

Structured physical activity and psychosocial correlates in middle-school girls

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Abstract

Objective. Little is known about the types of physical activity (PA) in which adolescent girls participate. Understanding this, along with examining specific psychosocial correlates of PA, may help guide the development of effective interventions to prevent the decline in PA in female youth.

Methods. 2791 sixth grade girls participating in the Trial of Activity for Adolescent Girls from six geographical locations completed surveys assessing participation in sports teams and activity classes/lessons in and out of school, self-efficacy for PA, PA enjoyment, physical education (PE) enjoyment, and perceived school climate for girls' PA (data collection: January–May 2003). Correlates of girls' participation in structured PA and sociodemographic differences were explored.

Results. 89.5% of girls participated in structured PA: 39% at school and 86% outside of school. Across race/ethnicity, most reported activities were basketball (44%), cheerleading/dance (41%), and swimming (39%). Controlling for socioeconomic status, geographical location, and race/ethnicity, girls with a higher self-efficacy (OR=3.44, CI=1.72–6.92) and higher enjoyment of PE class (OR=1.97, CI=1.25–3.120) were more likely to participate in structured PA. PA enjoyment and perceived school climate for girls' PA were not associated with participation in structured PA.

Conclusion. Interventions that increase self-efficacy and enjoyment of PE could result in greater participation in structured PA and higher overall PA levels among adolescent girls.

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Introduction

Regular physical activity has favorable effects on weight maintenance and/or loss, improved psychological well-being and cardiovascular fitness in adolescents (USDHHS, 2001). Recent recommendations state that school age youth should participate in 60 min or more of moderate-to-vigorous physical

activity per day (Strong et al., 2005). However, most adolescents are not meeting these recommendations (Pate et al., 1994), and physical activity participation tends to decline with age (Kimm et al., 2000). To develop more effective interventions, it is important to understand what activities interest adolescent girls and to explore the factors associated with physical activity participation.

Participation in organized and structured programs comprise a large and increasing proportion of physical activity among adolescents (Vilhjalmsson and Kristjansdottir, 2003), and involvement in community-based sports is an important predictor of physical activity (Strong et al., 2005). Sports and

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structured physical activities taking place at school and outside of school have been promoted as a method to increase physical activity (Moore and Werch, 2005). However, the specific activities in which adolescent girls participate at or outside of school are not well-described. Even less is known about racial/ethnic and geographical location differences, although many studies have examined physical activity levels among adolescent girls (Barnett et al., 2002; Mota and Esculcas, 2002; Jago et al., 2005).

A review by Sallis et al. (2000) indicated that many studies have examined psychosocial correlates of total (structured and unstructured) physical activity. Two correlates associated with physical activity include self-efficacy (Sallis et al., 2000; Dishman et al., 2004) and enjoyment (USDHHS, 1996; Dishman et al., 2005). Because girls spend a considerable amount of time at school, the school social climate that supports girls' being physically active may also influence physical activity in girls (Birnbaum et al., 2005). However, most previous work evaluated overall physical activity, not structured activity, which may have a different set of predictors. Total physical activity is a combination of structured (e.g. physical education class, organized sports and activity lessons) and unstructured (e.g. free play) physical activity and many physical activity interventions for this age group are structured in nature. Because of this, there is value in understanding correlates of structured physical activity.

The objectives of the present study were (1) to identify structured physical activities, such as organized sports and physical activity classes and lessons, which adolescent girls reported to participate in most frequently at school or outside of school; and (2) to examine the association of psychosocial variables with adolescent girls' participation in structured physical activity. The psychosocial variables were selected based on a social ecological model (Elder et al., 2006) and for their conceptual relevance to the main outcome of structured physical activity.

Methods

Study description

The Trial of Activity for Adolescent Girls (TAAG) is a multi-center group-randomized trial designed to test school and community interventions to reduce the decline in moderate to vigorous physical activity among middle-school girls. TAAG is a collaborative study involving six field centers in the vicinities of Washington, D.C. and Baltimore, Maryland (University of Maryland), Columbia, South Carolina (University of South Carolina), Minneapolis, Minnesota (University of Minnesota), New Orleans, Louisiana (Tulane University), Tucson, Arizona (University of Arizona), and San Diego, California (San Diego State University), a Coordinating Center at the University of North Carolina, Chapel Hill, and the Project Office at the National Heart, Lung, and Blood Institute. Each field center received approval from its respective institutional review board to conduct this study. A complete description of the study design for TAAG is reported elsewhere (Stevens et al., 2005). The present study is a cross-sectional examination of baseline data from the main trial.

