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RESEARCH ARTICLE

Changes in Psychosocial Factors and Physical Activity Frequency Among Third- to Eighth-Grade Girls Who Participated in a Developmentally Focused Youth Sport Program: A Preliminary Study

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ABSTRACT

BACKGROUND: Despite the numerous physiological, psychological, and academic benefits of physical activity (PA), declines in PA levels among girls have been observed over the last decade. The purpose of this preliminary study was to assess the short-term changes pertaining to Girls on the Run and Girls on Track developmentally focused youth sport programs (DYS) on global self-esteem, body image, commitment to PA, and PA frequency.
METHODS: This preliminary study employed a nonexperimental, one-group, pre- and postintervention study design using a 29-item paper-and-pencil assessment tool ($n = 1034$).
RESULTS: Paired sample *t*-tests from pre- to postintervention revealed statistically significant differences in self-esteem ($p < .001$), body size satisfaction ($p < .001$), and vigorous PA frequency ($p < .001$). Stratification by the number of times participating in the intervention revealed the greatest changes at first participation followed with continued improvements in self-esteem ($p = .013$) and body size satisfaction ($p < .001$) for those participating in a second time. Age differences were also observed between participants $\leq$10 years old and 11–15 years; in that significant improvements in commitment to PA ($p = .003$) were observed for the older girls.
CONCLUSIONS: Findings suggest DYS programs Girls on the Run and Girls on Track may produce beneficial changes in self-esteem, body size satisfaction, PA commitment, and PA frequency. Although the findings from the current report are preliminary, they suggest that DYS programs designed exclusively for girls may provide the necessary framework to promote PA to achieve the numerous associated benefits.

Keywords: child and adolescent health; physical fitness and sport; public health.

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Among children and adolescents, physical activity (PA) is associated with more benefits including lower rates of obesity, improved cardiovascular and muscular fitness, higher bone mineral density, improved psychosocial health, and academic achievement.[1–6] More specifically, girls who are physically active perform better academically (ie, higher grades and lower dropout rates) and have higher self-esteem and self-worth when compared with their more sedentary counterparts.[7–9] Moreover, because PA habits that are developed early in life carry over into adulthood, regular participation in PA during childhood and adolescence may be critically important in the promotion and maintenance of healthy body weight, risk factor reduction, and chronic disease prevention throughout the life span.[10]

Despite the known benefits of PA, across all age groups, girls tend to be less physically active than boys.[11–14]Furthermore, research suggests a decline in PA from childhood into adolescence; *a trend that is more prominent in girls*.[13,15–17] Although the causes of gender-related differences in PA remain unclear, several factors have been suggested which contribute to lower PA levels that are commonly observed in girls, including low self-esteem and body image, lack of motivation, enjoyment, interest or valuation of PA, low athletic competence, and lack of parental and peer support.[9,18–22]

Self-esteem is a construct that comprises believing in oneself, feeling good about oneself, and valuing oneself.[9] Research regarding the association between self-esteem and PA has suggested the following: (a) girls' self-esteem influences participation in PA[23] and (b) participation in sports teams is positively associated with higher self-esteem.[24,25] Moreover, body image has been associated with both self-esteem[26] and PA.[27,28] Among adolescent girls, weight and appearance concerns have been found to be motivators for PA[27,28] with perceived and ideal body size discrepancies predictive of weight management motives for PA.[29]

Also influencing PA among adolescents is girls' interest in and perceived importance of PA.[30] Those who place a higher value on sport and health improvement are found to be more physically active.[31] Unfortunately, research indicates that girls place less importance on sports and are less interested in PA compared with boys of the same age.[32]

In addition to the above-described determinants of PA among girls, it is also important to consider factors that influence PA maintenance as they age into adulthood. Physical activity commitment has been defined as a global psychological construct reflecting the ''binding force'' that supports continued exercise involvement.[33,34] Because the factors described above vary significantly to those of boys, programs designed to engage and maintain girls in PA should provide instruction and experiences that focus on increasing self-esteem, positive body image, valuation of PA, motivation to be physically active, and develop a sense of commitment to be physically active by providing social environments that involve a range of fun activities that girls enjoy.[35]

