NIH Public Access
Author Manuscript
Prev Med. Author manuscript; available in PMC 2012 February 1.

Published in final edited form as:
Prev Med. 2011 February 1; 52(2): 130–132. doi:10.1016/j.ypmed.2010.11.013.

Adolescents' attitudes toward sports, exercise and fitness predict physical activity 5 and 10 years later

Dan J. Graham, Ph.D.,
Division of Epidemiology and Community Health University of Minnesota, Twin Cities 1300 S. 2nd St., Suite 300, Minneapolis, MN 55454

John R. Sirard, Ph.D., and
University of Virginia

Dianne Neumark-Sztainer, Ph.D., R.D.
University of Minnesota, Twin Cities

Abstract

Objective—To determine whether adolescent attitudes towards sports, exercise and fitness predict moderate-to-vigorous physical activity (MVPA) 5 and 10 years later.

Method—A diverse group of 1902 adolescents participating in Project EAT (Eating and Activity in Teens), reported weekly MVPA and attitudes toward sports, exercise and fitness in EAT-I (1998-99), EAT-II (2003-04), and EAT-III (2008-09).

Results—Mean MVPA was 6.4, 4.8, and 4.0 hrs/wk at baseline, 5-yr, and 10-yr follow-up, respectively. Attitudes toward sports, exercise, and fitness together predicted MVPA at 5- and 10-years. Among the predictors of 5- and 10-year MVPA, attitude's effect size, though modest, was comparable to the effect sizes for sports participation and BMI. Adolescents with more-favorable attitudes toward sports, exercise and fitness engaged in approximately 30-40% more weekly MVPA at follow-up (1.7 hr/wk at 5 years and 1.2 hr/wk at 10 years) than those with less-favorable attitudes.

Conclusion—Adolescents' exercise-related attitudes predict subsequent MVPA independent of baseline behavior suggesting that youth MVPA promotion efforts may provide long-term benefits by helping youth develop favorable exercise attitudes.

Keywords

physical activity; adolescent; attitude

Introduction

The high prevalence of obesity in youth has increased interest in interventions promoting youth physical activity (PA), particularly given evidence that PA tracks across the lifespan at a moderate level (e.g. Kjonniksen et al., 2008; Malina, 1996, 2001). Young people's

© 2010 Elsevier Inc. All rights reserved.

Dan J. Graham, Ph.D. (corresponding author) djgraham@umn.edu phone: 1-315-569-9041 fax: 1-651-696-6348.

Publisher's Disclaimer: This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

NIH-PA Author Manuscript
NIH-PA Author Manuscript
NIH-PA Author Manuscript

NIH-PA Author Manuscript

NIH-PA Author Manuscript

NIH-PA Author Manuscript

exercise-related attitudes are linked to current PA (e.g. Dishman et al., 2006; Ferguson et al., 1989; Motl et al., 2002; Sallis et al., 2000) and PA over 1-2 years (e.g. Dishman et al., 2010; Neumark-Sztainer et al., 2003a; Trost et al., 1997). However, links between adolescent attitudes and PA have not been reported over much longer time periods. The Theory of Reasoned Action / Planned Behavior (e.g. Ajzen, 1991) suggests that health behavior, including PA, is determined by intentions individuals form based on their attitudes toward the behavior. Our research question was whether adolescents' attitudes towards sports, exercise and fitness predict moderate-to-vigorous physical activity (MVPA) 5 and 10 years later. We hypothesized that more-favorable attitudes would predict more MVPA longitudinally.

Methods

Participants

Participants (n = 1902; Table 1 presents demographic characteristics) were middle- (n = 1376) and high-school students (n = 576) in the Twin Cities area of Minnesota recruited from schools serving diverse populations. Adolescents completed a survey in 1998-1999 as part of Project EAT (Eating and Activity in Teens; for information on EAT see Neumark-Sztainer et al., 2002;Neumark-Sztainer et al., 2003b), including questions regarding weekly MVPA and attitudes toward sports, exercise and fitness. Height and weight were measured at this time. Five and ten years later (EAT-II: 2003-04; EAT-III: 2008-09) these individuals reported weekly MVPA (see Neumark-Sztainer et al., 2006a for information about follow-up design).

