at age 14	-0.026 (0.017)	-0.026 (0.017)	-0.022 (0.017)	-0.022 (0.017)
High school graduation rate at age 18			0.081 (0.197)	0.091 (0.199)
Pupil-to-staff ratio			0.006 (0.004)	0.006 (0.004)
Log (expenditures per pupil)			-0.16*** (0.058)	-0.16** (0.058)
Log (real GDP per capita)			0.053 (0.085)	0.049 (0.084)
Unemployment rate at age 16			0.001 (0.005)	0.001 (0.005)
Number of observations	3,782	3,782	3,782	3,782
R-squared adj.	0.21	0.21	0.21	0.21

Weighted linear probability models. Errors are clustered at the state level.
AFQT is age-standardized with mean 0 and standard deviation of 1.
All models include cohort and geographical division dummies.

**Table 6: Effect of Minimum Academic Requirements on High School Graduation (Boys):
Non-Linear Effect**

High school graduate=1	All	Athletes	Non-Athletes
Rule=3	0.054** (0.026)	0.060*** (0.020)	0.028 (0.039)
Rule=4	0.062** (0.030)	0.110*** (0.023)	0.014 (0.042)
Rule=5	0.101*** (0.030)	0.076** (0.030)	0.126*** (0.041)
AFQT	0.181*** (0.010)	0.118*** (0.014)	0.210*** (0.013)
Black	0.122*** (0.028)	0.071* (0.038)	0.124*** (0.036)
Hispanic	-0.009 (0.033)	0.006 (0.038)	-0.005 (0.036)
Parents' highest grade completed	0.013*** (0.003)	0.011*** (0.003)	0.014*** (0.004)
Log (total family income in 1979)	0.048*** (0.008)	0.036*** (0.010)	0.052*** (0.010)
Living in a metropolitan area at age 14	-0.030 (0.019)	-0.032 (0.024)	-0.025 (0.025)
High school graduation rate at age 18	0.153 (0.265)	0.435* (0.227)	-0.083 (0.341)
Pupils/staff	0.012** (0.005)	0.012*** (0.004)	0.012 (0.008)
Log (expenditures per pupil)	-0.098 (0.075)	-0.060 (0.084)	-0.204** (0.100)
Log (real GDP per capita)	0.052 (0.086)	0.053 (0.141)	0.111 (0.099)
Unemployment rate at age 16	-0.002 (0.005)	-0.006 (0.010)	0.006 (0.006)
Number of observations	3,946	1,768	2,178
R-squared adj.	0.26	0.17	0.27

Weighted linear probability models. Errors clustered at the state level.

AFQT is age-standardized with mean 0 and standard deviation of 1 prior to weighting.

All include cohort and geographical division dummies.

6 Discussion

In this paper, I exploit cross-variation in the minimum academic requirements for athletic participation in high school in the 1970s to assess whether a particular type of negative incentive has any effect on boys' likelihood of high school graduation.

I find that the impact of the rule is positive and significant. This result has two implications. First, minimum academic requirements for sports participation can have a positive impact on high school graduation rates. However, a general interpretation depends on the strictness of the rule; a higher minimum requirement implies a lower likelihood of finding a positive impact on graduation rates. In this paper, states with the strictest rule require students to pass approximately half the subjects of a standard high school semester curriculum. Therefore, the intended effect is greater than the unintended effect.

Nevertheless, the causal interpretation of these results crucially depends on the absence of other state-level characteristics that may be simultaneously increasing the strictness of the eligibility rules and increasing boys' graduation rates. The finding that there seems to be no impact of the rule on the graduation rates of girls and that the effect is stronger for athletes provides evidence against this concern.

Second, although most of the literature finds that boys do not respond to positive incentives (Angrist 2007, Angrist and Lavy, 2009 and Kremer et al. 2009), the results of this paper suggest that negative incentives may be effective in changing boys' behavior.

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