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Gendered Fields: Sports and Advanced Course Taking in High School

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Abstract

This study explores the association between sports participation and course taking in high school, specifically comparing subjects with varied gendered legacies—science and foreign language. Analyses of a nationally representative longitudinal sample (*N*=5,447) of U.S. adolescents from the National Longitudinal Study of Adolescent Health and the linked Adolescent Health and Academic Achievement transcript study show that male and female athletes are more likely than non-athletes to take both advanced foreign language and Physics, largely because of their higher academic orientation. However, the association between sports participation and course taking was strongest for girls' Physics coursework, suggesting that sports may provide girls with a unique opportunity to develop the skills and confidence to persevere in the masculine domain of science.

Keywords

Education; Academic achievement; Gender; Sport

Introduction

Understanding the role of gender in the American educational system has been an important component of research and policy discussions for decades. The research has noted gender gaps in core academic subjects, including a lack of female participation and interest in math and science, and an underrepresentation of boys in humanities and language courses (American Association of University Women [AAUW] 1999; Seymour and Hewitt 1997; Xie and Shauman 2003). A common explanation for these current differences is that certain fields have a gendered legacy that creates obstacles for members of the other sex to surmount. Socialization processes expose girls and boys to societal gender stereotypes about gender-appropriate courses to study, and adolescents may avoid certain subjects for fear of being stigmatized or may internalize these stereotypes and lose confidence in their own abilities in non gender-typical areas (Correll 2001, 2004; Sadker and Sadker 1994). An additional explanation for the dearth of girls in science suggests that such courses require characteristics such as independence and competition—skills boys are socialized to have more than girls—and therefore boys elect to take these subjects more often than girls do (Eccles et al. 1999; Hanson and Kraus 1998).

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Science is a highly valued and highly salaried field, and women's absence from this discipline has consequences for their economic opportunity. This concern has led researchers to evaluate how participation in non-academic activities that are also traditionally male-dominated can help girls' academic pursuits in science. One of the most prominent of these activities is sports. Sports are potentially important because participation may impart the skills, self-confidence, and ability to resist traditional gender roles needed for girls to succeed in historically masculine academic fields (Hanson and Kraus 1998; 2003; Seymour and Hewitt 1997). This research explores this by addressing how the association between athletic participation and high school course taking differs for adolescent boys and girls in academic subjects with varying gendered legacies—science and foreign language. This study builds on research linking sports, gender, and educational success, but also ties broadly to the literature on the ways that gender roles are reinforced or challenged.

Using data from the National Longitudinal Study of Adolescent Health and the linked Adolescent Health and Academic Achievement study, we examine whether participating in a school sport predicts advanced course taking in science and foreign language during high school for both boys and girls. We focus specifically on advanced courses because they are not required of all students and because they lay the foundation for later educational and occupational trajectories (Schneider et al. 1998). Contrasting science with foreign language provides an opportunity to address whether there are overall benefits of sports participation for advanced course taking versus effects specific to girls' course taking in the masculine domain. We also examine potential mechanisms for the effect of sports on advanced coursework, and explore whether the academic consequences of sports are similar for high school students from different racial/ethnic backgrounds.

Sports Participation and Academic Success

A great deal of social science research has documented at least minimal positive educational and occupational outcomes for adolescents who participate in sports (Barron et al. 2000; Coleman 1961; Glanville et al. 2008; Otto and Alwin 1977; Picou et al. 1985; Videon 2002). Most frequently noted is that athletes have higher educational attainment (Barber et al. 2001; Coleman 1961; Marsh 1993; McNeal 1995; Otto and Alwin 1977; Sabo et al. 1993). Furthermore, athletes have better academic performance in high school, such as improved grades and coursework selection (Broh 2002; Crosnoe 2002; Eccles and Barber 1999; Marsh 1993; Marsh and Kleitman 2003).

Sports may contribute to academic achievement in several ways. First, the emphasis on success and hard work may increase students' desire to succeed in school and thus may enhance an academic orientation (Dworkin et al. 2003; Glanville et al. 2008; Hanson and Kraus 1998). Rules about "no pass, no play" may further motivate school athletes to do well in their courses. In addition, involvement in sports and other extracurricular activities may integrate students into their schools, providing a greater sense of belonging and increasing visibility and status among other students and teachers (Broh 2002; Coleman 1961; Feldman and Matjasko 2005; Rees et al. 1990). Student athletes may therefore feel more attached to their schools and teachers and more engaged in their classrooms, all of which can contribute to educational success (Crosnoe et al. 2004; Finn 1989). Finally, participation and achievement in sports may promote self-confidence and well-being (Daniels and Leaper 2006; Gore et al. 2001; Marsh 1993; Tracy and Erkut 2002). Sports may thus encourage students to persevere in advanced courses by integrating them into their schools and instilling the drive and confidence to succeed.

Of course, adolescents who opt to participate in sports, or who are selected to be members of an athletic team, may already possess characteristics and resources that contribute to academic success (Eide and Ronan 2001; Eitle 2005; Feldman and Matjasko 2005; Videon 2002). For example, students from more privileged class backgrounds are more likely to participate in sports (Melnick et al. 1988; McNeal 1988; Videon 2002), and they typically have higher levels of academic achievement (Entwisle et al. 1997; Lareau 2002). Furthermore, students who are engaged in the school may be more drawn to participate in school-sponsored activities like sports, and trying out and playing on a high school athletic team may require a certain level of personal resources, such as self-confidence and a drive for success. However, participation itself is likely to enhance existing personal resources and contribute to continued or improved academic performance (Videon 2002).

Though these benefits of sport may well apply to all adolescents, we have some reason to expect that sports participation may not have the same salutary effects for all students (Miller et al. 2005). Researchers have generally found that the positive effects of sports on academic outcomes are strongest for White adolescents (Eitle 2005; Hanson and Kraus 1998, 2003; Sabo et al. 1993). This difference may be due in part to differential access to sports as well as divergent educational opportunities and contexts for adolescents of different racial/ethnic backgrounds (Hanushek and Rivkin 2006; Weiler 1998; Weis 1988). African American students in particular may be steered toward sports, perhaps in lieu of academic pursuits (Harris 1994; Harrison et al. 2004). African American and Latino/a boys and girls may be encouraged to pick one domain to focus their energies, and may thus experience conflict between sports and educational success. However, gender and race may interact and lead to different effects of sports on academic outcomes (Eide and Ronan 2001), and it is important to consider how these race differences may differ for girls and boys.

Gender, Sports, and Course Taking

Gender has been an important component to much of the sports and education research, in part because of gender gaps in both sports participation and some academic outcomes. Girls express less interest and confidence in math and science (Catsambis 1994; Correll 2001; Sadker and Sadker 1994), take fewer advanced science courses, particularly Physics, in high school (AAUW 1999; Riegle-Crumb et al. 2006; Xie and Shauman 2003), and are less likely to pursue college degrees in math- and science-related fields (Jacobs 1996; Seymour and Hewitt 1997; Xie and Shauman 2003). Researchers have thus been particularly interested in the positive effects of sports on girls' achievement in masculine subjects such as science, suggesting that sports participation helps girls resist conventional gender scripts (Hanson and Kraus 1998, 2003; Seymour and Hewitt 1997). Within a cultural resource theoretical framework, it could be argued that girls translate the resources provided by sports into other arenas of their lives (Miller et al. 1998). Few other activities provide girls the opportunity to learn traditionally masculine values such as competition, an emphasis on achievement, assertiveness, and independence—qualities needed to succeed in science classrooms (Hanson 1996; Sadker and Sadker 1994). Furthermore, participation and success in one male-dominated domain may give girls the confidence to undertake another, and it may expand the set of activities girls perceive to be appropriate for their involvement.