Measures

All measures had adequate two-week test-retest reliability.

Physical Activity—A modified Leisure Time Exercise Questionnaire (Godin and Shephard, 1985; modifications described in Neumark-Sztainer et al., 2004) assessed MVPA at each wave. This reliable measure correlates significantly with other adolescent PA measures (Sallis et al., 1993). Participants report how many hours per week they engage in vigorous (described as "your heart beats rapidly"; examples like biking fast and aerobic dancing were provided), moderate ("not exhausting"; examples included walking quickly and baseball), and mild (require "little effort"; examples included golf and bowling) activities. Response options were: none, < 0.5 hrs/week, 0.5 – 2 hrs/week, 2.5 – 4 hrs/week, 4.5 – 6 hrs/week, 6+ hrs/week. Summing moderate and vigorous hours produced weekly MVPA.

Attitudes toward Sports, Exercise and Fitness—Relevant baseline questions were: "How much do you care about: 1) 'staying fit and exercising?' and 2) 'doing well in sports?'" Responses ranged from 1) Not at all to 4) Very much and were summed for analyses (α= 0.60).

Sports Participation—A single item (taken from Brener et al., 2003) assessed baseline sports participation: "During the past 12 months, on how many sports teams did you play?" with answer options: 0, 1, 2, and 3 or more teams.

Body Mass Index—A ratio of weight and height (kg/m^2), body mass index (BMI) is the most appropriate and widely used field measure of weight status. BMI was calculated by trained staff using a calibrated digital scale and stadiometer (see CDC 2009 for information on BMI calculation and utilization) and analyzed as a continuous measure.

NIH-PA Author Manuscript

NIH-PA Author Manuscript

NIH-PA Author Manuscript

Demographic Characteristics—Age, ethnicity/race, and sex were self-reported at baseline. For analysis, race was dichotomous (white / non-white) and age was continuous (11-18 years).

Statistical Analyses

Three linear regression models were tested with baseline, 5-year, and 10-year MVPA as outcomes. Each model included the predictors, attitudes toward sports, exercise and fitness, and age, race, sex, and baseline BMI, sports participation, and MVPA as covariates. Participants with complete data (n = 1902) were part of a baseline group of 4,746. Attrition was not equal across sociodemographic characteristics; thus, the data were weighted to adjust for differential responding (described in Neumark-Sztainer et al., 2006b).

Results and Discussion

Baseline attitudes toward exercise and fitness were generally positive with 50% of participants caring “very much,” 33% caring “somewhat,” 14% caring “a little,” and 3% caring “not at all.” Baseline attitudes toward sports were similar: 42%, 29%, 15%, and 12% of adolescents reported caring “very much,” “somewhat,” “a little,” and “not at all,” respectively. Consistent with trends nationally (e.g. Goldberg and King, 2007), mean BMI increased over time (from 23.3 at baseline to 24.3 and 26.4, at 5- and 10-years, respectively), and MVPA decreased (from 9.4 hrs/wk at baseline to 8.0 and 6.9 hrs/wk at 5- and 10-years).

In regression analyses, attitudes predicted baseline, 5- and 10-year MVPA controlling for demographics and baseline covariates (see Table 2). Standardized regression coefficients (β) indicated that effect sizes for attitudes predicting MVPA, though modest, were comparable in size to the effects of BMI and sports participation. Because attitudes predicted MVPA, post-hoc *t*-tests compared MVPA for those with high versus low attitude scores (based on a median split). These tests revealed that adolescents with more-favorable attitudes reported approximately 25-30% more MVPA at 5- and 10-year follow-up than those with less-favorable attitudes (9.1 vs. 6.8 hrs/week at 5 years; $t = 15.0$, $p<0.001$; and 7.6 vs. 6.2 hrs/week; $t = 5.4$, $p<0.001$ at 10 years). These group differences in MVPA are clinically meaningful in relation to risk of cardiovascular disease and mortality (e.g. Kohl, 2001).

