

RESEARCH ARTICLE

Physical Activity and Sports Team Participation: Associations With Academic Outcomes in Middle School and High School Students

CLAUDIA K. FOX, MD^a

DAHEIA BARR-ANDERSON, PhD, MSPH^b

DIANNE NEUMARK-SZTAINER, PhD, MPH, RD^c

MELANIE WALL, PhD^d

ABSTRACT

BACKGROUND: Previous studies have found that higher physical activity levels are associated with greater academic achievement among students. However, it remains unclear whether associations are due to the physical activity itself or sports team participation, which may involve requirements for maintaining certain grades, for example. The purpose of this study is to examine the associations between sports team participation, physical activity, and academic outcomes in middle and high school students.

METHODS: Data were drawn from Project EAT (Eating Among Teens), a survey of middle and high school students ($n = 4746$). Students self-reported their weekly hours of physical activity, sports team participation, and academic letter grades. Two statistical models were considered: first, 2 separate regression analyses with grade point average (GPA) as the outcome and either sports team participation or physical activity as the predictor; second, a single regression with GPA as the outcome and both sports team participation and physical activity as the simultaneous predictors.

RESULTS: For high school girls, both physical activity and sports team participation were each independently associated with a higher GPA. For high school boys, only sports team participation was independently associated with a higher GPA. For middle school students, the positive association between physical activity and GPA could not be separated from the relationship between sports team participation and a higher GPA.

CONCLUSIONS: Regardless of whether academic success was related to the physical activity itself or to participation on sports teams, findings indicated positive associations between physical activity involvement and academic achievement among students.

Keywords: physical fitness and sports; public health; health policy.

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^aFellow, Academic General Pediatrics, (lusc0001@umn.edu), Department of Pediatrics, Division of General Pediatrics, University of Minnesota, 717 Delaware St, 3rd floor, Minneapolis, MN 55414.

^bAssistant Professor, (barra027@umn.edu), School of Kinesiology, College of Education and Human Development, University of Minnesota, 207 Cooke Hall, 1900 University Ave. S.E., Minneapolis, MN 55455.

^cProfessor, (neuma011@umn.edu), Division of Epidemiology and Community Health, School of Public Health, University of Minnesota, 1300 South 2nd St, Suite # 300, Minneapolis, MN 55454.

^dAssociate Professor, (wallx007@umn.edu), Department of Biostatistics, School of Public Health, University of Minnesota, 420 Delaware St S.E., Minneapolis, MN 55455.

Address correspondence to: Claudia K. Fox, Fellow, Academic General Pediatrics, (lusc0001@umn.edu), Department of Pediatrics, Division of General Pediatrics, University of Minnesota, 717 Delaware St, 3rd floor, Minneapolis, MN 55414.

Schools have been targeted as a critical setting in which to address obesity among youth by providing a venue for children and adolescents to engage in regular physical activity.¹ Advocates of this concept indicate that, in addition to improving adiposity and cardiovascular health,² regular physical activity is associated with improved academic outcomes in school-age youth. Indeed, this contention is supported by multiple studies which indicate that students who perform more hours of physical activity and/or more intense physical activity have better academic achievement than those who are less physically active.³⁻⁹ In contrast, only a few investigations show no favorable relationship between physical activity and academic performance.¹⁰⁻¹²

Nevertheless, the interpretation of previous studies that have examined the association between physical activity and academic success is difficult without understanding the role that sports team participation plays in this relationship. For adolescent students, in particular, sports team participation may be the major route by which they are physically active, and multiple studies suggest that participation on sports teams is also associated with better academic outcomes.¹³⁻¹⁶ Therefore, researchers remain uncertain whether improved academic achievement among adolescents involved in sports teams relates to the general benefits of physical activity or to the specific benefits of participating on an athletic team. For example, academic requirements for sports participation and/or pro-education social norms among teammates may positively affect academic outcomes. Accordingly, when examining the association between physical activity and academic success, it is important to investigate the association between physical activity and academic outcomes while adjusting for sports team participation, as well as the association between sports team participation and academic outcomes while adjusting for physical activity.