Literature regarding a unique type of PA programming called developmentally focused youth sports (DYS) programs has accumulated over the past decade.[36–38] DYS programs teach sport and life skills concurrently[38] using sport as a medium for providing youth with opportunities for psychological, emotional, social, and intellectual growth.[36,37] Sport programs provide the opportunity for life skills instruction because of parallels that exist between life and sport including problem solving, goal setting, teamwork, communication, management of success and failure, and receiving and applying constructive feedback.[39] In addition, sport and life skills have similar learning modes such as demonstration, modeling, and practice.[40] Thus, the concurrent acquisition of sport and life skills in girls may foster interest in PA as well as improvement in various psychosocial factors (eg, self-esteem and body image).[41]

DYS programs are traditionally designed exclusively for boys or may be coeducational. Examples of DYS programs include (a) Sports United to Promote Education and Research (SUPER), a coeducational program that integrates goal setting, problem solving, and positive thinking with team sports including soccer, volleyball, and basketball;[39] (b) Play It Smart, a program designed exclusively for boys which incorporates football with academic, career, and personal development;[42] and (c) the First Tee, a coeducational program that teaches youth core values like respect, honesty, confidence, responsibility, and community service in the context of golf.[43]

As previously described, girls' interest in and perceptions of PA differ from their male counterparts. Therefore, DYS programs geared for girls should address factors that contribute to higher PA participation while also providing gender-specific life skills. In addition, curricular lessons should include situations that are familiar to girls such as peer pressure, gossiping, bullying, body image, healthy decision making, active listening, and getting along with peers. Girl-focused DYS program should also endorse an activity that is familiar to girls to facilitate interest and valuation of PA, which will support confidence and motivation to be physically active. Unfortunately, no evidence-based, empirically tested DYS programs designed exclusively for girls currently exist.[9] However, 1 promising program described in the Tucker Center Research Report, *Developing Physical Active Girls: An Evidence Based Multi-disciplinary Approach*, is Girls on the Run, an initiative designed solely for girls to learn life and physical (sport) skills concurrently.[9]

Based on the need to create and develop evidence-based DYS programs that are designed exclusively for girls, the purpose of the current preliminary study was to evaluate the influence of Girls on the Run and Girls on Track programs on self-esteem, body image, commitment to PA, and PA behaviors in third- to eighth-grade girls.

METHODS

Participants

Girls were recruited for either the Girls on the Run (third–fifth grade) or Girls on Track (sixth–eighth grade) curriculum from a convenience sample of 20 Girls on the Run councils through print advertisements displayed at each program delivery site. The Girls on the Run councils (ie, program delivery area) represented Southern, Midwestern, Northeastern, and Pacific regions of the U.S. Councils and may have more than 1 program delivery site; however, each site must be facilitated by a trained Girls on the Run leader and 1 assistant.

The Girls on the Run and Girls on Track youth self-selected to participate and provided passive assent. Written consent was obtained from participants' parents/guardians. Study protocols were approved by the university institutional review board of the principal investigator. Data were collected from January to June, 2007. Of the 2233 girls who participated in the intervention, 6 (0.3%) did not complete the assessments, 1045 (46.8%) completed the preassessment only, 148 (6.6%) completed the postassessment only, and 1034 (46.3%) completed both the pre- and postassessment. These data reflect findings from the participants who completed both the pre- and postassessment (n = 1034).

Intervention

Girls on the Run International is a nonprofit organization with the mission of ''preparing girls for a lifetime of self-respect and healthy living.''[44] Girls on the Run was developed to address the decline in PA that occurs in girls from childhood to adolescence. Girls on the Run delivers 2 DYS programs for girls aged 8–13 that combine training for a 3.1 mile (5K) running event with experiential curricula that promotes positive emotional, social, mental, and physical development. Girls on the Run councils partner with a variety of non-profit organizations including community hospitals, recreation centers, public and private schools, YWCAs, YMCAs, Boys & Girls Clubs, health departments, and universities to serve participants after school.