The intertwining of race and gender complicates the connection between sports and science for minority women, particularly as stereotypes about race are in part contingent on gender (Timberlake and Estes 2007). Because concepts of normative femininity and gender roles are largely entrenched in "whiteness" (Connell 1987), the explanation that sports help girls by countering traditional gender scripts may be less applicable to women of color. If sports empower girls to overcome the stigma of violating traditional gender norms, this may not apply to young women of color who may not be as stigmatized for participating in masculine activities (Tracy and Erkut 2002). On the other hand, minority girls could face a double stigma because they are already seen as deviating from normative White femininity; therefore, further transgressing gender roles by playing sports could potentially be met with even higher levels of resistance than White girls face. The sanctions these young women face could potentially offset the benefits of sports participation. In short, these gendered patterns of association between sports and science may differ across racial/ethnic groups.

Current Study

Although existing research has contrasted the effects of sports for boys and girls, it has focused either singularly on masculine domains or broadly across global academic outcomes (Crosnoe 2002; Hanson and Kraus 1998; Seymour and Hewitt 1997; Videon 2002). The conclusions from this research are frequently that sports do help girls, both in overall academics and perseverance in masculine subjects. However, without also considering gender differences in traditionally feminine domains, it is difficult to conclude that the academic benefits result from the challenges to traditional femininity that sports theoretically impart. Therefore, in this study we specifically address gender differences in the effect of sports across two subjects, comparing science (a traditionally masculine domain) and foreign language (a traditionally feminine subject). We also explore potential academic, school, and social-psychological characteristics that may help explain this association, and we specifically test for differences in this association by race and ethnicity. Finally, because characteristics of high schools, such as size, sector, location, and resources, may contribute to both athletic and academic opportunities for students, we employ multilevel modeling to account for school characteristics.

Overall, the literature on sports and education leads us to expect that participation in sports is associated with a higher likelihood of taking Physics and advanced foreign language by the end of high school. We propose three potential hypotheses for this association, and describe how each prediction will be tested in this study. The first hypothesis is that sports are associated with better educational outcomes across the board, particularly because it heightens student's academic orientation, connects them to the school, and provides social and psychological resources. We assess this hypothesis by using hierarchical linear modeling (HLM) to predict advanced course taking in each subject with sports participation after accounting for students' background characteristics (e.g. their parent's education level and family structure), their initial course placement, and the types of schools they attend. We then attempt to explain the link between sports and Physics or foreign language coursework by controlling for school integration (e.g. attachment to their teachers and school), social-psychological resources (e.g. perceived intelligence), and academic orientation (e.g. grades and educational expectations). According to this hypothesis, we expect that both girls and boys who participate in sports will be more likely to take both types of courses, and that this association will be largely mediated by academic orientation, school integration, and social-psychological variables.

Second, researchers have noted that sport is a historically masculine activity that contributes to gender socialization, and that participating in sports can help girls pursue other traditionally masculine activities such as science. If this is the case, we expect to find support for a second hypothesis: the effect of sports is strongest for girls' Physics taking. We thus compare estimated effects of sports participation on Physics and advanced foreign language course taking after accounting for students' overall academic performance. If girls who play sports are more likely to take Physics but not advanced foreign language after accounting for their overall academic success, it may be because sports provide them with an alternative to traditional feminine scripts.

The third hypothesis is that, because stigma for gender transgressions may vary by racial/ethnic identity, and because adolescents from disadvantaged racial/ethnic groups may perceive conflict between sport and academic success, we expect that the salutary effects of sports may be weaker or even absent for African American and Latina/o girls and boys. We test this hypothesis by introducing interactions between race/ethnicity and sports participation, and evaluate whether the estimated effect of sports participation differs for students of different racial/ethnic identity.

Method

Data

This study used data from the National Longitudinal Study of Adolescent Health (Add Health) and the linked Adolescent Health and Academic Achievement (AHAA) transcript study. Add Health is a large, nationally representative school-based survey of more than 90,000 7th through 12th grade students in over 130 schools who completed an In-School questionnaire during the 1994–1995 school year. From these schools, a longitudinal sample of 20,745 students completed an in-home interview in 1995 (Wave I) and were followed up in 1996 (Wave II) and 2001 (Wave III). At the Wave III follow-up, respondents were asked to participate in the AHAA study by agreeing to release their high school transcripts, which contain detailed information on course taking and performance during high school (Muller et al. 2007). In addition to containing information about the survey respondents, these transcripts can also be aggregated within schools to characterize the school's academic environment. Combining these data sets provides an excellent opportunity to study the social and academic world of adolescents with a nationally representative sample (Riegle-Crumb et al. 2005).

This study used the In-School and Wave I surveys of Add Health as well as the AHAA academic transcript data. In order to include respondents with information on sports participation and academic outcomes, we restricted our sample to Wave I respondents with valid sampling weights who had at least four years of transcript data (or if the transcript covered fewer than four years, those who graduated). Because all independent variables are measured at the time of the In-School and Wave I survey (1994–1995), we also included only high school students in grades 9–11 during the 1994-1995 school year to ensure at least one year between sports participation and the completion of high school coursework. Finally, to test for differences by race and ethnicity, we eliminated the small number of adolescents who did not identify as non-Latino/a White, Black, Latino/a, or Asian. This leaves us with a final sample of 5,447 students (2,786 girls and 2,661 boys). In some schools, however, no AHAA participants enrolled in Physics or advanced foreign language, and we thus cannot be certain that these courses were offered in those schools. Accordingly, we restricted the analytical sample for each outcome by excluding respondents in such schools (final sample: N=5,400 for Physics; N=5,091 for foreign language).

Measure

Advanced Course Taking—High school courses in foreign language and, to a lesser degree, science are hierarchically organized in sequences in which knowledge gained in one course is necessary to proceed to the next course. Our measures of advanced course taking are dichotomous variables reflecting whether a student received credit for a Physics course and whether a student received credit for three or more years of a particular foreign language by the end of high school. In both subjects, these courses are typically electives beyond state minimums for high school graduation (US Department of Education 2002, 2003).

Sports Participation—Our measure of sports participation combines information from the In-School survey and the high school transcripts. A question on the In-School survey asked students to identify "clubs, organizations, and teams" in which they participated or intended to participate at school during the current academic year. Sports included were: softball/ baseball, basketball, field hockey, football, ice hockey, soccer, swimming, tennis, track and field, volleyball, wrestling, and other sports. In addition, we utilize yearly measures from students' high school transcripts that indicated whether respondents were enrolled in competitive sports, which is an aggregate category including team and individual sports, gymnastics, track and field, and swimming. We combined information from these two sources to create a variable that indicates the student participated in sports during the 1994–1995 academic year (as indicated by the survey and/or the student's transcript). We initially considered constructing a categorical measure of sports participation that considered variation among sports in gendered rates of participation and the gendered legacy of the sport. However, many historically male-dominated sports (soccer, track, field hockey) had relatively equal rates of participation among girls and boys in our sample, and we were also unable to distinguish male and female sports in some sport types (baseball/softball, "other" sports). Consequently, we measured sports participation with a single dichotomous variable that indicated participation in any school sport.

School Integration—We include a number of measures to reflect the level of students' integration into the school institution. *School attachment* was measured using three questions that asked the respondent the extent to which they felt a part of the school, happy to be at their school, and close to people at their school (Cronbach's α=.77). Responses were coded from 1 to 5 (low to high) and were averaged. *Teacher attachment* measured the degree to which a student had trouble getting along with teachers (reverse coded), believed teachers treated students fairly at their school, and felt that teachers cared about them (Cronbach's α=.61). These questions were coded from 1 to 5, with 5 indicating high levels of teacher attachment, and were averaged. *Disengagement from school* was calculated as the average of three questions regarding how often the adolescent had difficulty paying attention in class and getting homework done and how many times he or she had skipped school (Cronbach's α=.59). Responses to the first two questions were coded from 0 (never) to 4 (everyday), and we collapsed responses to the third item into five categories: 0 (never), 1 (1–2 days), 2 (3–5 days), 3 (6–9 days) and 4 (10 or more days). Finally, *extracurricular participation* is a dichotomous variable indicating whether the adolescent reported participating in at least one of the non-athletic clubs, organizations and teams listed in the In-School survey during the 1994–1995 school year (e.g. band, drama club, and yearbook).