This study builds on the current body of research by addressing the following research questions: (1) What is the relationship between sports team participation and academic performance among a large and diverse population of middle school and high school students in analyses controlling for sociodemographic variables? (2) What is the relationship between current recommendations for physical activity and academic performance in this population? and (3) Above and beyond their relationship with each other, to what extent do sports team participation and physical activity each *independently* relate to academic performance?

METHODS

Study Population

Data for this secondary data analysis were collected from 4746 middle school and high school

students from 31 schools in the Minneapolis/St Paul metropolitan area of Minnesota. There was equal participation from male students (50.1%) and female students (49.7%), and the mean age of the participants was 14.9 years (range 11–18 years). Middle school students comprised 33.9% of the sample, and high school students comprised 64.8% of the sample. The racial/ethnic backgrounds of the participants were diverse: 48.5% white, 19.0% African American, 19.2% Asian American, 5.8% Hispanic, 3.5% Native American, and 3.9% mixed/other. The socioeconomic status (SES) of the students was also diverse and included 17.5% low SES, 18.9% lower-middle SES, 26.5% middle SES, 23.4% upper-middle SES, and 13.7% high SES. The University of Minnesota Institutional Review Board Human Subjects Committee approved this secondary data analysis for exempt status.

Procedure

Data were collected during the 1998-1999 academic school year. Following approval of the original study by the University of Minnesota Institutional Review Board Human Subjects Committee, consent processes were authorized by each school district's research board. The St Paul school district required active parental consent (14 schools). The Minneapolis and Osseo school districts approved passive parental consent (17 schools). Trained staff collected survey and anthropometric data in Health, Physical Education, and/or Science classes in one 90-minute period or two 50-minute periods.

Instrument

This large population-based assessment of ethnically and socioeconomically diverse students used the Project EAT (Eating Among Teens) survey. Project EAT is a 221-item survey that assesses eating behaviors, physical activity, weight-related issues, and other aspects of adolescent health.¹⁷⁻¹⁹ The survey was developed by a multidisciplinary research team which utilized a Social Cognitive Theory framework,^{20,21} information gleaned from focus groups of adolescent students,²² and a review of the literature for existing pertinent survey instruments. Psychometric properties (ie, test-retest reliability of questions and scales) were used to guide decisions about item inclusion and/or modification.

Measures

Sociodemographic Variables. Students reported race/ethnicity by responding to the question, "Do you think of yourself as . . . white, black or African American, Hispanic or Latino, Asian American, Hawaiian or Pacific Islander, or American Indian or Native

American?" If participants chose more than 1 category, responses were coded as "mixed/other." Socioeconomic status was assessed with an algorithm that accounted for student report of the highest level of education attained by parents, family eligibility for public assistance, eligibility for free or reduced-cost school meals, and parental employment status.²³ Possible SES values ranged from 1 to 5, with 1 representing low SES and 5 representing high SES. Participants were further classified as middle school students (grades 7-8) or high school students (grades 9-12) to address differences that may exist in organized sports teams between middle schools and high schools.

Sports Team Participation. Sports team participation was measured with the question "During the past 12 months, on how many sports teams did you play?"²⁴ Options were 0, 1, 2, and 3 or more teams. The 2-week test-retest correlation of .84 was completed prior to survey implementation in a sample of 252 seventh and tenth grade students from 3 schools that participated in Project EAT. Responses were dichotomized into a yes/no variable: those who participated on any sports team in the past 12 months, and those who did not participate on sports teams during the past 12 months.