These results suggest that PA-promotion interventions may derive added value from improving PA-related attitudes. This is not to suggest that interventions should target attitudes *instead of* PA behavior itself. Indeed, baseline MVPA was one of the strongest predictors of 5- and 10-year MVPA. However, targeting attitude and behavior *together* may more profoundly influence future PA than targeting behavior alone. Coupled with prior research demonstrating that interventions can improve youth’s exercise attitudes (e.g. Christodoulos et al., 2006; Digelidis et al., 2003; Nader et al., 1996; Stone et al., 1998), the present results suggest that enhancing attitudes could benefit PA promotion efforts.

Study Limitations and Strengths

Although self-report is arguably the most effective methodology for assessing some constructs in this study (e.g., attitudes), self-reported MVPA is subject to problems with memory and accurate estimation; MVPA may be more precisely measured objectively (e.g. via accelerometry). Some research has reported that individuals 10 years of age and older can reliably report their physical activity and rate its intensity (Sallis, 1993); Bar-Or, 1977); however, it is possible that perception or recall of MVPA differed by age. Additionally, although baseline attitudes preceded follow-up MVPA assessments, attitudes did not necessarily *cause* future behavior. Furthermore, sports participation assessed only “team,” not individual sports or activity programs/classes and school-based physical education,

NIH-PA Author Manuscript

NIH-PA Author Manuscript

NIH-PA Author Manuscript

which can influence exercise attitudes, was not specifically measured. However, this study makes significant contributions by assessing MVPA among a large, racially-diverse sample of adolescents over a critical 10-year period spanning the transition to young adulthood.

Conclusion

Adolescents holding more-positive attitudes toward sports, exercise and fitness are more active 5 and 10 years later, suggesting that youth activity-promotion efforts may benefit from targeting PA-related *attitudes* in addition to behavior itself.

Findings suggest the importance of helping youth develop positive PA attitudes. All youth participate in school physical education classes; thus, physical education has tremendous potential to influence PA attitudes. Similarly, parents can foster the development of more positive PA attitudes in their children via modeling positive PA attitudes and behaviors themselves (e.g. Bandura, 1969).

References

Ajzen I. The Theory of Planned Behavior. Organ Behav Hum Dec. 1991; 50:179–211.

Bandura, A. Social leaning theory of identificatory processes. In: Goslin, DA., editor. Handbook of Socialization Theory and Research. 1969. p. 213-262.

Bar-Or, O. Age-related changes in exercise perception. In: Borg, G., editor. Physical work and effort. Pergamon; New York: 1977. p. 255-266.

Brener ND, Kann L, Smith TK. Reliability and validity of the School Health Policies and Programs Study 2000 questionnaires. J Sch Health. 2003; 73:29–37. [PubMed: 12621721]

Centers for Disease Control and Prevention. Body Mass Index. [Retrieved October 19, 2010]. 2009 from http://www.cdc.gov/healthyweight/assessing/bmi/index.html

Christodoulos AD, Douda HT, Polykratis M, Tokmakidis SP. Attitudes towards exercise and physical activity behaviours in Greek schoolchildren after a year long health education intervention. Br J Sports Med. 2006; 40:367–371. [PubMed: 16556796]

Digelidis N, Papaioannou A, Laparidis K, Christodoulidis T. A one-year intervention in 7th grade physical education classes aiming to change motivational climate and attitudes towards exercise. Psychol Sport Exerc. 2003; 4:195–210.