Social-Psychological Resources—Sports may contribute to academic achievement and success in advanced coursework by enhancing social-psychological resources, such as confidence. Our first measure of such resources is *perceived intelligence*, which is the level of agreement (1 to 6) to a question about how smart the adolescent thinks he or she is compared to other students. *Self-esteem* is the mean level of agreement to a series of questions about how the adolescent feels about him or herself (e.g. "you have a lot of good qualities," "you have a lot to be proud of", Cronbach's α=.85). Responses are coded 1 to 5 (low to high) and are averaged.

Academic Orientation—We include two measures of academic orientation. *Educational expectations* is the respondent's report on a scale of 1 to 5 to a question from the Wave I in-home interview that asked how likely it is that he or she will attend college. *Grade point average* (GPA) was calculated by averaging all of the grades (which were weighted by the amount of course credit) that appeared on the student's high school transcript for the 1994–1995 school year. This variable is continuous, ranging from 0 (F) to 4 (A).

Controls—To account for differential opportunity to enroll in advanced courses, we controlled for students' initial subject-specific course placement during the first year of high school. Our measure of initial science placement is based on the AHAA constructed measure of science course sequence, which is an ordinal measure of the level of courses ranging from 0 to 6 (go to http://www.prc.utexas.edu/ahaa for more information on constructed variables from the AHAA dataset). In models predicting Physics coursework, we control for students' 9th grade science course placement. In models predicting advanced foreign language coursework, we controlled for whether or not a student was enrolled in any foreign language course in 9th grade.

In addition, all models controlled for student's background characteristics, including racial/ethnic identity, grade level, parent's education, family structure, and cognitive ability. Racial/ethnic identity was constructed from the Wave I self-report of race and ethnicity with the categories of non-Latino/a Black, Latino/a, Asian, and non-Latino/a White as the reference. Grade level is the adolescent's reported grade level at the time of the Wave 1 interview, with 11th grade as the reference category. If self-reported grade level was missing, it was substituted with the average grade level of the courses students took in the 1994–1995 school year, as indicated on their high school transcript. Parent's education serves as a proxy for family socioeconomic status and is the highest level completed by the resident parent, or the higher of the two if education was available for both parents. We collapsed this variable into categories for less than high school, high school, and more than high school as the reference group. Family structure was constructed from student reports of everyone living in the household, and was categorized as single-parent family, stepfamily, other family structure, and two parent biological family as the reference group. We used the student's age-standardized score on the Add Health version of the Peabody Picture Vocabulary Test (PVT) as a proxy for cognitive ability.

Athletic and academic opportunities vary considerably across schools, so we include several school-level variables to account for variation in opportunity and the school environment. We controlled for school size (small, medium, or large), sector (private or public), urbanicity (urban, suburban, or rural), regional location (Northeast, West, Midwest, or South), and parental education. Our school-level measure of parental education was aggregated from the individual-level variable and is the proportion of students in the school whose parents had at least some postsecondary education. We also control for the proportion of students in the school who participated in sports and the school's average 9th grade subject-specific placement. These continuous school-level variables (proportion college-educated parents, proportion of students in sports, mean Year 1 science placement, and proportion in foreign language Year 1) are standardized. Descriptive statistics for all individual- and school-level variables are presented in the Appendix.

Analytical Strategy—We employed multilevel modeling using the HLM software to explore the relationship between sports and advanced course taking (Raudenbush and Bryk 2002). For each of the two outcomes, we ran a series of five logistic regressions separately by gender. The first model examined the relationship between sports and course taking after accounting for initial course placement, background characteristics, and school-level controls. In the next three models, we examined whether the estimated effect of sports was reduced after controlling for school integration measures (Model 2), social-psychological resources (Model 3), and academic orientation (Model 4). In analyses not shown, we confirmed that all of these variables are significantly associated with advanced course taking in both subjects and could thus potentially mediate the relationships between sports and these outcomes. Finally, Model 5 included centered interaction terms between sports participation and racial/ethnic identity to evaluate our third hypothesis: whether the effect of sports varies across groups.

In our regression models, dichotomous variables are uncentered, and all ordinal and continuous variables are grand-mean centered (i.e. individual values are converted into deviations from the sample mean). In addition, all models are weighted at the individual-level to account for differences in the probability of selection. We used mean or modal substitutions for respondents who were missing information on control variables. We ran preliminary models including flags to indicate substitutions, but for parsimony did not include these indicators in final models as they did not substantively alter our results. Before running models separately by gender, we tested for significant differences in results for boys and girls by estimating models (not shown) with the total sample that included an interaction term between gender and sports participation.

Consistent with results from separate models, this interaction term was non-significant with one important exception, which we note below in our discussion of results.

Results

Consistent with previous research on gender differences in course taking patterns (AAUW 1999; Riegle-Crumb et al. 2006; Xie and Shauman 2003), a higher proportion of boys in our sample have earned credit for Physics by the end of high school (30% of boys vs. 23% of girls), but a higher proportion of girls have earned credit in an advanced foreign language course (32% of girls vs. 22% of boys). Despite this gap in Physics, boys and girls in our sample have similar levels of initial science placement (about 2=general/earth science), indicating that the gender gap in science either widens throughout high school or that Physics in particular is seen as a more inappropriate or less desirable course for girls than other types of science courses. The frequency of initial enrollment in foreign language does vary for boys and girls (50% of girls vs. 42% of boys), but the gap is slightly smaller than for advanced course taking. In addition, a larger proportion of boys than girls report participating in a sport (56% vs. 45%).

We first consider differences between athletes and non-athletes in high school course taking and in academic, school, social-psychological, and background characteristics. The results of an overall MANOVA by gender between all individual-level variables and sports participation indicate that there are significant group differences between athletes and non-athletes (for girls, $F(23, 2546)=18.18$, $p<.0001$, and for boys, $F(23, 2451)=17.46$, $p<.0001$). Means and standard deviations on all individual-level variables by gender and sports participation are presented in Table 1, and we tested differences between athletes and non-athletes using t-tests for ordinal or continuous variables and chi-square tests for categorical variables.

As seen in Table 1, among both boys and girls, youth who participate in sports are more likely than non-athletes to take advanced courses in both science and foreign language. Athletes differ from non-athletes on a number of background factors, including racial/ethnic identity, parental education, and family structure, and students who participate in sports are more likely to begin high school ahead of their non-athlete peers in both science and foreign language coursework. Results also indicate that both boys and girls in sports are more integrated in their schools, have higher levels of perceived intelligence and self-esteem, and have stronger academic orientations compared to their peers who do not participate in sports. These factors may thus provide an explanation for the effect of sports on academic achievement.

Physics Course Taking

To test our three hypotheses about the association between sports participation and advanced course taking among boys and girls, we now turn to multilevel analysis. Table 2 presents odds ratios from HLM regressions of Physics course taking on individual- and school-level variables for girls. Consistent with our first hypothesis, results from Models 1–4 suggest that girls who participate in sports are more likely to take Physics, in part because they are more connected to their schools, have greater social-psychological resources, and have higher overall academic orientation. After controlling for initial science placement and background factors in Model 1, girls who participate in sports are more than twice as likely to earn credit for Physics compared to those who do not participate (OR=2.22). As seen in Model 2, this is partly due to female athletes' greater attachment to teachers, engagement in schools, and extracurricular participation, as well as their higher levels of perceived intelligence (Model 3). Academic orientation, GPA in particular, is strongly associated with Physics, and its inclusion reduces the magnitude of the sports coefficient (Model 4). Furthermore, once GPA is included in the model, the school integration measures are reduced in size and are no longer significant. However, as shown in Model 4, girls who participate in sports are still about 71% more likely to take Physics compared to girls who do not participate, even after controlling for background, academic performance, school integration, and social-psychological resources (OR=1.71).