Physical Activity. Physical activity was measured using a modified version of the Leisure Time Exercise Questionnaire (LTEQ).^{25,26} Students were asked 3 questions to assess how many hours they spent performing vigorous- ("heart beats rapidly"), moderate- ("not exhausting"), and mild- ("little effort") intensity physical activities in a typical week. This measure captured both physical activity that was performed in the context of sports teams and physical activity that was not sports team based. Examples of vigorous-intensity activities were biking fast, aerobic dancing, running, jogging, swimming laps, rollerblading, skating, lacrosse, tennis, cross-country skiing, soccer, basketball, and football. Examples of moderate-intensity activities were walking quickly, baseball, gymnastics, easy bicycling, volleyball, skiing, dancing, skateboarding, and snowboarding. Examples of mild-intensity activities were walking slowly, bowling, golfing, fishing, snowmobiling, and yoga. Response options for each of the 3 questions were 0, <.5, .5-2.0, 2.5-4.0, 4.5-6.0, and >6 hours/week. The modified LTEQ test-retest correlations for moderate and vigorous physical activity were .52 and .63, respectively. This test of reliability was completed in a sample of 252 seventh and tenth grade students from 3 schools that participated in Project EAT prior to survey implementation. Because national guidelines for exercise specifically target moderate-intensity physical activities and vigorous-intensity physical activities, the present analysis summed the hours spent performing these 2 activity categories and called it "moderate to vigorous physical activity"

or "MVPA." Healthy People 2010 recommendations indicate that adolescents should engage in moderate physical activity for a minimum of 30 minutes, at least 5 times per week,²⁷ for a total of 2.5 hours/week. In contrast, an expert panel, under contract with the Centers for Disease Control and Prevention, suggests that adolescents should accumulate 60 minutes/day of MVPA,² for a total of 7 hours/week. Based on these 2 recommendations, this study categorized the MVPA responses into <2.5, 2.5-7, and >7 hours/week.

Student Grades. School grades were assessed by asking participants to "Mark the 2 grades you get most often."²⁸ Options included A, B, C, D, and F or incomplete. The test-retest correlation was .84. A logic/validity check was done to look for a sensible pattern of grade responses. The patterns of grade responses were sensible. Letter grades were coded as: A = 4.0, B = 3.0, C = 2.0, D = 1.0, and F or incomplete = 0. The 2 grades marked by the subjects were then averaged into a single grade point average (GPA). If participants recorded only 1 grade, then that grade was used in the analysis. Surveys that marked A and F, A and D, or B and F (ie, combinations of grades that were discrepant by more than 2 letter grades) were excluded (n = 42 were excluded).

Data Analysis

Descriptive means and proportions were presented for the main study variables, sports team participation, hours of MVPA, and GPA. To examine the effects of sports team participation and MVPA on GPA, 2 models were considered. In model 1, 2 separate multiple regression analyses were used with GPA as the outcome variable and either sports team participation or MVPA hour categories as a predictor, while controlling for SES and race/ethnicity. In model 2, a single multiple regression was used with GPA as the outcome variable and both sports team participation and MVPA hour categories included as predictors simultaneously, while controlling for SES and race/ethnicity. The second model accounted for any confounding effects that sports team participation may have had on GPA that were not due to MVPA, such as social norms among teammates regarding academic achievement or extra academic support that may have been available to sports team participants. Model 2 also estimated the potential direct effect MVPA had on GPA, for example, through physiological effects. For both models, regression adjusted mean GPA values were presented for each level of sports team participation and MVPA hours categories. Differences in GPA by sports team participation and trends in GPA by MVPA were evaluated based on *t* tests from the multiple regressions, including a test for trend across the 3 categories for MVPA. Additional multiple regression models were used to examine the dose-response relationship between the number

of team sports in which adolescents participated and GPA, and also hours of “mild” physical activity as a predictor of GPA, while controlling for SES and race/ethnicity. All multiple regressions were stratified by gender and grade level (middle school versus high school). Analyses were performed in SAS (version 9.1, 2003, SAS, Inc, Cary, N.C.).

RESULTS

Participation on at least 1 sports team in the past 12 months was reported by 53-71% of all middle school and high school students. Middle school boys were the most likely to participate in team sports, while high school girls were the least likely. Among all the students in the sample, 41-61% were engaging in the recommended 60 minutes of MVPA on most days of the week (>7.0 hours of MVPA/week). Approximately, 60% of boys and 41% of girls met this goal. Girls, on average, tended to have higher GPAs than boys, in both the middle school and high school groups (Table 1).