Dishman RK, Dunn AL, Sallis JF, Vandenberg RJ, Pratt CA. Social-cognitive correlates of physical activity in a multi-ethnic cohort of middle-school girls: two-year prospective study. J Pediatr Psychol. 2010; 35:188–198. [PubMed: 19468040]

Dishman RK, Saunders RP, Felton G, Ward DS, Dowda M, Pate RR. Goals and intentions mediate efficacy beliefs and declining physical activity in high school girls. Am J Prev Med. 2006; 31:475–483. [PubMed: 17110077]

Ferguson KJ, Yesalis CE, Pomrehn PR, Kirkpatrick MB. Attitudes, knowledge, and beliefs as predictors of exercise intent and behavior in schoolchildren. J Sch Health. 1989; 59:112–115. [PubMed: 2704183]

Godin G, Shephard RJ. A simple method to assess exercise behavior in the community. Can J Appl Sport Sci. 1985; 10:141–146. [PubMed: 4053261]

Goldberg JH, King AC. Physical activity and weight management across the lifespan. Annu Rev Public Health. 2007; 28:145–170. [PubMed: 17168638]

Kjonniksen L, Torsheim T, Wold B. Tracking of leisure-time physical activity during adolescence and young adulthood: a 10-year longitudinal study. Int J Behav Nutr Phys Act. 2008; 5:69. [PubMed: 19113990]

Kohl HW 3rd. Physical activity and cardiovascular disease: evidence for a dose response. Med Sci Sports Exerc. 2001; 33:S472–483. discussion S493-474. [PubMed: 11427773]

Malina RM. Tracking of physical activity and physical fitness across the lifespan. Res Q Exerc Sport. 1996; 67:S48–57. [PubMed: 8902908]

NIH-PA Author Manuscript

NIH-PA Author Manuscript

NIH-PA Author Manuscript

Malina RM. Physical activity and fitness: pathways from childhood to adulthood. Am J Hum Biol. 2001; 13:162–172. [PubMed: 11460860]

Motl RW, Dishman RK, Ward DS, Saunders RP, Dowda M, Felton G, Pate RR. Examining social-cognitive determinants of intention and physical activity among black and white adolescent girls using structural equation modeling. Health Psychol. 2002; 21:459–467. [PubMed: 12211513]

Nader PR, Sellers DE, Johnson CC, Perry CL, Stone EJ, Cook KC, Bebchuk J, Luepker RV. The effect of adult participation in a school-based family intervention to improve Children's diet and physical activity: the Child and Adolescent Trial for Cardiovascular Health. Prev Med. 1996; 25:455–464. [PubMed: 8818068]

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. [PubMed: 12445586]

Neumark-Sztainer D, Story M, Hannan PJ, Tharp T, Rex J. Factors associated with changes in physical activity: a cohort study of inactive adolescent girls. Arch Pediatr Adolesc Med. 2003a; 157:803–810. [PubMed: 12912787]

Neumark-Sztainer D, Wall M, Perry C, Story M. Correlates of fruit and vegetable intake among adolescents. Findings from Project EAT. Prev Med. 2003b; 37:198–208. [PubMed: 12914825]

Neumark-Sztainer D, Goeden C, Story M, Wall M. Associations between body satisfaction and physical activity in adolescents: implications for programs aimed at preventing a broad spectrum of weight-related disorders. Eat Disord. 2004; 12:125–137. [PubMed: 16864312]

Neumark-Sztainer D, Wall M, Eisenberg ME, Story M, Hannan PJ. Overweight status and weight control behaviors in adolescents: longitudinal and secular trends from 1999 to 2004. Prev Med. 2006a; 43:52–59. [PubMed: 16697035]

Neumark-Sztainer D, Wall M, Guo J, Story M, Haines J, Eisenberg M. Obesity, disordered eating, and eating disorders in a longitudinal study of adolescents: how do dieters fare 5 years later? J Am Diet Assoc. 2006b; 106:559–568. [PubMed: 16567152]

