

Elementary After School Programs: An Opportunity to Promote Physical Activity for Children

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Abstract

Objective: To present project design and baseline characteristics of a project promoting life-long physical activity (PA) in an elementary after-school program. **Methods:** The project incorporates a two group design with delayed treatment control. PA and context observations and surveys (n=533; grades 4-6; attitude, enjoyment, intention, subjective norm, confidence, PA behavior, and fruit and vegetable consumption) were conducted. **Results:** Students spend almost 90 minutes standing, sitting and lying down and less than 17 minutes in moderate and vigorous PA during the after-school program. Students were strenuously active 3.89 days per week, moderately active 3.12 days per week, and mildly active 3.06 days per week, and watched television or played video games for 3.71 hours per day during leisure time. Attitudes, enjoyment, intention, and subjective norms differentiated students in different stages of PA. **Discussion:** There is an opportunity for PA promotion during after school, and stage specific interventions are indicated to facilitate PA.

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There are numerous benefits of regular physical activity during childhood including physiological (improved strength and endurance, the building of bones and muscles, weight control, and improvement in blood pressure and cholesterol levels) and psychological (reduction in anxiety and stress coupled with increased in self-esteem) (Baranowski et al., 1997). Despite these benefits, during the past twenty years, the percentage of young people who are overweight has almost doubled (Centers for Disease Control and Prevention [CDC], 2004). Now approximately 9 million young people are considered overweight (CDC, 2004).

The Surgeon General's Guidelines for Physical Activity suggest that children accumulate at least 30 minutes of moderate physical activity most days of the week (United States Department of Health and Human Services [USDHHS], 2001). Almost fifty percent of young people aged 12-21 years are not vigorously active on a regular basis (USDHHS, 1999). Studies suggest the children who are

inactive during school do not participate in physical activity after school (Dale, Corbin, & Dale, 2000; Dietz, 2001).

Intervention of Physical Activity for Elementary School Children

Keeping students engaged in physical activity after school has the potential to decrease delinquency, risky health behaviors, and social problems that are most likely to occur in the after-school hours (McKenzie, Marshall, Sallis, & Conway, 2000). The time period between the end of the school day and the family's evening meal, typically 2 to 6 pm, provides a prime opportunity for children to engage in enjoyable, unstructured or structured physical activity. However, this is also a time during which many children engage primarily in sedentary pursuits such as watching TV and playing video games. Ensuring that children participate in at least thirty minutes of moderate to vigorous physical activity during the after-school time period would increase the percentage of children who meet physical activity guidelines. A promising

approach in motivating individuals is the stages of change (Prochaska & DiClemente, 1983), which has been successful in motivating adults to adopt physical activity (Nigg, 2002). Essentially, the stage approach posits that different variables are salient at different stages of adopting physical activity (Prochaska & Marcus, 1994).

However, few studies examine the stages of change for elementary school children. Further, although there are proven interventions to promote physical activity in the Physical Education Class (e.g., SPARK, CATCH), there are only a few studies that focus on measuring physical activity of elementary school children in after-school programs (Walton et al., 1999) and few interventions targeting physical activity outside of school (e.g., Sallis et al., 1997). The Sallis et al. study combined an in-school PE curriculum with a self-management program to teach behavior change skills to generalize to physical activity outside of school. However, no effects were found on physical activity outside of school (Sallis et al., 1997). Further, no studies have been identified that investigate if the stage framework is applicable in an after school program setting.

Purpose of This Intervention

This project (Fun 5 – a physical activity and nutrition program) aims to promote life-long physical activity among all participating children in an after-school program. Guided by the Sports, Play, and Active Recreation for Kids (SPARK) Active Recreation program, the Fun 5 program offers a variety of organized, non-competitive, non-gender-specific, and fun physical activities in which children of all skill levels can participate and experience success. This paper provides an overview of the study design and the evaluation, describes the sample of students who participated in this program, and describes baseline relationships in the areas of exercise behavior and stages of change related to psychosocial variables for students in an after school program.