Participants and data collection

Six middle schools from each TAAG field center agreed to participate in the study. The major eligibility criterion was the middle school had to be public and the majority of students enrolled reside in the community that serviced the

school. At baseline, 2818 girls completed the student questionnaire during the spring semester. Written parental or guardian consent and participant assent were obtained for all girls. Measurement coordinators from each field center were trained at a centralized training on the protocol and they subsequently trained and certified local measurement staff.

Measures

Self-efficacy for physical activity

Self-efficacy was assessed using a version of a previously validated scale (Saunders et al., 1997). After confirmatory factor analysis was performed in the TAAG Student Questionnaire pilot study, eight questions found to be appropriate for adolescent girls (Motl et al., 2000) from the original scale of 15 statements remained and were included. Cronbach's alpha for this subscale is 0.81.

Physical activity enjoyment

This variable was assessed using questions adapted from the Physical Activity Enjoyment Scale (PACES) (Kendzierski and DeCarlo, 1991). Based on previous focus groups (Motl et al., 2001) and structural equation modeling (Dishman et al., 2005), the scale was adapted for adolescents, and the length was reduced from 18 to 7 statements. Cronbach's alpha for this subscale is 0.88.

Physical education enjoyment

A measure of factors influencing enjoyment of physical education was previously developed for Black and White adolescent girls (Motl et al., 2001). The original scale contained 12 items, and previous work found that one item was sufficient to describe the variable (Motl et al., 2001).

Perceived school climate for girls' physical activity

A school climate measure specific to physical activity, based on items from the School Health Index and the PE Program Improvement and Self-Study Guide (CDC, 2000; NASPE, 1998), was developed for TAAG. This new and validated instrument (Birnbaum et al., 2005) assessed girls' perceptions of the influence of teachers and boys on the school climate for girls to be physically active. An additional item on the influence of girls was also added. Cronbach's alpha for the six-item scale is 0.61.

Items from the four scales previously described were rated on a 5-point Likert scale from disagree a lot (1) to agree a lot (5), but each scale was transformed to a 0 to 1 scale for analytical and interpretational purposes. A single score for each scale was computed by taking the mean of all items using questionnaires that had greater than or equal to 80% of the scale items as non-missing. Scores closer to 1 indicated positive behavior.

Diversity of involvement in structured physical activities

Girls were given a checklist of 14 sports and 17 activity classes or lessons and asked which ones they had been involved in during the past year at and outside of school. These questions were adapted from a survey administered to an ethnically diverse middle-school population (Hoefer et al., 2001). A single structured physical activity variable was created by summing all combined responses about sports participation at and outside of school, and activity lessons and classes engaged in outside of school during the past year.

Race/Ethnicity

Girls self-identified their race/ethnicity as Caucasian (non-Hispanic White), Black or African-American, Hispanic, Asian/Pacific Islander, American Indian or Alaska Native, "Other", or don't know. Girls who selected more than one category were classified as Multi-Racial. Due to the small sample sizes of Asian/Pacific Islander girls, American Indian or Alaska Native girls, and Multi-Racial girls, these racial/ethnic groups were collapsed and the racial/ethnic categories for these analyses were White, Black, Hispanic, and "Other".

Socioeconomic status

Participation in the subsidized school lunch program was used as a proxy for socioeconomic status. Girls were asked if they received free or reduced-price lunch at school; the possible responses were yes, no, or don't know.

