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ARTICLE

Athletic Participation and Academic Achievement of High School Students: A Longitudinal Study of Athletic and Non-Athletic Participants

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ABSTRACT

The majority of extant research studies have established that high school students' athletic participation is positively associated with several educational outcomes, including academic performance. However, the effect of long-term athletic participation on academic performance remains unclear. Using a longitudinal data of 220 students from a high school in eastern Massachusetts of the United States, this study has revealed that athletic participants in this school started with a statistically significant higher GPA than non-participants in the first year of study, and have continued to be higher in the following two years, lag behind significantly, however, in academic achievement growth from their non-participation counterparts. The results of the study call for thoughtful decision-making regarding sports programs and athletic policies, proper guidance and adequate support for athletes and an optimal sport-academic culture in American high schools.

1. Introduction

Athletic participation is an important part of high school students' life in the United Stated and the number of participants has increased for 26 consecutive years. The most recent *High School Athletics Participation Survey*, conducted by the National Federation of State High School Associations (NFHSA), indicated the number of participants of high school sports in 2014-2015 has topped the 7.8 million mark for the first time, an increase of 11,389 from the previous year (NFHSA, 2015).[17] It is a deep belief of the U.S. society that high school sports contribute to the overall education of adolescents, which "support academic achievement, good citizenship and equitable opportunities" (NFHSA, n.d.).[18]

At the same time, U. S. students' academic performance has continued to stand in the middle of the pack in major academic subjects, compared to their international peers. The Program for International Student Assessment (PISA) results, from 2012, revealed that the United States 15-year-old students are ranked 27th in mathematics, 20th in science, and 17th in reading, among the 34 OECD (2012)[19] countries. Conceivably, there is intense and sobering concern in the U.S. society over the mediocrity of U. S. high school students' global competitiveness in academic competencies. Viewing U.S. education as "stagnating," the U. S. Department of Education is advocating educational innovation and reforms, including new, higher academic standards, high-stake assessments, and strong teachers in every classroom initiative and strengthened teacher

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preparation regulation (U.S. Department of Education, n.d.).[26] Exacerbated by the current major reductions in state and local education funding across the country, school districts are forced to identify areas for budget reduction and sports programs, being viewed as having less academic legitimacy, have become an obvious and convenient area to cut. Many public schools are forced to cut athletics budgets significantly, and many sports programs are being eliminated (Up2us, n.d.).[25]

Similarly, the debate over whether athletic participation enhances or impedes academic achievement of high school students has resurfaced. Some educational researchers, practitioners, and policy-makers have started to speculate the nation's sports-saturated culture and the escalating pursuit of sports activities in high school and college settings. In "The Case Against High School Sports," the cover story in the 2013 issue of *The Atlantic Magazine*, Ripley (2013)[20] contrasted the American high schools sports culture and sports spending to that of high performing countries in PISA and wondered " … if Americans transferred our obsessive intensity about high-school sports -- the rankings, the trophies, the ceremonies, the pride -- to high-school academics. We would look not so different from South Korea, or Japan, or any of a handful of Asian countries whose hypercompetitive, pressure-cooker approach to academics in many ways mirrors the American approach to sports" (p. 78).

2. Theoretical Perspectives and Literature Review

Do athletic pursuit and commitment divert adolescents from academic pursuit and success? Does there exist a definite and direct relationship between athletic participation and academic achievement? This topic is not new. Since the 1960s, researchers from varied fields have looked into the connection. A half-century's inquiry into this topic has yielded conflicting results.