Methods

Study Design

This study uses a 2 group delayed treatment control design (see Table 1). The evaluation consists of two evaluation tools, a survey and SOFIT observation (System of Observation for Fitness Instruction Time).

Table 1
Study and Evaluation Design

Date	Schools 1-6	Schools 7-12	Evaluation (All Schools)
Phase I (Months 1-6)	Intervention	Control	Survey, SOFIT
Phase II (Months 7-12)	Follow-up	Intervention	Survey, SOFIT

Recruitment / Participants

Recruitment of schools to start and what they received: All 12 schools received an incentive to participate (SPARK Active Recreation two-day training course, curriculum binders, and equipment).

This pilot program is implemented in two phases, from January through June 2003 (Phase I), and August through December 2003 (Phase II), at twelve Department of Education A-Plus After-School Programs. The pilot program is offered to children in grades 4-6. A-Plus site coordinators and group leaders are trained in the

SPARK program by SPARK trainers to ensure effective implementation of organized physical activities (Phase I training in January 2003; Phase II training in August, 2003). Phase I includes six intervention (SPARK) sites and six assessment only (non SPARK program) sites. Phase II will include follow-up assessment of the six intervention sites from Phase I and implementing the SPARK program at the other six sites (that received assessment only in Phase I).

Intervention Description

The SPARK program focuses on the development of a variety of basic motor and manipulative skills, such as throwing, catching and kicking. Another focus of the program is development of positive social skills and the ability to get along with others by reinforcing ideas such as sharing equipment and demonstrating cooperative behavior. Finally, SPARK focuses on the development and maintenance of acceptable levels of physical fitness, through increased moderate to vigorous physical activity engagement. The goal of this program is to increase participation in activities and personal physical skill levels, while increasing confidence in ability to be physically active and promoting a positive attitude toward physical activity and health (McKenzie, Rosengard, Short & Strelow, 2000).

Student Fun 5 Calendar. Calendars are completed for one week per month to track changes in fruit and vegetable consumption and physical activity levels during the intervention period. The students at the intervention schools complete calendars to record whether they met the daily goals of eating five servings of fruits and vegetables per day. In addition, they record the number of minutes they did physical activity per day and if they met the goal of 30 minutes of physical activity each day and if any of their family members participated with them.

Personal Best Day. Personal Best Day is designed to assist the students in tracking their fitness progress over time. The Personal Best Day consists of a warm-up, three objective fitness tests (one minute sit-up test, 30 second push-up test, and the nine minute jog/walk) and a cool-down.

Treatment Fidelity

The following measures are taken to ensure adherence to a minimum of three SPARK sessions of 45 minutes or more per week.

Group Leader Activity Log. To track the implementation of SPARK, group leaders from intervention schools are completing daily logs of activities done in the after school program.

Site Visits. Periodic unscheduled site visits are conducted at the intervention schools. We use the SPARK evaluation sheet included in the training manual to evaluate the program. This records warm up, cool-down, inclusion of majority of children, enthusiasm of leader, enjoyment in children, and equipment to participant ratio, among other items.

Measures

Measures used in this study include both objective data (observation) and subjective (survey). SOFIT (System for Observing Fitness Instruction Time). SOFIT is an objective tool for assessing the quality of physical education instruction. It is a comprehensive system that provides a measure of student activity levels and lesson context during class time (McKenzie, 2002). We visited all twelve schools and conducted SOFIT observations. At each site, we used a tape player to listen to a prerecorded audiotape to pace our observations using a standard 10-second observe/10-second record format. During each record interval we entered a code for student activity and lesson context. At each school we randomly selected five students in each class for observation, ensuring equal distribution between males and females. Each student was observed during four-minute intervals during the observation period. The observation period begins when over half of the class is present and ends when half of the class departs from the area.

Inter-rater reliability observations were conducted for 33% of the schools and were 96.7% for student activity and 99.7% for lesson context. Each category (student activity and lesson context) should be 90% in agreement or better (McKenzie, 2002).