Sports Team Participation and Student Grades. The mean GPA for middle school boys who participated on sports teams was higher compared to those who did not participate on sports teams (t test = 2.03, p value = .043). The same did not hold for middle school girls (t test = 1.11, p value = .27). For high school boys and girls, sports team participation was significantly associated with a higher mean GPA (boys t test = 6.41, p value < .001; girls t test = 5.99, p value < .001) (Table 2 model 1). In addition, after adjusting for sociodemographic variables, a dose-response relationship existed between the number of sports teams on which high school students participated and their GPA. Specifically, for high school boys participating on 0, 1, 2, and 3 or more sports teams, their respective mean GPAs were 2.50, 2.69, 2.79, and 2.94 (t test for trend = 7.0, p < .001), and similarly, for high school girls their respective mean

GPAs were 2.73, 2.85, 3.06, and 3.20 (t test for trend = 7.5, p < .001). The trend between number of sports teams on which students participated and their GPA was not significant for middle school students.

MVPA and Student Grades. There was a significant linear association between performing more hours of MVPA and a higher mean GPA for both genders and school groups (Table 2 model 1). Specifically, for middle school boys, GPA increased from 2.62 for those who performed <2.5 hours/week of MVPA up to 2.82 for those who performed >7.0 hours/week (t test for trend = 1.98, p value = .048) representing an increase of .20 on the GPA scale. Similarly, high school boys saw the same .20 increase from a GPA of 2.57 up to 2.77 from lowest to highest MVPA hours category (t test for trend 2.86, p value = .004). The changes in GPA for middle and high school girls were similar (Table 2 model 1). There was no significant association between hours of *mild* exercise (ie, exercise requiring little effort such as walking slowly or bowling) performed per week and mean GPA for any of the student categories.

Sports Team Participation, MVPA, and Student Grades. The extent to which sports team participation and MVPA were independently associated with mean GPA is illustrated in Table 2 model 2. The positive relationship between sports team participation and GPA remained significant after adjusting for hours of MVPA in high school boys (t test = 5.63, p < .001) and girls (t test = 4.71, p < .001), but not in middle school students. After adjusting for sports team participation, the association between performing more hours of MVPA and a higher mean GPA was statistically significant only for the high school girls (t test for trend = 2.96, p = .003).

DISCUSSION

The present study examined the relationship between physical activity, sports team participation,

Table 1. Proportion of Students Participating on Sports Teams, Their Time Spent Performing MVPA, and Their Mean GPA

	Middle School		High School	
	Boys (n = 740)	Girls (n = 761)	Boys (n = 1472)	Girls (n = 1458)
Sports team participation*				
No	29.3 (215)	37.3 (284)	33.5 (492)	47.5 (689)
Yes	70.7 (519)	62.7 (477)	66.5 (977)	52.5 (762)
Hours MVPA/week*				
<2.5	15.8 (117)	26.5 (202)	14.7 (217)	28.3 (412)
2.5–7.0	25.0 (185)	32.1 (244)	24.1 (354)	30.1 (439)
>7.0	59.2 (438)	41.4 (315)	61.2 (901)	41.6 (607)
GPA†	2.75 ± .93	2.92 ± .85	2.71 ± .89	2.88 ± .85

*Estimates are presented as % (n). Note, total n is slightly different for sports team participation due to missing data.

†Estimates are presented as mean ± standard deviation.

MVPA, moderate to vigorous physical activity; GPA, grade point average.