There are currently two opposing theoretical perspectives regarding the impact of participation in athletics on academic achievement – that participation diverts attention from academic goals or has a positive effect on academic achievement. In *The Adolescent Society: The Social Life of the Teenager and Its Impact on Education*, one of the earliest works exploring the U.S. high school issues, Coleman (1961)[6] contended that an emphasis on extracurricular activities subverts the academic goals of education. Derived from the work of Coleman (1961),[6] the zero-sum perspective posits that a commitment to academic, social, or athletic pursuits necessitates a reduction in commitment to the other two. Because sports are both athletic and social in nature, participation is said to detract from academics. Some early studies on this topic have revealed results that are in line with the zero-sum perspective. For example, in replicating Coleman's findings, Hauser and Lueptow (1978)[10] examined five high schools in a midwestern city and found that while athletes had higher GPAs when graduating than they did when starting high school, they did not gain as much as non-athletes, which is a relative decline in achievement. Their findings were consistent with the idea that any gains by athletes over non-athletes could be attributed to initial differences between the two (Stevenson, 1975).[24]

In contrast to the zero-sum perspective, the developmental perspective views athletic participation as an essential element to aiding students' overall development, including academic. Much of the rationale behind the developmental perspective is found in the work of Bandura (1995, 1997)[1][2] on self-efficacy and motivation. When students feel good about themselves because of athletic participation, there is a snowball effect, which results in improved academics. Feelings of self-worth affect how much effort individuals are willing to put forth and how they persevere in the face of obstacles or failures (Bandura, 1997).[2] Numerous longitudinal studies have supported the positive effect of athletic participation on high school students' academic achievement (Broh, 2002;[4] Carlson, Scott, Planty, & Thompson, 2005;[5] Eide & Ronan, 2001;[8] Fejgin, 1994;[9] Jordan, 1999,[12] Videon, 2002;[27] Whitley, 1999).[28] In a six-year longitudinal study with a large, nationally representative sample, Marsh and Kleitman (2003)[16] found that athletic participation positively impacted student grades, along with many other positive outcomes including educational and occupational aspirations and attainment. More recently, Bowen and Greene (2012)[3] looked into all public high schools in Ohio and examined the data on schools' sports winning percentages, students' athletic participation rates, graduation rates, and standardized test scores over a five-year period, and found that a high school's level of athletic commitment is positively and significantly related to academic success (i.e., higher test scores, lower dropout rates).

While some studies seemed to confirm Coleman's (1961)[6] findings regarding a negative relationship between athletic participation and academic achievement while many others instead declared that the relationship is positive, still others continue to question both sides. Early in 1964, Lueptow and Kayser (1973)[13] conducted a longitudinal study involving 1750 male seniors in twenty public high schools in a midwestern state and found no significant differences in grades between athletes and non-athletes during the high school years. Some later studies

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also failed to detect any significant correlation between athletic participation and academic achievement, including Crosnoe's (2001)[7] study, in which data were collected over 1987 and 1990 from nine California and Wisconsin schools, and Stencel's (2005)[23] study, involving 507 students from ten high schools in Tennessee.

Fifty years' empirical studies on this subject have revealed mixed results. Clearly, further empirical studies using longitudinal data and looking into the change in academic performance between athletic participants and non-participants are needed for a better understanding of the long-term effect of athletic participation on academic achievement of high school students. The purpose of this study, therefore, is to examine the impact of athletic participation on high school students' academic performance by looking into the GPA data of both athletic participants and non-participants in a three-year span, with an aim to provide additional evidence and contribution to the extant literature on this topic.

3. Methods

The site of this study is a large high school in eastern Massachusetts, with an enrollment of 2,053 students for the 2013–2014 school year. The student body is dominantly white (84.5%), with 31% classified as low income, receiving free or reduced lunch. Each year, just over half of the seniors go on to attend a two or four-year college. The subjects included in this study consist of 110 athletic participants and 110 non-participants for the school years 2010–2011, 2011–2012, and 2012–2013. A subject's participation and non-participation status is based on three years' data. This categorization (i.e., athletic participation or non-participation of at least one sport three years in a row) eliminated a substantial group of students from the study who participated only one or two years. The 110 athletic participants consist of 62 males and 48 females. To match the number and gender composition of athletic participation group, a randomizer program was utilized to select 62 males and 48 females from 192 non-participants three years in a row from the student population.