Girls on the Run targets third- to fifth-grade girls and Girls on Track is for sixth- to eighth-grade girls. Both programs include a 12-week curriculum where participants meet twice weekly for an hour and a half. Although the principal philosophies and curriculum objectives are the same for both Girls on the Run and Girls on Track, each offers age-appropriate activities and accompanying discussions. Within the 12-week curriculum, weeks 1–4 focus on the topic area ''All About Me: Getting to Know Who I Am and What I Stand For.'' Sessions in weeks 1–4 provide participants with opportunities to assess their current behaviors and learn ways to change behaviors that need improvement, explore the importance of being physically healthy through proper exercise and nutrition habits, understand how to be emotionally healthy by identifying and dealing with certain emotions, and learn the differences between inner and outer beauty. Weeks 5–8 focus on ''Building My Team: Understanding the Importance of Cooperation.'' Lessons in weeks 5–8 encourage participants to explore the meaning of cooperation, learn active listening, understand the negative consequences of gossiping and bullying, and recognize the importance of having a positive attitude in dealing with others. Finally, weeks 9–12 incorporate the theme of ''Community Begins With Me: Learning About Community and Designing Our Own Community Project.'' Lessons pertaining to this theme allow participants to explore their responsibility to the community, analyze the cultural and social messages girls receive from the media, examine their own stereotyping and discriminatory behavior, and create and implement a community service project.[44] At the end of both 12-week programs, each girl participated in a 5K running event.

Each meeting is structured to include (a) a getting-on-board activity that serves as a warm-up, as well as an introduction to the session topic; (b) stretching activities that allow for questions and answers regarding the session topic; (c) a workout where the girls participate in multiple running activities involving a game or team goal to ''teach'' the session topic; (d) cool-down stretching and processing of the session topic; (e) session closing where the adult leader provides encouragement for individual and group behavior. A sample lesson is available at the Girls on the Run International Web; site.[44]

Instrument

A 29-item paper-and-pencil survey was used at pre- and postintervention that included 4 demographic items including age, race/ethnicity, current grade level, and number of times participated in Girls on the Run. The survey was constructed with existing tools such as the Rosenberg Self-Esteem Scale,[45] Schematic Figural Scale (child/adolescent version),[46] Commitment to PA Scale,[33] and a PA survey question from the 2005 version of the Youth Risk Behavioral Survey (YRBS).[47] The development of the survey was pilot tested among participants (n = 1065) in the

fall 2006 session (ie, participants from a previous session) to assess readability, comprehension, time for completion, standardization, and level of missing data. Based upon findings and input from coaches, the survey and standardization were modified slightly to further improve readability and comprehension.

The Rosenberg Self-Esteem scale is a reliable[45] and valid self-administered questionnaire for assessing self-esteem[48] in adolescents. It contains 10 items that measure global self-esteem, where higher scores reflect higher self-esteem.[45] The current study revealed a Cronbach alpha of 0.79 for both pre- and post-intervention.

The child and adolescent version of the Schematic Figural Scale was used to assess body image via body size satisfaction or dissatisfaction.[46] Each participant was asked to examine a series of 7 female child silhouettes, ranging in size from thin to obese. Each participant was then asked 2 questions regarding the silhouettes: (a) select the silhouette that best reflected their current body size and (b) select the figure that best represented their ideal body size. A discrepancy score was calculated by subtracting their perceived ideal body size from their perceived current status. Previous reliability analyses of the Schematic Figural Scale in a similarly aged population ranged from 0.59 to 0.71.[49] A Cronbach alpha of 0.62 pre-intervention and 0.69 postintervention was revealed for this study.

Commitment to PA was measured using a modified version of the Commitment to PA scale.[33] Modifications consisted of minimal wording changes to account for reading comprehension levels of elementary school

Table 1. **Demographic Characteristics of Study Participants From the Girls on the Run and Girls on Track Developmentally Focused Youth Sport (DYS) Programs (n = 1034)**