Statistical analysis

Descriptive analyses (e.g. frequencies, means, ranges, and percentages) of psychosocial variables and structured physical activities were calculated to summarize data within and across all racial/ethnic groups and geographical locations. Analyses of variance were used to make multiple comparisons between racial/ethnic groups. Geographical location, race/ethnicity, and subsidized school lunch were included in models as fixed effects, while school within field center was included as a random effect. Adjustments for multiple comparisons were made using Tukey's method. Regression analyses adjusting for the random effect evaluated the impact of the potential correlates, self-efficacy, physical activity enjoyment, physical education enjoyment, and perceived school climate, on girls' involvement in structured physical activity at school and outside of school. Race/ethnicity, geographical location, their interaction, and socioeconomic status were covariates in these analyses. Both logistic regression ('participation in any structured physical activity' versus 'participation in no structured physical activity') and multiple regression (participation in 0, 1–4, 5–7, 8+ activities, based on quartiles) analyses were performed. Data were analyzed using the Statistical Analysis System (SAS) version 9.1.

Results

Description of sample

2791 6th grade girls participated in TAAG. Table 1 displays the distribution of the sample by race/ethnicity and geographical location. Although the majority of the girls were non-Hispanic White, the racial composition of the sample varied by geographical location. Almost equal proportions of the girls responded that they did (47%) or did not (41%) receive free or reduced lunch.

Involvement in structured physical activity

The majority of girls (89.5%) participated in some type of structured physical activity; 39% engaged in school-based activities and 86% in non-school-based activities. On average, each girl participated in approximately five structured activities over the past year (four sports, lessons, or classes outside of school versus one sport at school). The most frequently reported structured physical activities are displayed in Table 2.

Racial/Ethnic and geographical location differences in structured physical activity

Among all racial/ethnic groups, the most frequently reported structured physical activity was basketball followed by either cheerleading/dance or swimming. No racial/ethnic differences in the mean number of structured physical activities were found (p -value=0.63) (Table 3). However, Hispanic and "Other" girls reported a higher number of involvement in sports teams at school than White girls (p <0.02). No racial/ethnic differences were found for participation in sports teams, classes, and/or lessons outside of school.

The only difference in mean number of structured physical activities across geographical locations was that girls from Louisiana participated in a greater number of structured activities compared to girls from California and South Carolina

Table 1

Description of 6th grade participants at baseline, Trial of Activity for Adolescent Girls (Data collection from January–May 2003)^a

Variable	<i>n</i>	%
<i>Ethnicity</i> ^b		
Non-Hispanic	2195	80
Hispanic	562	20
<i>Race</i> ^c		
White	1227	44
Black or African American	673	24
Hispanic ^d	564	20
Other	310	11
<i>Location</i> ^e		
Arizona	403	15
53% W, 38% H, 7% O, 2% B		
California	308	11
41% H, 37% W, 16% O, 6% B		
Louisiana	571	20
51% B, 20% H, 17% W, 12% O		
Maryland	579	21
46% W, 24% B, 17% H, 13% O		
Minnesota	331	12
79% W, 11% H, 9% O, 1% B		
South Carolina	599	21
49% W, 36% B, 9% O, 6% H		
<i>Subsidized school lunch</i> ^f		
Yes	1141	41
No	1286	47
Don't know	327	12
	Mean	SD
Any structured physical activity involvement ^g	5.2	5.12
Sports at school	0.8	1.48
Sports outside of school	2.2	2.47
Lessons/classes outside of school	2.1	2.30
Self-efficacy ^h	0.7	0.20
Physical activity enjoyment ⁱ	0.8	0.20
Physical education enjoyment ^j	0.8	0.28
School climate ^k	0.6	0.19

^a Data for 2818 girls are available. However, 12 are classified as 7th graders, 2 as 8th graders, and 13 with missing data for grade. For these analyses, only 6th graders are included. Final sample included 2791 girls.

^b Ethnicity data are missing on 34 girls.

^c Race data are missing on 17 girls. The "Other" category is comprised of 187 Multi-Race, 104 Asian, and 19 American Indian girls.

^d Two girls reported not being of Latino, Hispanic, Mexican American, or Spanish origin, but thought of themselves as "Other" and specified "Hispanic."

^e Percentages represent racial/ethnic breakdown at each geographical location: W=White, B=Black or African American, H=Hispanic, O=Other.

^f Subsidized school lunch data are missing on 37 girls.

^g Any structured physical activity involvement is determined by summing the number of sports teams girls reported having been on during the past year at school and outside of school plus the number of classes or lessons girls reported taking during the past year outside of school only.