Early studies in this area claiming a positive relationship between athletics and academics has been criticized for being cross-sectional in nature, as well as not controlling for pre-existing differences (Holland & Andre, 1987).[11] Even with a longitudinal study that looks at achievement over two or three years, factors other than athletics, such as socioeconomic status and parental involvement, could be contributing to the higher achievement of the athletic participant group (Marsh, 1988).[15] In order to address these criticisms and account for preexisting subject characteristics, this study is not concerned primarily with the overall means of the two groups, but rather with the growth, either negative or positive, in student GPA over the three years when students were either participating or not participating in athletics. For any claim of a positive relationship between athletic participation and academic achievement to be made, the GPAs of athletes must increase at a higher rate during the years of participation than those of non-participants at the same school, in the same grades, and with the same gender makeup, during the same time period, and this positive academic performance change must be statistically significant. By concentrating on GPA growth rate, this study has focused on the effects of participation alone. If there are other variables helping students of either sample group, whether they be socioeconomic status, intrinsic motivation, or parental involvement, these students will have a higher starting GPA than those without such advantages, and the purpose of this study is to negate the starting advantage by focusing solely on the growth of GPA over the course of the study.

4. Results and Discussion

4.1 GPA Difference Between Athletic Participants and Non-participants in Each School Year: Cross-sectional Data Analysis

This study first looked into the GPA difference between athletic participants and non-participants for the school years 2010–2011, 2011–2012, and 2012–2013, respectively. Normality and homogeneity were checked against 220 subjects' GPA scores in each year before performing the significance tests. To check the normality of the data set, Kolmogorov-Smirnova and Shapiro-Wilk tests were run for each year utilizing the participant / non-participant grouping in the factor field. As noted in Table 1, the assumption of normality of distribution was met for both the athletic participants and non-participants GPA in 2012 and 2013 (GPA 2012 athletic participants: $D(110) = .059$, $p \geq .05$; GPA 2012 non-participants: $D(110) = .081$, $p \geq .05$; GPA 2013 athletic participants: $D(110) = .067$, $p \geq .05$; GPA 2013 non-participants: $D(110) = .077$, $p \geq .05$;). While the athletic participants GPA in 2011 met the normality assumption ($D(110) = .074$, $p \geq .05$), the non-participants GPA in 2011 was significantly non-normal in distribution ($D(110) = .089$, $p \leq .05$). Therefore, the Mann-Whitney U test was run as the significance test for the 2011 GPA data.

Table 1. Test of Normality - Kolmogorov-Smirnova and Shapiro-Wilk Tests for All Three Study Years Grouped by Participant / Non-Participant Variable

Variable	Kolmogorov-Smirnova			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
GPA 2011 Athletic Participant	.074	110	.182	.980	110	.096

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GPA 2011 Non-participant	.089	110	.032	.975	110	.039
GPA 2012 Athletic Participant	.059	110	.200	.985	110	.238
GPA 2012 Non-participant	.081	110	.072	.986	110	.318
GPA 2013 Athletic Participant	.067	110	.200	.986	110	.288
GPA 2013 Non-participant	.077	110	.111	.987	110	.381

In addition to the normality checking, Levene's test was run to check the homogeneity of variance of the data sets for both athletic participants and non-participants. As listed in Table 2, the assumption of homogeneity of variance was met for all three years' GPA data (GPA 2011: $F = 1.88$, $p \geq .05$; GPA 2012: $F = .350$, $p \geq .05$; GPA 2013: $F = .290$, $p \geq .05$).

Table 2. Test of Homogeneity - Levene's Test: Equal Variances Assumed

Variable	F	Sig.
GPA 2011	1.884	.171
GPA 2012	.350	.554
GPA 2013	.290	.591

A Mann-Whitney U test (for 2011 GPA) and two independent t-tests (for 2012 and 2013 GPAs) were run to identify if any statistically significant difference exists between athletic participants and non-participants in GPA in each of the three academic years. As shown in Tables 3, 4, and 5, for 2011, on average, athletic participants had higher GPAs ($M = 2.88$, $SE = .059$) than non-participants ($M = 2.67$, $SE = .068$). This difference was statistically significant ($U = 5023$, $Z = -2.18$, $p \leq .05$); however, it represented a small-sized effect ($r = -.15$). For 2012 and 2013, athletic participants continued to remain higher GPAs on average than the non-participants (GPA 2012 athletic participants: $M = 2.78$, $SE = .060$; GPA 2012 non-participants: $M = 2.62$, $SE = .064$; GPA 2013 athletic participants: $M = 2.75$, $SE = .057$; GPA 2013 non-participants: $M = 2.69$, $SE = .060$); the group difference, however, was not statistically significant (2012 GPA: $t(218) = 1.79$, $p = \geq .05$.; 2013 GPA: $t(218) = .77$, $p \geq .05$).