In the final model, we tested our third hypothesis by exploring whether this effect varied by racial/ethnic identity. We found a marginally significant interaction between racial/ethnic identity and sports participation for African American girls and Asian girls (Model 5), and we estimated predicted probabilities in order to interpret these interaction terms. White girls who participate in sports are more likely to take Physics than their same-race peers who do not participate (.14 versus .07), even after accounting for school integration, confidence, and overall academic performance. Among African American girls, however, athletes are no more likely to take Physics than their non-athlete peers (.11 for both groups), and Asian girls in sports have lower odds of taking Physics compared to Asian girls not in sports (.20 versus .23). Though these interaction terms were only marginally significant, these results offer some support for our prediction that White students receive more benefits from sports compared to students from other racial/ethnic backgrounds.

Results for Physics course taking for boys are presented in Table 3. Results are consistent with our first hypothesis: boys who play sports are more likely to take Physics because they are more integrated in their schools (Model 2), have more confidence in their abilities (Model 3), and are more academically oriented (Model 4). After accounting for initial science placement and demographic characteristics in Model 1, boys who participate in sports are about 53% more likely than non-athlete boys to complete Physics (OR=1.53). Yet after controlling for school integration (Model 2), we found no significant differences between athletes and non-athletes. With the inclusion of academic orientation indicators in Model 4, the odds ratio for sports participation is further reduced and remains non-significant. Additionally, the estimated effects of school integration and social-psychological resources on Physics course taking are also reduced in size and significance after controlling for boys' academic orientation.

Importantly, unlike for girls, there is no remaining effect of sports on boys' Physics course taking after accounting for school integration, social-psychological resources, and academic orientation (Model 4). An interaction between gender and sports participation in a pooled model (analyses not shown) indicated that the association between sports and Physics is significantly different for boys and girls. This gives partial support for our second prediction – that sports participation is most strongly associated with Physics course taking for girls. We revisit this hypothesis after considering results for foreign language coursework. Finally, Model 5 tested our third hypothesis by including interaction terms for sports participation and racial/ethnic identity. None of these interaction terms are significantly associated with Physics, suggesting that the effect of sports on boys' Physics course taking does not vary by racial/ethnic identity.

Advanced Foreign Language Course Taking

We next turn to models predicting the impact of sports participation on advanced course taking in foreign language. Table 4 presents results from multilevel analyses of girls' advanced foreign language course taking on individual– and school-level variables. As with Physics, the initial model shows a strong association between sports participation and advanced foreign language, as girls in sports are approximately 61% more likely than non-participants to complete 3 or more years of foreign language coursework (OR=1.61). Results from the next two models indicate that girls in sports may be advantaged because they are more attached to teachers and involved in additional extracurricular activities (Model 2) and because they have higher levels of perceived intelligence and self-esteem (Model 3). Yet as with Physics, the effect of school integration is explained by GPA (Model 4). In sum, girls who play sports are more likely to take advanced foreign language courses because of their overall higher academic orientation.

Once we controlled for overall academic performance (Model 4), the effect of sports on girls' foreign language course taking was reduced to non-significance. This finding is consistent with the second hypothesis, that sports participation has an impact on girls' course taking in "masculine" subjects (Physics and not foreign language) apart from its association with their overall academic success. To test our third hypothesis, we entered interactions between race/ethnicity and sports participation in Model 5. We found a significant interaction between racial/ethnic identity and sports participation for Latina girls. Specifically, calculated probabilities indicate that Latina girls in sports actually have lower odds of taking advanced foreign language compared to Latina girls who do not participate in sports (.10 versus .21, respectively).

The final table (Table 5) displays results from multilevel models predicting advanced foreign language course taking for boys. Controlling for foreign language coursework during the first year of high school, boys who participate in sports are about 72% more likely to take advanced foreign language compared to boys who do not participate in sports (OR=1.72). While this association is explained in part by school connectedness (Model 2), these measures are no longer significant after controlling for overall academic performance (Model 4). Furthermore, after controlling for overall academic performance, sports participation is no longer significantly associated with boys' foreign language course taking. This suggests that, consistent with our first hypothesis, boys who play sports are more likely to take advanced courses across subjects (Physics and foreign language) because they are more academically oriented.

Model 5 assesses differences by race and ethnicity in the association between sports and course taking in foreign language. Interaction terms for racial/ethnic identity suggest a significant difference in the effects of sports participation between White and Asian boys, such that there is an additional positive effect for Asian athletes. For Asian boys, participating in sports increases the likelihood of taking advanced foreign language coursework even after accounting for overall academic achievement (predicted probabilities are .07 for athletes and .02 for non-athletes). Sports participation has no significant remaining effect on the foreign language course taking of White boys after controlling for these factors.

Given our finding that girls in sports enroll in Physics courses at higher rates than their non-athlete peers, even after accounting for their overall academic performance, we considered the extent to which sports participation may reduce the gender gap in Physics course taking. To illustrate, we estimated predicted probabilities of completing Physics by gender and sports participation using results from Model 4. These estimates reflect the probability of completing Physics for athletes and non-athletes holding all other independent variables constant. As shown in Fig. 1, participating in sports increases girls' likelihood of taking Physics, reducing the gender gap in Physics course taking among athletes (.13 for girls versus .18 for boys among athletes compared to .08 for girls versus .16 for boys among non-athletes). On the one hand, girls who play sports may possess certain characteristics (such as the confidence to resist gender stereotypes) that also make them more likely to pursue Physics. On the other hand, this finding may suggest that sports provide a unique benefit for girls' pursuit of Physics, encouraging them to participate in this advanced science course at higher rates.

Discussion

Overall these results are consistent with prior research finding that adolescents who participate in sports have better academic outcomes (Barber et al. 2001; Broh 2002; Coleman 1961; Crosnoe 2002; Eccles and Barber 1999; Marsh 1993; Marsh and Kleitman 2003; McNeal 1995; Otto and Alwin 1977; Sabo et al. 1993). Results from the initial models are consistent with our first hypothesis that both boys and girls who play sports are more likely than their same-sex peers who do not participate to take both Physics and advanced foreign language.

This suggests that sports involvement contributes to academic achievement across subjects for both boys and girls, and is not specific only to the masculine domain. We found that in most cases, this association was largely explained by athletes' higher academic performance. While school connectedness appeared to explain some of athletes' greater likelihood of taking advanced courses, controlling for students' grades reduced many of those school integration variables to non-significance. Feelings of attachment to school and teachers and engagement in the classroom may encourage academic success, and at the same time, succeeding in school may increase a student's sense of belonging in the school. Regardless of the direction of this association, results suggest that much of the positive benefit of sports on course taking is due to the overall higher academic performance of adolescents who play sports. Perhaps playing a sport encourages a competitive orientation or drive for success that promotes achievement in other arenas as well. This would benefit both boys and girls, but for girls, sports may be a unique setting to develop attitudes that emphasize competition and individual achievement. Alternatively, this finding could also reflect selection into sports, such that competitive and ambitious adolescents are motivated both to participate in sports and to excel in the classroom.

Apart from this overall benefit of sports, our findings also bolster research that suggests sports may help girls persevere in masculine academic subjects such as advanced science. Consistent with the second hypothesis, we find the strongest effects of sports for girls' Physics course taking. Even after controlling for school integration and academic orientation, girls in sports continued to be much more likely to complete Physics than girls who do not participate in sports. Furthermore, while social-psychological resources explained some part of the association between sports and Physics course taking for girls, the reduction in the sports coefficient was small. While the socialization theory for gender gaps in education suggests that sports participation can build skills such as self-esteem and confidence, it also argues that sports can provide an alternative to normative female gender roles that helps girls resist traditional feminine scripts. Although we are able to identify some potential social-psychological resources, we do not have any measures of gender ideology available from the Add Health and AHAA data. Therefore, it is possible that the unexplained association between sports and Physics is due to this resistance of gender norms, although this is only speculative at this point. It is also possible (though equally speculative) that girls who resist gendered expectations for their behavior are drawn both to sports and to the sciences.