Table 2. Regression Adjusted Mean GPA by Sports Team Participation and by Hours of MVPA. Model 1 Examines Sports Team Participation and MVPA in Separate Regressions, Model 2 Mutually Adjusts for Both Sports Team Participation and MVPA Simultaneously in the Same Regression

	Adjusted* Mean GPA by Sports Team Participation		t Test (p Value)	Adjusted* Mean GPA by Hours MVPA/Week			t Test for Trend (p Value)
	Yes	No		<2.5	2.5-7.0	>7.0	
MODEL 1							
Middle school							
Boys (n = 698)	2.81	2.65	2.03 (.043)	2.62	2.70	2.82	1.98 (.048)
Girls (n = 720)	2.96	2.83	1.11 (.267)	2.81	2.95	2.97	2.09 (.037)
High school							
Boys (n = 1426)	2.83	2.47	6.41 (< .001)	2.57	2.64	2.77	2.86 (.004)
Girls (n = 1408)	3.04	2.70	5.99 (< .001)	2.76	2.80	3.01	4.54 (< .001)
MODEL 2							
Middle school							
Boys (n = 698)	2.80	2.67	1.61 (.107)	2.64	2.71	2.82	1.98 (.107)
Girls (n = 720)	2.94	2.90	.62 (.533)	2.82	2.94	2.97	1.88 (.060)
High school							
Boys (n = 1426)	2.80	2.51	5.63 (< .001)	2.66	2.67	2.74	1.16 (.248)
Girls (n = 1408)	2.98	2.76	4.71 (< .001)	2.81	2.81	2.97	2.96 (.003)

*Adjusted for socioeconomic status and race/ethnicity.
MVPA, moderate to vigorous physical activity; GPA, grade point average.

and academic outcomes among middle school and high school students. The results indicated that for middle school boys and high school boys and girls, sports team participation was associated with a higher GPA. Furthermore, performing more hours of MVPA was associated with a higher GPA for girls and boys in middle school and high school. However, the results were different for analyses that examined the *independent* associations of both sports team participation and MVPA with GPA. Specifically, for high school girls, both hours performing MVPA and sports team participation were each independently associated with a higher GPA. In contrast, for high school boys, only sports team participation, and not MVPA, was associated with a higher GPA. For the middle school students of both genders, the association between performing more hours of MVPA and a higher GPA could not be separated from the positive relationship that sports team participation had with academic outcomes. That is, there was no clear independent variable that was associated with a higher GPA in middle school students.

The findings in the present analysis of a statistically significant association between sports team participation and a higher GPA were comparable to several studies which demonstrated that participation in organized sports is associated with improved academic outcomes among students.¹³⁻¹⁶ Indeed, it has been argued that sports team participation fosters student identification with schools and school-related values, including performing well academically.¹⁴ It is also possible that high school athletics affords a greater sense of school identification than does middle

school sports team participation. This may help explain why high school students in the present study, and not middle school students, demonstrated a positive association between sports team participation and a higher GPA, after adjusting for MVPA. Additionally, this difference between middle school and high school students may be due to the possibility that high schools in this study, and not middle schools, may have required students to maintain a minimum GPA in order to participate on sports teams.

In contrast, several previous studies found no association between sports team participation and academic outcomes. For example, Fisher, Juszczak, and Friedman found no relationship between sports involvement and academic performance among a sample of urban, mostly minority (68% African American), high school students.²⁹ However, Fisher, Juszczak, and Friedman's study did not differentiate between sports team participation and sports participation that was not performed in the context of a team. In another study, Yin and Moore, using the National Educational Longitudinal Study of 1988, concluded that eighth graders who participated on sports teams had lower cognitive test scores compared to those students who did not participate. Yet these differences in test scores did not persist when the students progressed to 10th and 12th grades.³⁰ Notably, Yin and Moore's study controlled for student participation in nonsport extracurricular activities, unlike the present study. Therefore, it is conceivable that for the present study, student participation in nonsport extracurricular activities was a confounding factor that may have contributed to higher student grades.

In addition to the variations in study design, multiple other factors may contribute to the contradictory findings of studies that examined the relationship between sports team participation and academic outcomes. Some of the more salient factors may include variations in academic eligibility requirements that must be met by students in order to participate on sports teams, variations in the availability of academic tutoring for student athletes, differences in social norms regarding the importance of academic achievement across different sports, and variations in levels of physical activity required by different sports.