Table 3. GPA Summary Statistics for 2011, 2012, and 2013

Variable	N	Mean	St. Deviation	St. Error Mean
GPA 2011 Ath. Participant	110	2.88	.617	.059
GPA 2011 Non-participant	110	2.67	.717	.068
GPA 2012 Ath. Participant	110	2.78	.630	.060
GPA 2012 Non-participant	110	2.62	.676	.064
GPA 2013 Ath. Participant	110	2.75	.601	.057
GPA 2013 Non-participant	110	2.69	.626	.060

Table 4. Mann-Whitney U Test Results for 2011

Test Statistics:	U	Z	Sig.
	5023	-2.18	.030
Variable	N	Mean Rank	Sum of Ranks
GPA 2011 Athletic Participant	110	119.84	13182
GPA 2011 Non-participant	110	101.16	11128

Table 5. Independent Samples t-test Results for 2012, and 2013: Equal Variances Assumed

Variable	t	Sig.	Mean Differ.	St. Error Differ.
GPA 2012	1.79	.075	.157	.088
GPA 2013	.766	.445	.063	.083

As the above group difference test results show, the GPA difference for 2011 was statistically significant, and, even though athletes lost part of their advantage during the second and third years of the study, they still outperformed non-participants. As discussed previously, a number of previous studies have cited this type of data as proof that athletic participants achieve higher academically than non-participants (Marsh, 1988).[15] However, the positive, significant gains by athletes over non-athletes could be attributed to initial differences between the two (Stevenson, 1975),[24] if the potential pre-existing differences were not identified and accounted for. For example, as described by Spreitzer and Pugh (1973),[22] highly motivated and disciplined students are naturally drawn to the competition, achievement, and goal orientation that are inherent in athletics. Are better outcomes due to athletics, or do athletics simply attract more motivated and capable students? Manlove's (2013)[14] mixed-methods study is a great example of the issues in this area. The quantitative data show a positive relationship between athletics and academic performance, while the qualitative data point to other factors affecting academic performance such as emotional support and intrinsic drive. In order to better isolate the effect of athletic participation, this study's main focus is on the change in GPA from year one to year three, what has been referred to as the growth rate. If athletic participation results in higher academic achievement, the GPAs of athletes should grow at a statistically significant higher rate than that of non-participants.

4.2 GPA Change Over A Three-Year Span: Longitudinal Data Analysis

To determine the change for the GPAs of the two groups over three years of the study, a growth rate formula was used to calculate the GPA change. As shown in the following equations, during the years of participation, the change in GPA for athletic participants was negative two percent. For non-participants, the growth rate was zero, meaning that there was no change in average GPA over the three years of the study.

Athletic participants group's growth rate = $(2.75/2.88)^{1/3} - 1 = (.95)^{1/3} - 1 = .98 - 1 = - .02$; As a percentage = -2%

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Non-participants group's growth rate = $(2.69/2.67)^{1/3}$ - 1 = $(1.01)^{1/3}$ - 1 = 1 – 1 = 0; As a percentage = 0%

To determine if there is a statistical significant difference between athletic participants and non-participants in their academic performance change, an additional variable ("academic performance change") was calculated by applying the growth rate formula utilized above (i.e., growth rate = (present/ past) $^{1/n}$ -1) to each of the 220 subjects in the two sample groups. Since the normality assumption was not met in the "academic performance change" data set (see Table 6 below for details), the Mann-Whitney U test was utilized to check for the significance.