Finally, our results provide some support for our third hypothesis about differences in the association between sports and course taking by racial/ethnic identity. After accounting for school integration, social-psychological characteristics, and academic performance, Latina girls who participate in sports are actually less likely to complete advanced foreign language coursework. While we speculated that racial/ethnic variation could reflect differences in norms about femininity or perceptions of women of color in sports, we are not confident that this finding is consistent with our hypothesis. Our measure of foreign language coursework includes Spanish courses for native speakers; thus, for Latino/a students, 3 or more years of foreign language coursework may not indicate advanced course taking in the same way as it does for non-Latino/a students. Latina girls who participate in sports may be more integrated into mainstream classrooms and therefore less likely to take Spanish courses for native speakers, and our results may reflect this. However, we also found that sports was more positively associated with Physics course taking among White girls than among African American or Asian girls, though this finding was only marginally significant. Taken together, our results provide some evidence for the idea that sports may not benefit all girls equally. Further research is needed to explain why young women of color may not see the same benefits of participating in sports as White girls do.

The findings from these analyses reflect the complex link between sports and academic outcomes, and raise important questions for future studies. First, considerable variation exists within the realm of sports, including the level of competition, whether athletes compete individually or as a team, an individual's position of leadership within a team, and even the gendered legacy of the sport. According to a 2007–2008 survey conducted by the National Federation of State High School Associations, there is now a great deal of overlap between the most popular sports for girls and boys in high school (National Federation of State High School Associations 2009). Apart from participation rates, recent research also highlights the many positive ways young female athletes navigate the "female/athlete paradox" (Ross and Shinew 2008). However, some sports remain predominantly male or female, and the degree to which these sports integrate students into their schools or provide skills and resources such as independence and self-confidence may vary. In addition, participation in historically male-dominated sports, such as football, basketball, and hockey, may give girls the confidence to pursue other "masculine" fields in a way that participation in swimming or tennis may not. Furthermore, considering the dimension of "jock" identity formation appears to be another fruitful area for understanding how sports influence academics (Barber et al. 2001;Eccles and Barber 1999; Miller et al. 2005). We have considered sports participation as a whole, but future research should consider these types of variation within participation as well.

As noted above, we cannot be certain that our results point to a causal connection between playing sports and taking advanced courses in high school. We include rigorous controls in our models for background characteristics that are associated with both sports participation and academic outcomes (such as social class background), but we cannot completely account for selection into sports. Furthermore, while we do find an effect of sports on advanced coursework after controlling for initial course taking in science and foreign language, it is possible that students with a disposition towards sports are similarly drawn to more challenging coursework. Additionally, because the Add Health data only allow us to measure sports participation at one point in time, we cannot determine when respondents started playing sports, or whether they continued through the end of high school. Persistence in sports throughout high school, not just short-term participation, may be particularly beneficial to educational outcomes. Further research should more specifically address the issues of who participates in sports as well as trajectories of participation (e.g. Fredricks and Eccles 2002).

Finally, though we speculate that sports may be especially important for girls by providing the skills and confidence to resist traditional notions of appropriate activities for girls, research needs to investigate more specifically how gender identity influences sports and academics, as well as how these outcomes act to reshape ideas about gender, including variation by race and ethnicity. This could in part be explored by examining other types of gendered academic subjects, such as engineering and technical fields, as well as by more specifically measuring concepts such as gender identity or beliefs about appropriate gender roles. Overall, this study lends further evidence that sports continue to be an important component of the school institution that is associated with students' academic performance in high school. While this positive association is found among both boys and girls, our results suggest that sports play a particularly important role in girls' perseverance in traditionally masculine academic subjects.

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Appendix

Unweighted Descriptive Statistics for Individual– and School-Level Variables

Individual-Level Variables **(*N*=5,447)**	**Mean**	**SD**
Advanced Course Taking		
Physics	.27	
Foreign Language	.27	
Sports Participation	.52	
Racial/Ethnic Identity		
Non-Latino/a White	.53	
Black	.20	
Latino/a	.18	
Asian	.09	
Grade Level (1994–1995)		
9th Grade	.30	
10th Grade	.35	
11th Grade	.34	
Parent's Education		
Less than High School	.11	
High School	.26	
More than High School	.63	
Family Structure		
Two Biological Parents	.57	
Step Family	.18	
Single Parent	.21	
Other	.04	
Picture Vocabulary Test Score[a]	101.87	(14.09)
Initial Science Placement (Year 1)[b]	1.96	(1.28)
Took Foreign Language Year 1	.46	
School Integration		
School Attachment[c]	3.78	(.83)
Teacher Attachment[c]	3.72	(.72)
Disengagement from School[e]	1.00	(.76)
Other Extracurricular Participation	.50	
Social-Psychological Resources		
Perceived Intelligence[d]	3.94	(1.08)
Self-Esteem[c]	4.05	(.59)
Academic Orientation		
GPA (1994–1995)[e]	2.59	(.88)
Educational Expectations[c]	4.20	(1.10)

***School-Level Variables* (*N*=75)**	**Mean**	**SD**
Mean Year 1 Science Placement	.00	(1.00)
Proportion in Foreign Language Year 1	.00	(1.00)
Proportion of Students in Sports	.00	(1.00)
Proportion College-Educated Parents	.00	(1.00)
School Size		
Small	.16	
Medium	.36	
Large	.48	
Sector		
Public	.88	
Private	.12	
Urbanicity		
Urban	.29	
Suburban	.52	
Rural	.19	
Region		
Northeast	.19	
West	.20	
Midwest	.23	
South	.39	

[a] Range: 14 to 136

[b] Range: 0 to 6

[c] Range: 1 to 5

[d] Range: 1 to 6

[e] Range: 0 to 4

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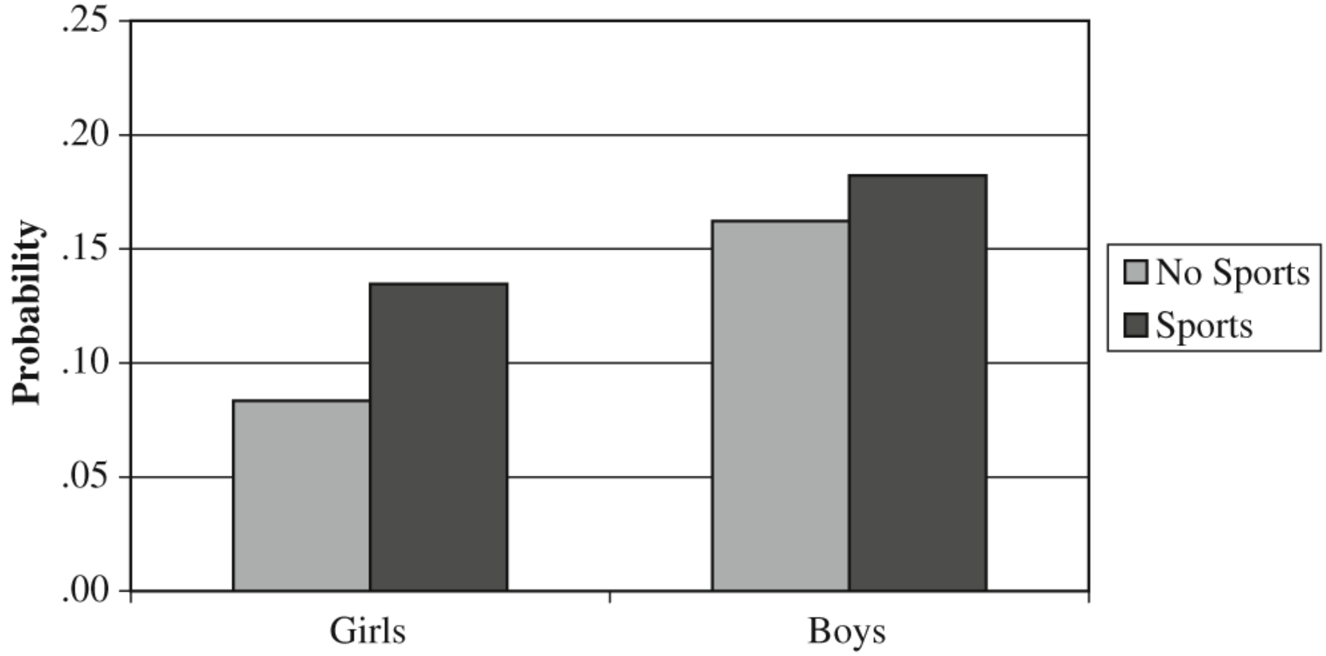

Fig. 1.
Predicted probability of completing physics by gender and sports participation.