	Participants With Pre- and Post-Data (n = 1034)		Participants With Pre- or Post-Data (n = 1199)		
Characteristic	**n**	**%**	**n**	**%**	**p-Value**
Region					
Northeast	51	4.9	433	36.1	<.001*
Southeast	472	45.6	308	25.7	
Midwest	328	31.7	364	30.4	
Southwest	39	3.8	16	1.3	
West	143	13.8	78	6.5	
Missing	1	0.1	0	0	
Race/ethnicity					
Caucasian	631	61.0	462	38.5	.114
African American	78	7.5	47	3.9	
Hispanic	72	7.0	34	2.8	
Other	58	5.6	34	2.8	
Missing	195	18.9	622	51.9	
Age					
8	2	0.2	6	0.5	.146
9	184	17.8	124	10.3	
10	281	27.2	206	17.2	
11	254	24.6	177	14.8	
12	141	13.6	70	5.8	
13	26	2.5	18	1.5	
14	9	0.9	9	0.8	
15	2	0.2	3	0.3	
Missing	135	13.1	586	48.9	
Grade					
Third	299	28.9	49	4.1	.273
Fourth	323	31.2	46	3.8	
Fifth	264	25.5	30	2.5	
Sixth	52	5.0	5	0.4	
Seventh	13	1.3	1	0.1	
Eighth	2	0.2	0	0	
Missing	78	7.5	1067	89.9	
Participation in GOTR					
First time	620	60.0	84	7.0	.254
Second time	265	25.6	45	3.8	
Three or more times	109	10.5	14	1.2	
Missing	0	0	1056	88.1	

*Tests are significant at $p < .05$.
GOTR, Girls on the Run.

girls. The Commitment to PA scale consists of 12 items that comprise 3 subscales: (a) *attitudes* toward PA; (b) *valuation* of PA; and (c) *motivation* to be physically active. Responses were scored on a 4-point Likert-type scale ranging from 0 to 3. The current study yielded a pre-intervention Cronbach alpha of 0.81 and a postintervention Cronbach alpha of 0.83. In addition, significant correlations with vigorous physical activity (VPA) frequency suggesting concurrent validity.[50]

Running was the primary activity encouraged in the Girls on the Run and Girls on Track programs. Since the metabolic cost of running is estimated as being greater than 6 metabolic equivalents, it is considered a vigorous-intensity activity.[51] Thus, a question from the 2005 YRBS that ascertained frequency of vigorous intensity activity over a week was used to provide an estimate of VPA.[47] Participants were asked to indicate how many days during the past 7 that they exercised or participated in PA for at least 20 minutes that made them sweat and breathe hard. Sample activities were listed to aid recall (eg, basketball, soccer, running, swimming laps, fast bicycling, fast dancing, or similar aerobic activities).

Procedure

Participants completed the Girls on the Run or Girls on Track curriculum, and a nonexperimental, one-group, pre- and postintervention study design was used to determine changes in self-esteem, body size satisfaction, commitment to PA, and PA frequency. A full description of the intervention and study procedures are available elsewhere.[52] Briefly, Girls on the Run and Girls on Track leaders administered the comprehensive self-report survey to program participants before and after the 12-week curriculum. At each data collection period (ie, pre- and post-intervention), the program leaders read the survey questions aloud while the participants recorded their responses on the survey. Survey completion required approximately 30 minutes.

Data Analyses

All variables were normally distributed and reported as a mean ± standard deviation. Proportions were noted for categorical variables. Descriptive statistics were used for demographic characteristics and pre- and postintervention values for body image, global self-esteem, commitment to PA, and PA frequency. Paired sample *t*-tests were used to compare mean differences in pre- to postintervention values for body image, self-esteem, commitment to PA (including subscales: values, attitudes, and motivation), and PA frequency in Girls on the Run and Girls on Track DYS programs. Finally, paired sample *t*-tests were used to compare mean differences in pre- and postintervention values, after stratifying by the number of times a girl participated in the Girls on the Run programs (1, 2, or >3 times) and age (<10 years and 11–15 years). Due to the number of planned comparisons, Holm's Bonferroni step-down corrections were applied to maintain the Type I error rate at 0.05.[53] SPSS 14.0 (SPSS Inc., Chicago, IL) was used for analyses.