Table 6. Kolmogorov-Smirnova & Shapiro-Wilk Tests for Acad. Performance Change

Variable	Participation Status	Kolmogorov-Smirnova			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Academic Performance Change	Athletic Participant	.169	110	.000	.892	110	.000
Academic Performance Change	Non-Participant	.171	110	.000	.877	110	.000

As noted below in Table 7, non-participants had a higher mean rank and summary of ranks (athletic participants' mean rank of 99.30 vs. non-athletic participants' mean rank of 121.70; athletic participants' sum of ranks of 10922.50 vs. non-athletic participants' sum of ranks of 13387.50), and this difference was statistically significant (U = 4817.50, Z = -2.62, $p \leq .05$), with a small effect size (r = .20).

Table 7. Mann-Whitney U Results for Academic Performance Change

Test Statistics:	U	Z	Sig.
	4817.50	-2.62	.009

Variable	Participation Status	N	Mean Rank	Sum of Ranks
Academic Performance Change	Athletic Participant	110	99.30	10922.50
Academic Performance Change	Non-Participant	110	121.70	13387.50

While in year one of the study athletes had a statistically significant higher GPA than non-participants, this advantage could be the result of pre-existing differences between the two groups, and, while athletes continued to have higher GPAs in years two and three, these differences were not statistically significant and in fact the GPAs of the athlete group actually went down. The -2% growth rate for athletes compared to the steady academic performance of non-participants, as well as the statistically significant advantage of non-participants in regards to academic performance change must lead us to question the developmental perspective and take a closer look at the zero-sum perspective proposed over half a century ago (Coleman, 1961).[6] From the view of the developmental perspective, athletic participation leads to increased interest in school, a heightened sense of self-worth, more attention from adults such as teachers and coaches, membership in elite peer groups, a desire to meet eligibility requirements, as well as aspirations to compete in college (Snyder & Spreitzer, 1990).[21] While all of this may still be true, there is no evidence in this study to suggest that any of these factors leads to improved academic performance. Coleman (1961)[6] would definitely interpret "membership in elite peer groups" to mean "popularity" and see this factor as a negative in relation to academic achievement. In fact, if any or all of these advantages result from athletic participation and athletes are still experiencing negative GPA growth, it is possible that the earliest negative theories regarding athletic participation and academic achievement are the ones that are correct.

After analyzing the results of this study, it is apparent that renewed attention should be paid to the zero-sum perspective. Perhaps the athletic and social aspects of high school sports are not leaving enough time or energy for academic pursuits. Whether it be the pressure to win that results in a requirement to be on time for practice every day and leaves little time to make up school work or get extra help, or long bus rides for away games, or the fact that practice and games can leave competitors both physically and mentally exhausted, student-athletes may not have enough time or energy to improve their academic performance. Sport-related concussions also put adolescent athletes at risk for decline in academic achievement due to significant loss of instructional time as a result of the prolonged recovery. While the above possibilities may all be factors that are detrimental to student-athlete academic performance, they are ultimately similar to what Coleman concluded back in 1961, that athletic participation diverts attention from athletic goals.

5. Implications and Future Research

The debate since the 1960s over the relationship between athletic participation and academic achievement of adolescents, accompanied by controversial and inconclusive results, has become an even more relevant and urgent issue at present given the increasing budget constraints in our nation's schools. Many policy makers and education leaders are facing the dilemma of athletic budget cuts. The results of the study, based on the data from a large high school in eastern Massachusetts, have revealed that athletic participants in this high school

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started with a statistically significant higher GPA than non-participants in the first year of study, and have continued to be higher in the following two years, lag behind, however, in academic achievement growth from their non-participation counterparts. While the difference in academic achievement growth is statistically significant ($p<.05$), the effect size (i.e., the practical significance) is small (ES=.20). By considering both the statistical and practical significances, school leaders and stake holders should make prudent and wise decisions regarding the allocation of funding or other decisions related to athletic policy, taking into consideration the measures of benefits of athletic participation to the overall development of adolescents and the intensity of sports programs in the schools. Regular assessment of sports programs and school-home support system should be put in place to ensure that athletes are getting proper and adequate guidance, supervision, and support to achieve the right balance between academics and athletics.