^h The higher the score, the higher the participant's self-efficacy to be physically active. Range from 0 to 1. Data are missing on 44 girls.

ⁱ The higher the score, the higher the level of physical activity enjoyment. Range from 0 to 1. Data are missing on 27 girls.

^j The higher the score, the higher the level of physical education enjoyment. Range from 0 to 1. Data are missing on 57 girls.

^k The higher the score, the more positive school climate for girls to be physically active. Range from 0 to 1. Data are missing on 93 girls.

Table 2

Most commonly reported structured physical activity at baseline stratified by race/ethnicity and geographical location as reported by 6th grade participants, Trial of Activity for Adolescent Girls (Data collection from January–May 2003)^a

	Overall sample	Race/Ethnicity				Geographical location ^b					
		White	Black ^c	Hispanic	Other	AZ ^b	CA ^{b, d}	LA ^{b, e}	MD ^{b, f}	MN ^{b, g}	SC ^{b, h}
Basketball	1 (44.3)	1 (40.3)	1 (54.4)	1 (41.1)	1 (44.2)	1 (41.7)	4 (29.9)	2 (50.3)	1 (47.7)	3 (35.1)	1 (50.3)
Cheerleading/Dance	2 (41.5)	3 (36.5)	2 (53.6)	4 (38.7)	3 (40.3)	4 (34.5)	3 (31.8)	1 (56.2)	4 (37.0)	6 (33.8)	2 (45.7)
Swimming	3 (39.0)	2 (36.7)	3 (40.4)	2 (39.4)	2 (42.9)	3 (35.0)	2 (32.5)	3 (45.2)	2 (41.5)	2 (39.0)	3 (36.6)
Soccer	4 (33.0)	4 (36.3)	8 (22.0)	3 (39.2)	4 (32.3)	2 (39.2)	1 (36.4)	8 (28.2)	3 (38.2)	1 (39.3)	6 (23.4)
Baseball/Softball	5 (31.0)	5 (31.8)	5 (29.4)	5 (33.0)	6 (26.5)	6 (30.5)	5 (27.0)	4 (40.1)	5 (29.5)	5 (33.8)	5 (24.7)
Dance	6 (29.2)	6 (26.7)	4 (33.9)	6 (30.3)	5 (27.4)	7 (25.6)	6 (22.1)	6 (37.3)	6 (28.3)	4 (34.1)	4 (25.7)
Volleyball	7 (23.8)	7 (21.4)	7 (25.7)	7 (25.2)	7 (26.1)	5 (33.3)	8 (15.9)	5 (39.2)	8 (19.9)	8 (20.5)	8 (12.5)

^a Statistics are represented as rank from 1 to 8 of the most frequently reported structured physical activity (e.g. organized sports, activity classes, and lessons). Percentage of girls who participated is given in parenthesis.

^b State abbreviations for geographical locations: AZ=Arizona, CA=California, LA=Louisiana, MD=Maryland, MN=Minnesota, SC=South Carolina.

^c For Black girls, the 6th most popular structured physical activity was track and field; 27.8% of Black girls participated in track and field.

^d For California, the 7th most popular structured physical activity was gymnastics; 19.8% of girls from California participated in gymnastics.

^e For Louisiana, the 7th most popular structured physical activity was track and field; 34.7% of girls from Louisiana participated in track and field.

^f For Maryland, the 7th most popular structured physical activity was gymnastics; 20.7% of girls from Maryland participated in gymnastics.

^g For Minnesota, cheerleading/dance and baseball/softball tied for 5th place. The 7th most popular structured physical activity was tennis; 23.9% of girls from Minnesota participated in tennis.

^h For South Carolina, the 7th most popular structured physical activity was gymnastics; 19.5% of girls from South Carolina participated in gymnastics.

(6.5 activities versus 4.1 and 4.4, respectively; $p < 0.01$). Results for the most reported activities by geographical location were similar. Regardless of the location, basketball, swimming, cheerleading/dance, and soccer were reported most often. Girls in Arizona, Maryland, and South Carolina reported basketball most often. Girls in California and Minnesota reported soccer, while girls in Louisiana reported cheerleading/dance most often.