Survey. The survey includes questions that address physical activity, related attitude, enjoyment, intention, subjective norm, confidence, physical activity behavior, physical activity stage, fruit and vegetable consumption, and fruit and vegetable stage. The survey will be administered to the participating students at four time points.

Physical activity was defined for the students as any activity that makes your heart beat faster and/or makes you breathe harder, such as walking briskly, biking, swimming, paddling, and aerobics classes. The term “regular” physical activity was defined for students as at least 4 times per week for at least 30 minutes each day at the above-mentioned intensity or higher (Pate et al., 1995).

Attitude was measured using a 7-point bipolar adjective scale suggested by Ajzen and Fishbein (1980). An example of a statement that preceded the adjectives was “I think regular physical activity is....” Four items addressed the instrumental aspect of attitude (useless-useful, harmful-beneficial, bad-good, foolish-wise) and three questions addressed the affective attitude (not fun-fun, boring-interesting, unpleasant-pleasant). Coefficient alpha for this study was .79.

Enjoyment was measured using the 16-item scale developed by Motl et al (2001). The participants are asked to describe how they feel about the being active on a scale of 1 (strongly disagree) to 5 (strongly agree). Coefficient alpha for this study was .48.

Intention was assessed using a scale adapted from Courneya, Nigg and Estabrooks (1998). An example sentence is “I plan to be physically active at least 4 times a week...” with responses on a five point scale that ranged from (1) – disagree a lot to (5) – agree a lot. Coefficient alpha for this study was .71.

Subjective Norm was measured by three items such as “Most people who are important to me think I should be physically active on a regular basis...” and scored on a five-point scale that ranged from (1) – disagree a lot to (5) – agree a lot (Courneya et al., 1998). Coefficient alpha for this study was .70.

Confidence was measured by responses to six questions such as “I feel confident that I can participate in regular physical activity when it is raining...” and scored on a five point scale that ranged from (1) – not all confident to (5) completely confident (Benisovich, Rossi,

Norman, & Nigg 1998). Coefficient alpha for this study was .54.

Physical activity behavior was assessed using Godin and Shephard’s Leisure-Time Exercise Questionnaire (Godin & Shepard, 1985; Godin, Jobin, & Bouillon, 1986). Participants indicated how many times during an average week they engaged in strenuous, moderate, and mild physical activity for more than 30 minutes at a time during their free time. The 30 minutes is a slight modification from the original question (which used 15 minutes) to coincide with the recommendations (Pate et al., 1995). Strenuous physical activity was defined as heart beats rapidly, sweating, e.g. running, jogging, vigorous swimming, vigorous long distance bicycling, vigorous aerobic dance classes. Moderate physical activity was defined as not exhausting, light sweating, e.g. fast walking, baseball, easy bicycling, volleyball, hula. Mild physical activity was defined as minimal effort, no sweating, e.g. easy walking, yoga, horseshoes. One additional question addressed how many hours the student watched TV or played video games on an average day.

Physical Activity stage at baseline was measured using questions recommended by Nigg (2002). The specific responses were preceded by the definition of regular physical activity and the question, “Do you do regular physical activity as described above?” The response choices were “No, and I do not plan to start regular physical activity in the next six months” (precontemplation), “No, but I plan to start regular physical activity in the next 6 months” (contemplation), “No, but I plan to start regular physical activity in the next 30 days” (preparation), “Yes, I have been, but for less than six months” (action), and “Yes, I have been for more than six months” (maintenance). Students were instructed to select only one stage that best described their current physical activity pattern.

Fruit and Vegetable stage at baseline was measured using specific responses preceded by the definition of fruit and vegetable serving sizes and the question, “Do you eat 5 or more servings of fruits and vegetables each day?” The response

choices were “No, and I do not plan to start eating 5 servings of fruits and vegetables a day in the next 6 months” (precontemplation), “No, but I plan to start eating 5 servings of fruits and vegetables a day in the next 6 months” (contemplation), “No, but I plan to start eating 5 servings of fruits and vegetables a day in the next 30 days” (preparation), “Yes, I have been, but for less than 6 months” (action), and “Yes, I have been for more than 6 months” (maintenance). Students were instructed to select only one stage that best described their current fruit and vegetable consumption pattern.