While athletic participation can still be considered an important part of the overall education of students, helping to develop teamwork, leadership, diligence and perseverance, these benefits may not automatically translate to the classroom. Any future arguments for the preservation of the funding of athletic programs should be made based on these factors, as well the recreational benefits of athletics, but not based on a relationship to increased academic performance. Playing sports in high school is a great experience for many students and funding should continue, but not at the expense of other programs that are directly related to academic achievement. Coaches should be encouraged to allow students to be late for practice if receiving extra help or making up academic work, and practice and game schedules should be created with consideration given to the need of students to have time for homework and studying. Activities such as pep rallies for sporting events perhaps should be kept to a minimum if they interfere with the normal academic school schedule. The argument held by many that athletic funding should be cut to avoid budget shortfalls has more credence as a result of this study if the alternatives are laying off teachers or increasing class size.

Future studies should determine if participants differ significantly in academic performance growth based on the rate of participation, be it one sport, two, three, or even more. It is possible that participation rate was an intervening variable to the results of this study but its effects are unknown at this point. If there is any validity to the zero-sum perspective, students who participate in two or more sports for three years might experience negative academic growth while playing just one sport might be the right amount for participation to have a positive impact. A study comparing one-sport participation to two or more would help answer this question.

Another interesting group not analyzed in this study are students who were athletes for a year or two but then ended their participation. It is important to investigate why this occurs and to analyze the academic results for these students. It seemed to the researchers, while gathering sample data for this study, that some students ended participation due to low GPAs that did not meet the minimum requirement to participate, but others were doing well academically. Did they stop participating because they were not good athletes, or did they find, as Coleman (1961)[6] theorized, that the time spent participating was taking away from their academic pursuits? If students who participate in athletics often have pre-existing advantages such as intrinsic motivation, involved parents, and leadership qualities, and if students who have these advantages and then stop participating have higher GPA growth rates than those who continue to participate, then a strong case could be made in support of the zero-sum perspective.

If the preceding recommendations are implemented and the results are the same for both groups as in this study, then the bigger question that needs to be asked is why students, both athletes and non-participants, do not experience growth in their GPAs throughout their high school careers? If, as students grow older, they are accumulating new knowledge and skills, why is their performance static? Are the athletic participants taking harder courses as they get older, resulting in a lack of perceived growth results, or are there other variables involved? Future studies should attempt to determine if additional course rigor is impacting achievement by utilizing a weighted GPA rather than the simple GPA used here. Do teachers grade harder as students get older? It would seem that as students mature, they should become more concerned about the future, whether it be attempting to get into college or preparing for the workplace, and an increase in focus on the future would result in improved academic performance, but this is not the case.

6. Conclusion

In the midst of current tightening of education budget nationwide, school leaders and the whole education community are facing a greater challenge than ever before, in allocating budget and making decisions on the fate of athletic programs. Given the current mediocrity of U.S. students' academic performance in reading, science and mathematics, it is indeed a critical time to reflect on the sport-saturated culture in U.S. educational institutions and its potential diverting effect on students' time and energy

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on academics. However, athletic participation is essential to adolescent growth and development, physically, cognitively, and socially, and it has great potential to contribute to the overall development of adolescents, including the development of positive personal character traits, sportsmanship and citizenship, attributes that will benefit adolescents for the rest of their lives. For some students, athletic participation is a significant factor that motivates them to stay in school, succeed academically, and opens doors to college education. Instead of deep-cuts of athletic budget and eliminating athletic programs in schools, educational leaders and policy makers should consider both the benefits of athletic participation to the overall development of adolescents as well as its potential diverting effect on students' academic performance when proper guidance and adequate support are lacking from school and home. It is imperative that school leaders, involving all stakeholders of the education community, work out specific and well thought-out policies and identify and recommend best practices in athletic participation to create a balanced and optimal sport-academic culture that benefits all students in American schools.

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