Psychosocial factors

White girls had a greater level of physical activity self-efficacy and physical activity enjoyment than the other racial/ethnic groups (Table 3). However, White girls also reported the lowest level of physical education enjoyment, which was lower than that of Black girls. Girls from Minnesota consistently reported high scores and girls from Louisiana reported the lowest scores for self-efficacy, physical activity enjoyment, and perceived positive school climate. There were no geo-

graphical location differences for enjoyment of physical education class.

Association of psychosocial factors with girls' participation in structured physical activity

The level of high physical activity self-efficacy was 3.44 times greater and the level of high physical education class enjoyment was 1.97 times greater for girls who participated in any structured physical activity compared to girls who participated in no structured physical activity. No differences were found for physical activity enjoyment and perceived school climate (Table 4).

Multiple regression models in which structured physical activity participation was categorized (0, 1–4, 5–7, 8+ activities) indicated that, as the category of involvement in structured physical activities increased, so did levels of physical activity self-efficacy and enjoyment of physical education class. Girls who were highly involved (participated in greater than 8

Table 3

Outcome and psychosocial variables stratified by race/ethnicity at baseline, Trial of Activity for Adolescent Girls (Data collection from January–May 2003)^a

	White	Black	Hispanic	Other	<i>p</i> -value ^b
Number of structured physical activity	4.9 (0.25)	5.1 (0.30)	5.6 (0.30)	5.3 (0.35)	0.092
Self-efficacy	0.71 (0.008)	0.67 (0.010)	0.66 (0.010)	0.65 (0.012)	<0.001 ^c
Physical activity enjoyment	0.87 (0.008)	0.81 (0.010)	0.81 (0.010)	0.83 (0.012)	<0.001 ^d
Physical education enjoyment	0.77 (0.013)	0.82 (0.016)	0.80 (0.016)	0.78 (0.019)	0.030 ^e
Perceived school climate	0.66 (0.010)	0.61 (0.012)	0.62 (0.012)	0.64 (0.013)	<0.001 ^f

^a Statistics represented as mean (standard error).

^b *p*-values are from mixed model analyses of variance that controlled for geographical location and subsidized lunch. *p*-value tests for differences between racial/ethnic groups. Tukey–Kramer method is used to adjust for multiple comparisons.

^c Mean for self-efficacy is statistically significantly greater in Whites than in any other group (p -value < 0.0001 for all possible comparisons).

^d Mean for physical activity enjoyment is statistically significantly greater in Whites than in any other group (p -value < 0.01 for all possible comparisons).

^e Means for physical education enjoyment are statistically significantly different between Whites and Blacks only ($p = 0.03$).

^f Means for perceived school climate are statistically significantly greater in Whites as compared to Blacks and Hispanics ($p < 0.004$).

Table 4
Baseline logistic regression results to examine association among psychosocial variables and structured physical activity, Trial of Activity for Adolescent Girls (Data collection from January–May 2003)^a

	Any structured physical activities	No structured physical activities	OR (95% CI)	p-value
<i>Self-efficacy</i>				
Higher	1265	117	3.44 (1.72, 6.92)	<0.001
Lower	1194	171	1	
<i>Physical activity enjoyment</i>				
Higher	1294	137	0.76 (0.38, 1.52)	NS
Lower	1182	151	1	
<i>Physical education enjoyment</i>				
Higher	1949	201	1.97 (1.25, 3.12)	0.004
Lower	506	78	1	
<i>School climate</i>				
Higher	1223	140	0.63 (0.30, 1.31)	NS
Lower	1203	132	1	

OR: odds ratio; CI: confidence interval.

^a Logistic regression analyses modeled probability of participating in any structured physical activities ($n=2332$) versus participating in non-structured physical activity ($n=259$). Model controlled for socioeconomic status, geographical location, race/ethnicity, and geographical location * race/ethnicity interaction.

structured physical activities) had greater levels of those psychosocial measures than girls in the other categories.

Discussion

In a large sample of girls across differing geographical locations, the vast majority participated in structured physical activity. Higher physical activity self-efficacy and physical education enjoyment were significantly associated with structured physical activity. These findings suggest that interventions to increase self-efficacy and making physical education classes more enjoyable for girls may result in greater participation in structured physical activity and higher overall physical activity levels among adolescent girls.