Table 1

Weighted descriptive statistics by gender and sports participation

	Girls					Boys				
	Sports			**No Sports**		**Sports**			**No Sports**	
	(*N*=1,283)			**(*N*=1,503)**		**(*N*=1,564)**			**(*N*=1,097)**	
	Mean	**SD**		**Mean**	**SD**	**Mean**	**SD**		**Mean**	**SD**
Dependent Variables										
Advanced Course Taking										
Physics	.31		***	.17		.35		***	.23	
Foreign Language	.40		***	.25		.28		***	.15	
Independent Variables										
Racial/Ethnic Identity										
Non-Latino/a White	.71		***	.62		.69		***	.62	
Black	.16		*	.19		.16			.17	
Latino/a	.09		***	.14		.09		***	.16	
Asian	.04			.05		.06			.05	
Grade Level (1994–1995)										
9th Grade	.35			.34			.34		.35	
10th Grade	.38		*	.34		.33			.32	
11th Grade	.27		**	.32		.33			.34	
Parent's Education										
Less than High School	.07		***	.15		.06		***	.12	
High School	.26			.30		.26		***	.32	
More than High School	.67		***	.55		.69		***	.56	
Family Structure										
Two Biological Parents	.61		**	.55		.63		***	.52	
Step Family	.17			.17		.16			.18	
Single Parent	.19		*	.22		.17		***	.24	
Other	.02		***	.06		.04		***	.06	
Picture Vocabulary Test Score[a]	103.75	12(.78)	***	100.69	13(.35)	104.59	12(.94)	***	102.50	(14.98)

	Girls					Boys				
	Sports			No Sports		Sports			No Sports	
	(*N*=1,283)			(*N*=1,503)		(*N*=1,564)			(*N*=1,097)	
	Mean	**SD**		**Mean**	**SD**	**Mean**	**SD**		**Mean**	**SD**
Initial Science Placement (Year 1)[b]	2.17	1(.12)	*	2.08	1(.10)	2.17	1(.11)	***	1.93	(1.29)
Took Foreign Language Year 1	.53		**	.48		.47		***	.34	
School Integration										
School Attachment[c]	3.87	(.76)	***	3.61	(.92)	3.98	(.76)	***	3.66	(.86)
Teacher Attachment[c]	3.73	(.66)	*	3.67	(.71)	3.75	(.70)	***	3.58	(.84)
Disengagement from School[e]	.95	(.68)		.92	(.73)	1.02	(.70)	***	1.15	(.89)
Other Extracurricular Participation	.75		***	.50		.42		***	.22	
Social-Psychological Resources										
Perceived Intelligence[d]	4.03	1(.01)	***	3.78	1(.05)	4.03	1(.06)	***	3.80	(1.15)
Self-Esteem[c]	3.99	(.56)	***	3.88	(.60)	4.24	(.52)	***	4.11	(.58)
Academic Orientation										
GPA (1994–1995)[e]	2.90	(.75)	***	2.60	(.84)	2.63	(.81)	***	2.27	(.91)
Educational Expectations[c]	4.52	(.84)	***	4.13	1(.15)	4.25	1(.04)	***	3.81	(1.31)

The difference in mean or proportion between athletes and non-athletes was tested using t-tests for ordinal or continuous variables and chi-square tests for categorical variables (two-tailed tests).

[a] Range: 14 to 136

[b] Range: 0 to 6

[c] Range: 1 to 5

[d] Range: 1 to 6

[e] Range: 0 to 4

* $p<.05$

** $p<.01$

*** $p<.001$

Table 2

Odds ratios from multilevel regression of girls' physics course taking on sports participation (*N*=2,768)

	Model 1			Model 2			Model 3			Model 4			Model 5		
Sports Participation	2.22	(.15)	***	2.14	(.17)	***	2.05	(.18)	***	1.71	(.18)	**	1.69	(.18)	**
Racial/Ethnic Identity															
Black	.94	(.24)		.96	(.25)		.81	(.27)		1.10	(.35)		1.08	(.35)	
Latina	.83	(.27)		.80	(.26)		.86	(.28)		.89	(.28)		.93	(.27)	
Asian	3.69	(.34)	***	3.54	(.36)	**	3.86	(.40)	**	2.49	(.41)	*	2.40	(.40)	*
Grade Level (1994–1995)															
9th Grade	1.02	(.21)		1.01	(.21)		1.01	(.21)		.92	(.21)		.91	(.21)	
10th Grade	1.13	(.18)		1.18	(.18)		1.19	(.19)		1.13	(.17)		1.11	(.17)	
Parent's Education															
Less than High School	.84	(.34)		.89	(.31)		.92	(.31)		1.26	(.34)		1.27	(.34)	
High School	.58	(.18)	**	.57	(.19)	**	.66	(.20)	*	.77	(.22)		.78	(.21)	
Family Structure															
Step Family	.74	(.18)	+	.79	(.19)		.76	(.18)		.93	(.19)		.93	(.19)	
Single Parent	.77	(.21)		.81	(.22)		.79	(.23)		1.02	(.24)		1.06	(.25)	
Other	.32	(.42)	**	.40	(.40)	*	.43	(.39)	*	.67	(.41)		.69	(.41)	
Picture Vocabulary Test Score	1.05	(.01)	***	1.04	(.01)	***	1.03	(.01)	***	1.02	(.01)	*	1.02	(.01)	*
Initial Science Placement (Year 1)	1.62	(.13)	***	1.58	(.13)	**	1.58	(.13)	**	1.41	(.12)	**	1.41	(.12)	**
School Integration															
School Attachment				1.02	(.10)		1.04	(.11)		1.02	(.10)		1.01	(.10)	
Teacher Attachment				1.40	(.13)	**	1.30	(.12)	*	1.12	(.12)		1.11	(.12)	
Disengagement from School				.64	(.13)	**	.66	(.13)	**	.91	(.14)		.91	(.14)	
Other Extracurricular Participation				1.69	(.18)	**	1.49	(.18)	*	1.33	(.19)		1.33	(.19)	
Social-Psychological Resources															
Perceived Intelligence							1.55	(.09)	***	1.22	(.09)	*	1.23	(.09)	*
Self-Esteem							1.02	(.15)		1.08	(.16)		1.08	(.16)	
Academic Orientation															
GPA (1994–1995)										4.27	(.18)	***	4.30	(.18)	***
Educational Expectations										1.30	(.12)	*	1.28	(.12)	*
Race/Ethnicity Interactions															