RESULTS

Among the 2233 participants, 1034 (46.3%) completed both the pre- and postassessment. Table 1 presents the demographic characteristics of

Table 2. **Mean Differences in Self-Esteem, Body Size Satisfaction, Commitment to Physical Activity (PA) (Including Subscales), and PA Frequency from Pre- to Postintervention (n = 1034)**

Variable	Pre-Intervention Mean ± SD	Postintervention Mean ± SD	p-Value
Self-esteem†	22.27 ± 4.58	23.45 ± 4.39	<.001*
Body size satisfaction‡	0.69 ± 0.96	0.41 ± 0.81	<.001*
PA commitment§	27.35 ± 5.54	27.70 ± 5.56	.038
PA values‖	14.54 ± 3.05	14.64 ± 2.93	.284
PA attitudes¶	7.12 ± 2.05	7.22 ± 1.99	.161
PA motivation#	5.69 ± 1.90	5.79 ± 1.98	.099
PA frequency (days/week)	4.71 ± 2.01	5.12 ± 1.83	< .001*

*Tests are significant at $p < .05$ using Holm's step-down correction.

†Scores ranged from 0 to 30; higher scores indicated greater self-esteem. Sum score based on the following questions: I am satisfied with myself; I do not think I am good at all; I feel that there are a lot of good things about me; I can do things as well as most other people; I feel I do not have much to be proud of; I feel useless at times; I have a lot to offer people; I wish I could have more respect for myself; I feel that I am a failure; I take a positive attitude toward myself.

‡Discrepancy score calculated by subtracting ideal body size from perceived body size.

§Scores ranged from 0 to 36; higher scores indicated greater commitment to PA. Sum score based on the following formula: Value + Attitudes + Motivation.

‖Scores ranged from 0 to 18; higher scores indicated greater perceived value of PA. Sum score based on the following questions: I look forward to PA; PA is very important to me; Life is better because I am physically active; PA feels good; I would change my schedule to participate in PA; PA is the best part of my day.

¶Scores ranged from 0 to 9; higher scores indicated fewer negative attitudes toward PA. Sum score based on the following questions: I do not enjoy PA; I do not like thinking about PA; I do not like being physically active every day.

#Scores ranged from 0 to 9; higher scores indicated fewer motivational barriers to PA. Sum score based on the following questions: I wish there were better ways to get healthy than being physically active; PA is hard work; I have to force myself to be physically active.

Table 3. **Mean Differences in Self-Esteem, Body Size Satisfaction, and Commitment to Physical Activity (PA) (Including Subscales) From Pre- to Postintervention, Stratified by the Number of Times Participating in the Program (n = 1034)**

	First-Time Participating (n = 620)			Second-Time Participating (n = 265)			Three ≥ Participating (n = 109)		
Variable	**Pre Mean ± SD**	**Post Mean ± SD**	**p-Value**	**Pre Mean ± SD**	**Post Mean ± SD**	**p-Value**	**Pre Mean ± SD**	**Post Mean ± SD**	**p-Value**
Self-esteem†	21.64 ± 4.57	23.19 ± 4.51	<.001*	23.37 ± 4.50	23.90 ± 4.14	.013*	23.14 ± 4.21	23.76 ± 4.19	.076
Body size satisfaction‡	0.82 ± 0.99	0.47 ± 0.84	<.001*	0.52 ± 0.81	0.31 ± 0.74	<.001*	0.34 ± 0.95	0.25 ± 0.76	.151
PA commitment§	26.74 ± 5.53	27.44 ± 5.59	.002*	28.36 ± 5.59	27.80 ± 5.78	.048	28.47 ± 5.04	28.77 ± 4.78	.418
PA attitudes‖	6.96 ± 2.09	7.18 ± 2.01	.021	7.35 ± 1.99	7.22 ± 2.04	.254	7.50 ± 1.72	7.44 ± 1.76	.723
PA values¶	14.28 ± 3.12	14.53 ± 2.97	.047	15.00 ± 2.92	14.64 ± 3.01	.017	14.96 ± 2.82	15.27 ± 2.50	.108
PA motivation#	5.46 ± 1.89	5.66 ± 1.98	.018	6.08 ± 1.87	5.95 ± 2.05	.238	6.07 ± 1.81	6.13 ± 1.77	.768
PA frequency	4.64 ± 2.02	5.08 ± 1.86	<.001*	4.78 ± 2.01	5.15 ± 1.76	.002*	5.07 ± 1.89	5.29 ± .82	.259

*Tests are significant at $p < .05$ using Holm's step-down corrections.