Sallis JF. Epidemiology of physical activity and fitness in children and adolescents. Crit Rev Food Sci Nutr. 1993; 33:403–408. [PubMed: 8357503]

Sallis JF, Buono MJ, Roby JJ, Micale FG, Nelson JA. Seven-day recall and other physical activity self-reports in children and adolescents. Med Sci Sports Exerc. 1993; 25:99–108. [PubMed: 8423762]

Sallis JF, Prochaska JJ, Taylor WC. A review of correlates of physical activity of children and adolescents. Med Sci Sports Exerc. 2000; 32:963–975. [PubMed: 10795788]

Stone EJ, McKenzie TL, Welk GJ, Booth ML. Effects of physical activity interventions in youth. Review and synthesis. Am J Prev Med. 1998; 15:298–315. [PubMed: 9838974]

Trost SG, Pate RR, Saunders R, Ward DS, Dowda M, Felton G. A prospective study of the determinants of physical activity in rural fifth-grade children. Prev Med. 1997; 26:257–263. [PubMed: 9085396]

NIH-PA Author Manuscript

NIH-PA Author Manuscript

NIH-PA Author Manuscript

Table 1

Demographic Characteristics of 1902 Project EAT Participants in the Minneapolis/St. Paul, Minnesota area (baseline data collected in 1997-1998)

Baseline Characteristic	n	%
Race		
White	1017	53.5
Black	415	21.8
Asian	381	20.0
Other	89	4.7
Sex		
Male	819	43.1
Female	1083	56.9
Baseline Sports Participation		
0 sports	700	39.1
1 sport	399	22.3
2 or more sports	693	38.7

Baseline Characteristic	*Mean* (*SD*)	Range
Age	14.9 (1.6)	11 - 18
BMI (kg/m^2)	23.3 (5.0)	12.0 – 50.7
Baseline MVPA (hr/wk)	9.4 (6.4)	0.0 – 24.0
Exercise/fitness/sports attitudes[a]	6.3 (1.6)	1 - 8

[a] Attitudes score is sum of responses to: “How much do you care about staying fit and exercising?” and “How much do you care about doing well in sports?” Response options included: (1) Not at all, (2) A little, (3) Somewhat, (4) Very much.

NIH-PA Author Manuscript NIH-PA Author Manuscript NIH-PA Author Manuscript

Table 2

Linear Regressions Predicting MVPA at Baseline, 5-, and 10-year follow-up among 1902 Project EAT Participants in the Minneapolis/St. Paul, Minnesota area (baseline data collected in 1997-1998)

	Baseline			5-year follow-up			10-year follow-up		
Variable	**b**	**SE**	**β**	**b**	**SE**	**β**	**b**	**SE**	**β**
Intercept	−2.16*	1.00	--	6.42***	0.88	--	4.17***	0.94	--
Age	0.18*	0.09	0.05	−0.44***	0.08	−0.13	0.23**	0.09	−0.07
Race[a]	2.10***	0.29	0.16	1.24***	0.26	0.11	2.01***	0.28	0.18
Sex[b]	1.18***	0.29	0.09	1.41***	0.25	0.13	1.53***	0.27	0.13
BMI	−0.02	0.03	−0.02	−0.07*	0.03	−0.06	−0.03	0.03	−0.03
Baseline MVPA	--	--	--	0.19***	0.02	0.23	0.11***	0.02	0.12
Baseline Sports Participation	0.89***	0.14	0.16	0.39**	0.13	0.08	0.27*	0.14	0.06
Exercise/fitness/sports attitude	1.18***	0.10	0.29	0.22*	0.10	0.06	0.20*	0.10	0.06
R^2_{adj}	0.21	--	--	0.17	--	--	0.11	--	--

*p<.05,

**p<.01,

***p<.001

[a]White = 1, Non-white = 0;

[b]Male = 1, Female = 0