	Model 1			Model 2			Model 3			Model 4			Model 5		
Black*Sports Participation													.50	(.40)	+
Latina*Sports Participation													.64	(.42)	
Asian*Sports Participation													.40	(.54)	+
School-Level Controls															
Mean Year 1 Science Placement	1.32	(.15)	+	1.37	(.15)	*	1.38	(.14)	*	1.45	(.16)	*	1.46	(.16)	*
Proportion of Students in Sports	.76	(.22)		.74	(.24)		.78	(.24)		.74	(.28)		.75	(.29)	
Proportion College-Educated Parents	1.00	(.14)		1.05	(.17)		1.07	(.17)		1.10	(.18)		1.09	(.18)	
School Size															
Small	1.35	(.53)		1.20	(.58)		1.15	(.55)		1.53	(.62)		1.49	(.62)	
Medium	1.09	(.36)		.99	(.38)		.98	(.38)		.99	(.41)		1.01	(.42)	
Private School	1.80	(.49)		1.78	(.50)		1.82	(.48)		1.77	(.54)		1.76	(.55)	
Urbanicity															
Urban	1.09	(.29)		1.00	(.30)		1.01	(.31)		1.14	(.34)		1.15	(.34)	
Rural	1.33	(.34)		1.24	(.37)		1.31	(.37)		1.23	(.46)		1.23	(.47)	
Region															
West	.94	(.35)		.91	(.38)		.88	(.40)		.47	(.42)	+	.49	(.43)	
Midwest	.44	(.33)	*	.45	(.35)	*	.42	(.35)	*	.29	(.38)	**	.30	(.38)	**
South	.53	(.47)		.46	(.51)		.45	(.53)		.30	(.60)	*	.31	(.60)	+
Intercept (β)	−1.61			−1.87			−1.80			−1.85			−1.89		
Log Likelihood	−3945.58			−3864.96			−3849.98			−4062.14			−4092.20		

+ $p<.10$

* $p<.05$

** $p<.01$

*** $p<.001$

Table 3

Odds ratios from multilevel regression of boys' physics course taking on sports participation (*N*=2,632)

	Model 1			Model 2			Model 3			Model 4			Model 5		
Sports Participation	1.53	(.14)	**	1.26	(.16)		1.29	(.16)		1.15	(.16)		1.14	(.16)	
Racial/Ethnic Identity															
Black	1.30	(.27)		1.21	(.27)		1.15	(.27)		1.42	(.28)		1.37	(.31)	
Latino	.83	(.33)		.78	(.34)		.79	(.36)		.86	(.37)		.88	(.37)	
Asian	5.01	(.38)	***	4.28	(.40)	***	4.58	(.42)	***	3.59	(.44)	**	3.35	(.41)	**
Grade Level (1994–1995)															
9th Grade	1.06	(.18)		.98	(.19)		.98	(.19)		.93	(.20)		.93	(.20)	
10th Grade	1.40	(.17)	*	1.42	(.19)	+	1.46	(.18)	*	1.43	(.18)	*	1.43	(.18)	*
Parent's Education															
Less than High School	.55	(.38)		.59	(.38)		.63	(.38)		.64	(.38)		.63	(.39)	
High School	.44	(.19)	***	.44	(.20)	***	.47	(.19)	***	.53	(.20)	**	.53	(.20)	**
Family Structure															
Step Family	.60	(.17)	**	.64	(.17)	*	.65	(.17)	*	.80	(.18)		.79	(.18)	
Single Parent	.49	(.19)	***	.58	(.19)	**	.58	(.20)	**	.64	(.22)	*	.64	(.22)	*
Other	.65	(.34)		.82	(.37)		.75	(.38)		.91	(.41)		.96	(.40)	
Picture Vocabulary Test Score	1.05	(.01)	***	1.04	(.01)	***	1.03	(.01)	***	1.02	(.01)	**	1.02	(.01)	**
Initial Science Placement (Year 1)	2.16	(.13)	***	2.10	(.12)	***	2.04	(.13)	***	1.93	(.14)	***	1.94	(.14)	***
School Integration															
School Attachment				1.06	(.10)		1.11	(.11)		1.12	(.11)		1.12	(.12)	
Teacher Attachment				1.43	(.13)	**	1.40	(.14)	*	1.24	(.14)		1.24	(.14)	
Disengagement from School				.71	(.12)	**	.69	(.12)	**	.87	(.13)		.87	(.13)	
Other Extracurricular Participation				1.88	(.17)	***	1.70	(.18)	**	1.36	(.18)	+	1.34	(.18)	
Social-Psychological Resources															
Perceived Intelligence							1.42	(.07)	***	1.16	(.08)	+	1.16	(.08)	+
Self-Esteem							.74	(.14)	*	.75	(.15)	+	.76	(.15)	+
Academic Orientation															
GPA (1994–1995)										2.68	(.15)	***	2.67	(.15)	***
Educational Expectations										1.16	(.08)	+	1.17	(.08)	+
Race/Ethnicity Interactions															

	Model 1			Model 2			Model 3			Model 4			Model 5		
Black*Sports Participation													1.38	(.56)	
Latino*Sports Participation													.58	(.44)	
Asian*Sports Participation													1.48	(.57)	
School-Level Variables															
Mean Year 1 Science Placement	.89	(.15)		.90	(.15)		.92	(.15)		.95	(.15)		.95	(.15)	
Proportion of Students in Sports	1.11	(.20)		1.08	(.22)		1.06	(.22)		.88	(.23)		.88	(.23)	
Proportion College-Educated Parents	1.19	(.16)		1.21	(.16)		1.23	(.16)		1.30	(.15)	+	1.29	(.15)	+
School Size															
Small	.61	(.54)		.58	(.55)		.55	(.54)		.73	(.55)		.73	(.55)	
Medium	.99	(.26)		1.03	(.29)		.99	(.29)		1.16	(.33)		1.17	(.33)	
Private School	2.23	(.52)		2.01	(.57)		2.18	(.57)		2.91	(.59)	+	2.91	(.59)	+
Urbanicity															
Urban	.73	(.25)		.77	(.27)		.75	(.27)		.83	(.28)		.82	(.28)	
Rural	1.46	(.34)		1.41	(.36)		1.48	(.35)		1.68	(.38)		1.69	(.38)	
Region															
West	.94	(.27)		.92	(.30)		.85	(.31)		.58	(.30)	+	.60	(.30)	+
Midwest	1.11	(.34)		.99	(.37)		.97	(.37)		.82	(.38)		.82	(.38)	
South	.76	(.32)		.65	(.35)		.63	(.36)		.43	(.38)	*	.42	(.37)	*
Intercept (β)	−1.24			−1.33			−1.30			−1.29			−1.28		
Log Likelihood	−3832.38			−3763.98			−3759.68			−3758.74			−3754.99		

+ $p<.10$

* $p<.05$

** $p<.01$

*** $p<.001$

Table 4

Odds ratios from multilevel regression of girls' foreign language course taking on sports participation (*N*=2,588)

	Model 1			Model 2			Model 3			Model 4			Model 5		
Sports Participation	1.61	(.13)	**	1.36	(.14)	*	1.37	(.15)	*	1.19	(.17)		1.16	(.18)	
Racial/Ethnic Identity															
Black	1.13	(.32)		1.20	(.35)		1.10	(.37)		1.38	(.43)		1.35	(.42)	
Latina	1.40	(.24)		1.48	(.25)		1.66	(.25)	*	1.82	(.26)	*	1.65	(.26)	*
Asian	2.30	(.37)	*	2.12	(.40)	+	1.99	(.40)	+	1.38	(.41)		1.48	(.38)	
Grade Level (1994–1995)															
9th Grade	1.03	(.23)		1.09	(.22)		1.09	(.21)		1.09	(.24)		1.10	(.24)	
10th Grade	.89	(.19)		.96	(.19)		.92	(.18)		.88	(.20)		.89	(.20)	
Parent's Education															
Less than High School	.88	(.27)		.86	(.28)		.92	(.28)		1.22	(.28)		1.28	(.28)	
High School	.78	(.20)		.78	(.20)		.95	(.21)		1.07	(.21)		1.07	(.21)	
Family Structure															
Step Family	.69	(.19)	*	.71	(.20)	+	.66	(.22)	+	.76	(.24)		.78	(.24)	
Single Parent	.62	(.26)	+	.66	(.27)		.60	(.26)	*	.71	(.30)		.71	(.30)	
Other	.62	(.32)		.73	(.32)		.68	(.33)		.79	(.38)		.81	(.38)	
Picture Vocabulary Test Score	1.04	(.01)	***	1.04	(.01)	***	1.03	(.01)	***	1.02	(.01)	*	1.02	(.01)	*
Took Foreign Language Year 1	5.86	(.24)	***	6.39	(.24)	***	6.81	(.26)	***	6.43	(.27)	***	6.19	(.27)	***
School Integration															
School Attachment				1.06	(.10)		1.19	(.10)	+	1.18	(.09)	+	1.16	(.09)	
Teacher Attachment				1.40	(.14)	*	1.38	(.15)	*	1.14	(.15)		1.15	(.15)	
Disengagement from School				.91	(.11)		.91	(.11)		1.16	(.12)		1.15	(.13)	
Other Extracurricular Participation				1.82	(.22)	**	1.61	(.22)	*	1.35	(.24)		1.37	(.24)	
Social-Psychological Resources															
Perceived Intelligence							1.65	(.08)	***	1.38	(.09)	**	1.38	(.09)	**
Self-Esteem							.63	(.14)	**	.66	(.13)	**	.66	(.13)	**
Academic Orientation															
GPA (1994–1995)										2.68	(.14)	***	2.71	(.14)	***
Educational Expectations										1.21	(.09)	*	1.20	(.09)	*
Race/Ethnicity Interactions															