As has been shown previously, self-efficacy is an important correlate of adolescent physical activity participation (Sallis et al., 2000). However, physical education enjoyment and not physical activity enjoyment (as hypothesized in the Surgeon General's Report on Physical Activity and Health (1996)) may weigh more heavily in determining the level of participation in structured physical activity than originally thought. Enjoyment of physical education class may be an indicator of girls' comfort in participating in group-based activities, which is the basis of structured programs, while physical activity enjoyment may reflect pleasure derived from movement more than feelings about group-based activities. The present findings are consistent with previous studies that made similar conclusions (Sallis et al., 1999a,b; Dishman et al., 2005). The growing evidence of the relation of physical education enjoyment to youth physical activity suggests that a higher priority needs to be placed on making sure physical education classes are enjoyable for all students.

Sports teams are common sources of physical activities for 6th grade girls. Seventy-six percent of girls participated in sports teams outside of school, at an average of two sports per girl, compared to only 39% of girls involved in sports teams at school at an average of one sport per girl. Schools may be limited in the activities they can provide and may only accommodate a small number of girls, thus forcing girls to go off campus to find opportunities for sports. Offering a greater variety of opportunities for structured activities after school could reduce barriers to participation, such as the need for transportation to other sites. After-school activities may have the added benefit of being free or very low cost, thus providing opportunities to reduce socioeconomic disparities in physical activity.

Despite the variability by geographical location, 7 of the 19 activities assessed were reported commonly across sites: basketball, cheerleading/dance, swimming, soccer, baseball/softball, dance, and volleyball. Cheerleading/dance, dance, and swimming have been traditionally popular physical activities among young females. The establishment of women's professional basketball and soccer leagues in the U.S. and the notoriety achieved by the U.S. Olympic softball and volleyball teams may help to explain the high reported participation in these sports.

Study strengths and limitations

Several strengths exist for this present study. The large and diverse study sample from six different locations across the United States increases the generalizability of the results. The girls in the study population were at an age in which their level of physical activity is expected to decline, so the identification of several popular structured activities suggests that more opportunities for participation in these activities should be provided to middle-school girls. All measures used in the analyses had been previously evaluated. Assessment of structured activities outside of school and at school revealed important differences that have intervention implications. The present study identified important psychosocial correlates of structured physical activities, thus complementing previous studies that examined correlates of habitual total activity.

A limitation for the present study is potential recall bias. Participants were 6th graders who were asked to recall their physical activity over the past year, which included at least a part of their fifth grade elementary school experience and time (summer) before they entered middle school. Second, the cross-sectional nature of these analyses limits the ability to conclude causality in the observed associations.

Another limitation is the dependent variable, number of structured physical activities in which girls participated. Girls reported whether or not they participated in any of the listed sports and classes/lessons over the past year. Because information on the length of time spent engaging in each activity was not available, this variable is not a clear proxy for overall physical activity level. A girl who participated in one sport for the majority of the year (i.e. gymnastics) may be getting more

physical activity than a girl who tried different activities, but did not continue with the activity the entire season. Future studies should also include information on length of time and hours per week to gain a better understanding of overall physical activity level in structured physical activities.

Although the same psychosocial variables that explain youth physical activity were associated with participation in structured programs, other important correlates were not measured in the present study. For example, social support for physical activity is likely related to a desire for the girls to participate in the same activity programs as their friends. Parent involvement is essential for girls to participate in structured programs because parents are usually required to pay fees or provide transportation to or from programs. Parental provision of transportation was associated with overall adolescent physical activity (Hoefler et al., 2001), and it may be more strongly related to participation in structured programs. Characteristics of available programs were not evaluated, such as cost, distance from home and school, and quality of leadership. Though the present study supports the application of psychosocial and social–ecological models to explaining structured physical activity, more variables need to be tested.

Conclusions

These findings suggest that interventions to increase self-efficacy and making physical education classes more enjoyable for girls may result in greater participation in structured physical activity and higher overall physical activity levels among adolescent girls.

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