†Scores ranged from 0 to 30; higher scores indicated greater self-esteem. Sum score based on the following questions: I am satisfied with myself; I do not think I am good at all; I feel that there are a lot of good things about me; I can do things as well as most other people; I feel I do not have much to be proud of; I feel useless at times; I have a lot to offer people; I wish I could have more respect for myself; I feel that I am a failure; I take a positive attitude toward myself.

‡Discrepancy score calculated by subtracting ideal body size from perceived body size.

§Scores ranged from 0 to 36; higher scores indicated greater commitment to PA. Sum score based on the following formula: Value + Attitudes + Motivation.

‖Scores ranged from 0 to 9; higher scores indicated fewer negative attitudes toward PA. Sum score based on the following questions: I do not enjoy PA; I do not like thinking about PA; I do not like being physically active every day.

¶Scores ranged from 0 to 18; higher scores indicated greater perceived value of PA. Sum score based on the following questions: I look forward to PA; PA is very important to me; Life is better because I am physically active; PA feels good; I would change my schedule to participate in PA; PA is the best part of my day.

#Scores ranged from 0 to 9; higher scores indicated fewer motivational barriers to PA. Sum score based on the following questions: I wish there were better ways to get healthy than being physically active; PA is hard work; I have to force myself to be physically active.

Table 4. **Mean Differences in Self-Esteem, Body Size Satisfaction, and Commitment to Physical Activity (PA) (Including Subscales) From Pre- to Postintervention, Stratified by Age Categories (≤10 years and 11–15 years) (n = 899)**

	<10 Years (n = 467)			11–15 Years (n = 432)		
Variable	**Pre Mean ± SD**	**Post Mean ± SD**	**p-Value**	**Pre Mean ± SD**	**Post Mean ± SD**	**p-Value**
Self-esteem[†]	22.37 ± 4.51	23.37 ± 4.05	<.001*	22.10 ± 4.61	23.58 ± 4.69	<.001*
Body size satisfaction[‡]	0.71 ± 0.96	0.42 ± 0.81	<.001*	0.66 ± 0.98	0.40 ± 0.83	<.001*
PA commitment[§]	27.70 ± 5.50	27.83 ± 5.48	.629	26.96 ± 5.55	27.70 ± 5.52	.003*
PA attitudes[‖]	7.14 ± 2.16	7.20 ± 2.08	.602	7.07 ± 1.97	7.21 ± 1.96	.186
PA values[¶]	14.74 ± 2.99	14.80 ± 2.77	.660	14.32 ± 2.97	14.62 ± 2.88	.020
PA motivation[#]	5.74 ± 1.95	5.75 ± 2.04	.889	5.63 ± 1.88	5.85 ± 1.95	.018
PA frequency	4.74 ± 2.07	5.10 ± 1.88	<.001*	4.62 ± 1.96	5.08 ± 1.83	<.001*

*Tests are significant at p <.05 using Holm's step-down corrections.

[†]Scores ranged from 0 to 30; higher scores indicated greater self-esteem. Sum score based on the following questions: I am satisfied with myself; I do not think I am good at all; I feel that there are a lot of good things about me; I can do things as well as most other people; I feel I do not have much to be proud of; I feel useless at times; I have a lot to offer people; I wish I could have more respect for myself; I feel that I am a failure; I take a positive attitude toward myself.

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[#]Scores ranged from 0 to 9; higher scores indicated fewer motivational barriers to PA. Sum score based on the following questions: I wish there were better ways to get healthy than being physically active; PA is hard work; I have to force myself to be physically active.

participants and those who only completed either the pre- or postassessment. No statistically significant differences were observed regarding race/ethnicity, age, grade, or previous participation between participants who completed both pre- and postassessments and those who only completed either pre- or post-assessment. The following results pertain to those participants who completed both pre- and postassessments ($n = 1034$).