	Model 1			Model 2			Model 3			Model 4			Model 5		
Black*Sports Participation													.55	(.40)	
Latina*Sports Participation													.29	(.48)	*
Asian*Sports Participation													1.22	(.69)	
School-Level Variables															
Proportion in Foreign Language Year 1	1.67	(.20)	*	1.71	(.21)	*	1.74	(.23)	*	1.85	(.24)	*	1.89	(.24)	*
Proportion of Students in Sports	1.40	(.32)		1.41	(.32)		1.49	(.32)		1.43	(.36)		1.48	(.35)	
Proportion College-Educated Parents	1.02	(.19)		1.04	(.18)		1.11	(.18)		1.13	(.21)		1.11	(.21)	
School Size															
Small	.07	(.93)	**	.06	(.96)	**	.05	(.94)	**	.05	1(.06)	**	.05	(1.04)	**
Medium	.45	(.40)	*	.41	(.42)	*	.38	(.44)	*	.39	(.51)	+	.39	(.52)	+
Private School	.86	(.93)		.75	(.96)		.68	(.96)		.70	1(.04)		.69	(1.03)	
Urbanicity															
Urban	2.12	(.41)	+	2.04	(.42)	+	2.24	(.43)	+	2.67	(.49)	+	2.66	(.49)	+
Rural	1.06	(.44)		1.00	(.44)		1.10	(.45)		1.07	(.44)		1.03	(.44)	
Region															
West	.63	(.58)		.62	(.58)		.62	(.56)		.41	(.61)		.44	(.60)	
Midwest	.50	(.61)		.52	(.60)		.52	(.59)		.40	(.67)		.42	(.66)	
South	.43	(.65)		.38	(.65)		.36	(.64)		.28	(.69)	+	.30	(.66)	+
Intercept (β)	−1.60			−1.89			−1.89			−1.85			−1.89		
Log Likelihood	−3656.71			−3625.41			−3668.66			−3548.11			−3556.60		

+ $p<.10$

* $p<.05$

** $p<.01$

*** $p<.001$

Table 5

Odds ratios from multilevel regression of boys' foreign language course taking on sports participation (*N*=2,504)

	Model 1			Model 2			Model 3			Model 4			Model 5		
Sports Participation	1.72	(.16)	**	1.56	(.18)	*	1.61	(.20)	*	1.35	(.21)		1.30	(.19)	
Racial/Ethnic Identity															
Black	.84	(.28)		.82	(.29)		.83	(.28)		1.10	(.27)		1.07	(.30)	
Latino	4.04	(.23)	***	4.02	(.23)	***	4.34	(.23)	***	5.75	(.26)	***	5.40	(.28)	***
Asian	1.79	(.46)		1.66	(.46)		1.87	(.47)		1.51	(.43)		1.10	(.41)	
Grade Level (1994–1995)															
9th Grade	.83	(.28)		.74	(.31)		.76	(.32)		.72	(.33)		.72	(.34)	
10th Grade	1.22	(.21)		1.16	(.24)		1.17	(.24)		1.04	(.25)		1.04	(.26)	
Parent's Education															
Less than High School	.97	(.38)		1.07	(.41)		1.14	(.43)		1.22	(.47)		1.18	(.48)	
High School	.48	(.26)	**	.49	(.28)	*	.54	(.28)	*	.60	(.26)	+	.59	(.26)	*
Family Structure															
Step Family	.50	(.24)	**	.50	(.24)	**	.50	(.25)	**	.63	(.25)	+	.62	(.26)	+
Single Parent	.41	(.30)	**	.47	(.31)	*	.46	(.31)	*	.51	(.34)	*	.51	(.34)	*
Other	.62	(.63)		.70	(.65)		.66	(.70)		.83	(.74)		.80	(.76)	
Picture Vocabulary Test Score	1.05	(.01)	***	1.05	(.01)	***	1.04	(.01)	***	1.03	(.01)	***	1.03	(.01)	***
Took Foreign Language Year 1	7.33	(.27)	***	7.24	(.27)	***	6.63	(.29)	***	6.32	(.31)	***	6.19	(.30)	***
School Integration															
School Attachment				.84	(.14)		.84	(.14)		.83	(.15)		.83	(.16)	
Teacher Attachment				1.29	(.15)		1.24	(.16)		1.06	(.16)		1.06	(.16)	
Disengagement from School			.65	(.16)		**	.63	(.16)	**	.78	(.18)		.79	(.19)	
Other Extracurricular Participation				1.65	(.19)	*	1.40	(.20)	+	1.15	(.20)		1.16	(.21)	
Social-Psychological Resources															
Perceived Intelligence							1.49	(.12)	**	1.18	(.12)		1.18	(.12)	
Self-Esteem							.91	(.18)		.98	(.20)		1.01	(.21)	
Academic Orientation															
GPA (1994–1995)										3.09	(.17)	***	3.09	(.17)	***
Educational Expectations										1.16	(.14)		1.16	(.15)	
Race/Ethnicity Interactions															

	Model 1			Model 2			Model 3			Model 4			Model 5		
Black*Sports Participation													1.26	(.70)	
Latino*Sports Participation													1.97	(.75)	
Asian*Sports Participation													3.66	(.63)	*
School-Level Variables															
Proportion in Foreign Language Year 1	1.10	(.18)		1.12	(.19)		1.16	(.19)		1.27	(.22)		1.28	(.22)	
Proportion of Students in Sports	2.93	(.28)	**	3.00	(.30)	**	2.85	(.29)	**	2.39	(.32)	**	2.35	(.32)	*
Proportion College-Educated Parents	1.06	(.12)		1.09	(.13)		1.10	(.13)		1.17	(.14)		1.19	(.14)	
School Size															
Small	.09	(.68)	**	.09	(.70)	**	.09	(.70)	**	.08	(.79)	**	.08	(.79)	**
Medium	.28	(.36)	**	.25	(.37)	**	.24	(.36)	***	.26	(.46)	**	.26	(.47)	**
Private School	.53	(.56)		.48	(.60)		.51	(.58)		.68	(.71)		.71	(.73)	
Urbanicity															
Urban	1.45	(.35)		1.48	(.35)		1.36	(.36)		1.80	(.42)		1.81	(.43)	
Rural	.40	(.40)	*	.42	(.42)	*	.46	(.43)	+	.48	(.50)		.50	(.51)	
Region															
West	.77	(.37)		.77	(.37)		.70	(.39)		.42	(.49)	+	.42	(.50)	+
Midwest	1.44	(.44)		1.27	(.45)		1.24	(.44)		1.01	(.59)		1.02	(.59)	
South	.71	(.47)		.63	(.48)		.57	(.48)		.37	(.58)	+	.37	(.58)	+
Intercept (β)	−2.37			−2.41			−2.35			−2.41			−2.36		
Log Likelihood	−3411.55			−3337.88			−3293.92			−3297.26			−3272.78		

+ $p<.10$

* $p<.05$

** $p<.01$

*** $p<.001$