The findings in the present analysis of a significant linear trend between performing more hours of MVPA and a higher GPA were consistent with many previous studies that have examined the association between physical activity and academic outcomes.³⁻⁹ For example, Nelson and Gordon-Larsen, in an analysis of the National Longitudinal Study of Adolescent Health (Add Health), found that 7th-12th graders who performed at least 5 “bouts” per week of MVPA were more likely to get an A in math and science than students who performed less than 5 “bouts” per week.⁶ Also, Field found that among a sample of 89 adolescents, those in the “high exercise” group had higher GPAs compared to those in the “low exercise” group.⁴ Notably, however, none of these studies adjusted for sports team participation. Because sports team participation may be the primary context in which many middle school and high school students are physically active and because sports team participation was associated with a higher GPA, possibly due to reasons other than increased physical activity (eg, eligibility requirements, peer norms for studying), sports team participation becomes an important confounder in the relationship between physical activity and academic outcomes. The present analysis found that only high school girls continued to show a positive relationship between hours performing MVPA and a higher GPA when adjustment was made for sports team participation.

An important strength of the present study was that data were collected on measures of both physical activity and sports team participation. This permitted the separate examination of the contribution of each variable to academic outcomes. Additionally, the Project EAT sample, because of its large size and diversity in race/ethnicity and SES, permitted generalization of the findings to other metropolitan populations of students. A limitation of this study was the lack of precision of the physical activity measure. Although physical activity recalls of children as young as fifth grade were shown to have adequate reliability and validity when used for research,²⁴ a measure of baseline cardiorespiratory fitness and an objective measure of exertion during physical activity would provide further insight into the effects of physical activity on academic

achievement. Self-report of academic grades may also have been a limitation of the study. Additionally, because of the cross-sectional study design, causality between sports team participation or physical activity and academic outcomes could not be determined.

CONCLUSION

The association between physical activity and academic performance is complex. More research is needed to address the nature of the “academic culture” of students who participate on sports teams compared to those who do not, and how this contributes to academic success. This may include an examination of school policies regarding student academic requirements for sports team participation or social norms among sports teammates and athletic coaches regarding academic achievement. It would also be informative to examine the relationship between relative cardiorespiratory exertion during physical activity and academic performance to determine if there is an optimal level of activity which may confer improved academic success. Finally, intervention studies are essential for identifying a causal relationship between physical activity and academic performance.

This study supported the notion that, in addition to the many health benefits that physical activity confers to adolescent students, physical activity is also related to improved academic outcomes. Regardless of whether academic success is related to the physical activity itself or to participation on sports team, schools may find this information useful when faced with pressures to address the high prevalence of obesity in youth via increasing opportunities for physical activity, while simultaneously preserving academic standards.

REFERENCES

1. Story M, Kaphingst KM, French S. The role of schools in obesity prevention. *Future Child*. 2006;16:109-142.
2. Strong WB, Malina RM, Blimkie CJ, et al. Evidence based physical activity for school-age youth. *J Pediatr*. 2005;146:732-737.
3. Shephard RJ. Habitual physical activity and academic performance. *Nutr Rev*. 1996;54: S32-S36.
4. Field T, Diego M, Sanders CE. Exercise is positively related to adolescents’ relationships and academics. *Adolescence*. 2001;36: 105-110.
5. Coe DP, Pivamik JM, Womack CJ, Reeves MJ, Malina RM. Effect of physical education and activity levels on academic achievement in children. *Med Sci Sports Exerc*. 2006;38: 1515-1519.
6. Nelson MC, Gordon-Larsen P. Physical activity and sedentary behavior patterns are associated with selected adolescent health risk behaviors. *Pediatrics*. 2006;117:1281-1290.
7. Sigfusdottir ID, Kristjansson AL, Allegrante JP. Health behaviour and academic achievement in Icelandic school children. *Health Educ Res*. 2007;22:70-80.
8. Carlson SA, Fulton JE, LEE SM, et al. Physical education and academic achievement in elementary school: data from