Most study participants who completed both pre- and postassessments were from the South (46%) or Midwest (36%). Race/ethnicity data included Caucasian (61.0%), African American (7.5%), and Hispanic (7.0%). The largest proportion of participants (85.6%) was composed of third to fifth graders, and most girls (60.0%) were participating in one of the programs for the first time.

Table 2 reports pre- and postintervention data for self-esteem, body size satisfaction, and commitment toward PA (including subscales for valuation, attitudes, and motivation). Mean values representing the number of VPA days in the last week are also shown. Paired sample *t*-tests revealed statistically significant differences in most variables from pre- to postintervention including self-esteem ($p < .001$), body size satisfaction ($p < .001$), and the number of VPA days within the last week ($p < .001$). No statistically significant differences were observed for commitment to PA and its associated subscales. Although not statistically significant, changes in commitment to PA from pre- to postintervention were approaching significance ($p = .038$).

Table 3 presents the pre- and postintervention self-esteem, body size satisfaction, commitment to PA, and subscales stratified by the number of times each participant joined Girls on the Run or Girls on Track. Paired sample *t*-tests revealed statistically significant differences in the following variables among participants who joined Girls on the Run or Girls on Track for the first time: self-esteem ($p < .001$), body size satisfaction ($p < .001$), commitment to PA ($p = .002$), and PA frequency ($p < .001$). Similar to first-time participants, girls who joined Girls on the Run or Girls on Track for a second time were observed with statistically significant increases in self-esteem ($p = .013$), body size satisfaction ($p < .001$), and PA frequency ($p = .002$). No statistically significant differences were observed from pre- to postintervention for girls who had participated in 1 of these programs 3 or more times.

Since PA levels are thought to decrease as a girl ages, pre- and postintervention differences in the variables of interest were also examined stratified by age group ($\leq$10 years old or $\geq$11 years) using paired sample *t*-tests (Table 4). In the younger age group, statistically significant differences from pre- to postintervention were found for self-esteem ($p < .001$), body size satisfaction ($p < .001$), and PA frequency ($p < .001$). Among the older girls, statistically significant differences were also observed for self-esteem ($p < .001$), body size satisfaction ($p < .001$), PA frequency ($p < .001$) as well as commitment to PA ($p = .003$). Analyses revealed no statistically significant differences between girls' $\leq$10 years old and girls $\geq$11 years old regarding the magnitude of change in scores.

DISCUSSION

The current preliminary study explored psychosocial and behavioral changes among girls in third to eighth grades who participated in the DYS programs Girls on the Run and Girls on Track. DYS programs designed specifically to increase PA using a framework that addresses gender-related barriers common among elementary- and middle school–aged girls are particularly important because past research suggests that the greatest age-related decline in PA levels occurs during these years.[54] Based upon the findings reported herein, the Girls on the Run and Girls on Track DYS programs resulted in beneficial changes in self-esteem, body size satisfaction, and PA commitment and frequency. More specifically, these findings suggest that following the 12-week programs, participants had significant gains in global self-esteem which support the suggestion that DYS programs foster positive self-worth.[41] The findings of this preliminary study are consistent with the previous research[55–57] that support the links among self-esteem, body image, and the adoption and maintenance of healthy behaviors including PA.[9,19,21,22,33,58] Although we are unable to determine the overall impact or sustainability of the Girls on the Run and Girls on Track programs, the increase in frequency of vigorous-intensity PA over the 12-week program, coupled with improved self-esteem and body size satisfaction, suggests that gender-specific DYS programs may attenuate the age-related decline in PA in girls, at least in the short term. Although the findings from the current study are considered preliminary because of the study design employed, they provide important justification for future longitudinal studies that propose to examine the impact of the Girls on the Run and Girls on Track programs on girls' PA levels using a more sophisticated research design that includes randomization to either a control or experimental group.

Results from the current preliminary study indicate 2 key findings. First, participation in the Girls on the Run and Girls on Track programs observed increases in commitment to be physically active, this is particularly important as commitment has been suggested to be an important determinant of long-term PA maintenance.[33,34,59] Furthermore, with regard to PA commitment, findings indicate important

age-related differences in PA commitment scores. More specifically, pre-intervention commitment scores were lower among older girls when compared with those ≤10 years of age (26.96 ± 5.55 and 27.70 ± 5.50, respectively). However, PA commitment scores significantly increased from pre- to postintervention in 11- to 15-year-old girls. These results are valuable as PA declines in girls occur as early as late elementary school.