- the Early Childhood Longitudinal Study. *Am J Public Health*. 2008;98:721-727.
9. Castelli DM, Hillman CH, Buck SM, Erwin HE. Physical fitness and academic achievement in third- and fifth-grade students. *J Sport Exerc Psychol*. 2007;29:239-252.
 10. Huang TT, Goran MI, Spruijt-Metz D. Associations of adiposity with measured and self-reported academic performance in early adolescence. *Obesity*. 2006;14:1839-1845.
 11. Daley AJ, Ryan J. Academic performance and participation in physical activity by secondary school adolescents. *Percept Mot Skills*. 2000;91:531-534.
 12. Sanders CE, Field TM, Diego M, Kaplan M. Moderate involvement in sports is related to lower depression levels among adolescents. *Adolescence*. 2000;35:793-797.
 13. Fredricks JA, Eccles JS. Is extracurricular participation associated with beneficial outcomes? Concurrent and longitudinal relations. *Dev Psychol*. 2006;42:698-713.
 14. Marsh HW, Kleitman S. School athletic participation: mostly gain with little pain. *J Sport Exerc Psychol*. 2003;25:205-228.
 15. Marsh HW. The effects of participation in sport during the last 2 years of high school. *Sociol Sport J*. 1993;10:18-43.
 16. Eccles JS, Barber BL. Student council, volunteering, basketball, or marching band: what kind of extracurricular involvement matters? *J Adolesc Res*. 1999;14:10-43.
 17. Neumark-Sztainer D, Croll J, Story M, Hannan PJ, French SA, Perry C. Ethnic/racial differences in weight-related concerns and behaviors among adolescent girls and boys: findings from Project EAT. *J Psychosom Res*. 2002;53:963-974.
 18. Irving LM, Wall M, Neumark-Sztainer D, Story M. Steroid use among adolescents: findings from Project EAT. *J Adolesc Health*. 2002;30:243-252.
 19. Ackard DM, Neumark-Sztainer D, Story M, Perry C. Overeating among adolescents: prevalence and associations with weight-related characteristics and psychological health. *Pediatrics*. 2003;111:67-74.
 20. Bandura A. *Social Foundations of Thought and Action: A Social Cognitive Theory*. Englewood Cliffs, N.J.: Prentice-Hall; 1986.
 21. Bandura A. *Social Learning Theory*. Englewood Cliffs, N.J.: Prentice-Hall; 1977.
 22. Neumark-Sztainer D, Story M, Perry C, Casey MA. Factors influencing food choices of adolescents: findings from focus-group discussions with adolescents. *J Am Diet Assoc*. 1999;99:929-937.
 23. Neumark-Sztainer D, Story M, Hannan PJ, Croll J. Overweight status and eating patterns among adolescents: where do youths stand in comparison with the Healthy People 2010 Objectives? *Am J Public Health*. 2002;92:844-851.
 24. Brener ND, Collins JL, Kann L, Warren CW, Williams BI. Reliability of the Youth Risk Behavior Survey Questionnaire. *Am J Epidemiol*. 1995;141:575-580.
 25. Sallis JF, Buono MJ, Roby JJ, Micalo FG, Nelson JA. Seven-day recall and other physical activity self-reports in children and adolescents. *Med Sci Sports Exerc*. 1993;25:99-108.
 26. Godin G, Shephard RJ. A simple method to assess exercise behavior in the community. *Can J Appl Sport Sci*. 1985;10:141-146.
 27. US Department of Health and Human Services. Healthy People 2010 Objectives. Available at: www.healthypeople.gov/hpscscripts/KeywordResult.asp?n266=266&n361. Accessed May 14, 2008.
 28. Resnick MD, Harris LJ, Blum RW. The impact of caring and connectedness on adolescent health and well-being. *J Paediatr Child Health*. 1993;29: S3-S9.
 29. Fisher M, Juszczak L, Friedman SB. Sports participation in an urban high school: academic and psychologic correlates. *J Adolesc Health*. 1996;18:329-334.
 30. Yin Z, Moore JB. Re-examining the role of interscholastic sport participation in education. *Psychol Rep*. 2004;94:1447-1454.

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