Second, although this study did not assess post-intervention follow-up, we were able to examine the pre- to postintervention differences in the study variables by the number of times that the girl participated in the DYS program. Although current findings suggest that gains in self-esteem, body size satisfaction, and PA commitment were greatest after the first exposure to the DYS program, gains in self-esteem, body size satisfaction, and PA frequency continued for second-time participants. Compared with first-time participants, returning participants had higher pre-intervention scores for global self-esteem, PA commitment (including attitudes toward PA, valuation of PA, and motivation to be physically active), and lower body size dissatisfaction suggesting possible long-term benefits of the Girls on the Run and Girls on Track programs. Furthermore, the higher baseline scores for the returning participants could possibly explain why there are few or no significant changes between pre- and postintervention scores in girls who participated in the program more than once. Future studies should consider the utilization of an experimental, longitudinal design in order to explore long-term impacts of the DYS programs to maintain improvements in psychosocial and behavioral changes.

Limitations

Several limitations should be considered when interpreting the results from the current study. First, the study utilized a pre-experimental, one-group, pre- and post-test study design. As such, findings that suggest a beneficial effect of the Girls on the Run and Girls on Track DYS programs on psychosocial factors and PA frequency should be considered preliminary and not conclusive. More specifically, the improvements that were observed from pre- to posttest in self-esteem, body size satisfaction, and commitment to be physically active and PA frequency could either be contributed to the DYS program or by alternative explanation(s) caused by threats to internal validity.[60]

Threats to studies that use a one-group pre/post-test design can be grouped into 3 overall sources of bias including (a) measurement (testing and instrumentation), (b) selection (maturation, statistical regression, selection, and participant attrition), and (c) historical (history and maturation),[60] all of which can affect the internal validity of the study and influence the findings. More specifically, with regard to measurement, the same survey, using tools with established validity and good reliability, was used for both the pre- and posttest assessment and all girls received the same program which reduces the possibility that an instrument or testing threat was breached. In addition, data pertaining to duration and lower intensity physical activities are unknown. However, the ascertainment of accurate PA levels in children via a subjective questionnaire is extremely challenging. As a result, the measurement tool that was used to evaluate changes in PA levels was limited to activities that were promoted in the intervention (ie, running) to begin to examine the influence of a DYS program on the frequency of VPA in girls.

Pertaining to selection bias, study participants self-selected to enroll in the DYS program, which could have presented at baseline with a greater motivation to be physically active when compared with girls who chose not to participate. In addition, the 46% response rate adds to selection bias and interpretation of results. Finally, regression bias may have posed a threat which would result in regression toward the mean in any given measure from pre- to posttest.

Finally, with regard to history, since the Girls on the Run and Girls on Track programs lasted a total of 12 weeks, it seems unlikely that a history or maturation threat could have been violated during this short period of time.

Conclusions

Although the current study has certain limitations, it nevertheless provides an interesting example of a promising DYS program that has been shown in the current study to improve global self-esteem, body size satisfaction, PA commitment, and PA frequency. These results provide interesting findings to support follow-up studies. Encouraging girls to become involved in PA programs that combine sport and life skills in a fun and supportive environment may increase the likelihood of increasing their commitment to and participation in PA across the life span. In addition, these results further support findings in the Tucker Center Research Report about the utility of girl-focused DYS programs.[9]

IMPLICATIONS FOR SCHOOLS

In summary, the findings from the current study have important implications for health education professionals who develop PA programs for girls. Prior to initiating programs to promote PA for girls, it is important to consider structuring educational programs which promote the development of self-esteem and positive attitudes toward PA in a fun atmosphere that does not stress exercise. The Girls on the Run and Girls on Track DYS programs may provide

the necessary structure and function for initiating and sustaining PA among girls; thus, increasing the likelihood of achieving and maintaining the beneficial effects of PA for health risk factor reduction and chronic disease prevention across the life span.

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