Results

Means, standard deviations and 95% confidence intervals (CI) of the SOFIT categories at baseline are presented for the entire sample and the intervention groups in Table 2. Except for walking, and moderate and vigorous physical activity (which is a linear combination of walking and very active categories) the two groups are not significantly different in student activity and lesson contexts.

Table 2
Baseline SOFIT Categories of Total Sample and By Group

Categories	All Schools (n=533)			Intervention (n=284) Control (n=229)		
	Mean	SD	95% – CI	Mean	SD	95% – CI
Student Activity (min)						
Lying down (1)	.53	1.73	0.00 – 1.62	1.06 <i>0.00</i>	2.43 <i>0.00</i>	0.00 – 3.60 <i>0.00 – 0.00</i>
Sitting (2)	87.44	25.18	71.45 – 103.44	86.00 88.89	20.68 31.02	64.30 – 107.70 56.34 – 121.44
Standing (3)	21.50	9.40	15.53 – 27.47	25.06 17.94	5.0 11.77	19.75 – 30.36 5.59 – 30.30
Walking (4)	12.22	7.37	7.54 – 16.91	18.06 6.39	3.64 4.97	14.24 – 21.87* 1.17 – 11.60
Very active (5)	4.53	3.00	2.62 – 6.44	5.33 3.72	2.26 3.63	2.96 – 7.71 0.00 – 7.53
Moderate & Vigorous Physical Activity	16.75	9.29	10.85 – 22.65	23.39 10.11	4.13 8.19	19.06 – 27.72* 1.51 – 18.71
Lesson Context (min)						
Management (M)	96.42	107.17	70.26 – 122.57	110.44 82.39	16.24 54.69	93.40 – 127.49 24.99 – 139.79
General Knowledge (K)	.44	4.54	0.00 – 1.42	0.89 <i>0.00</i>	2.18 <i>0.00</i>	0.00 – 3.17 <i>0.00 – 0.00</i>
Fitness (F)	1.22	2.64	0.00 – 2.90	1.28 1.17	2.67 2.86	0.00 – 4.08 0.00 – 4.17
Skill practice (S)	0.00	0.00	0.00 – 0.00	0.00 <i>0.00</i>	0.00 <i>0.00</i>	0.00 – 0.00 <i>0.00 – 0.00</i>
Game play (G)	23.08	14.90	13.62 – 32.55	24.28 21.89	10.82 19.18	12.92 – 35.64 1.77 – 42.01
Avg. Minutes Observed	126.42	28.54	108.28 – 144.55	136.00 116.83	19.84 34.32	115.18 – 156.82 80.81– 152.85

* statistically significant p<.05

Table 3 displays the means, standard deviations and 95% CI of the Survey variables at baseline for the entire sample and the intervention groups. For all variables, the two groups are not

significantly different on the determinants of physical activity and physical activity behavior, except for strenuous activity (where the control schools outperformed the intervention schools).

Table 3
Baseline Survey Variables of Total Sample and By Group

Variable	All Schools (n=533)			Intervention (n=284) Control (n=229)		
	Mean	SD	95% - CI	Mean	SD	95% - CI
Grade	4.48	.89	4.40 – 4.56	4.58 4.37	.73 1.04	4.49 – 4.66 4.24 – 4.50
Strenuous Activity (days/week)	3.89	2.24	3.69 - 4.08	3.57 4.25	2.15 2.30	3.32 – 3.83 * 3.96 – 4.54
Moderate Activity (days/week)	3.12	2.27	2.93 – 3.32	2.94 3.33	2.21 2.33	2.68 – 3.20 3.03 – 3.62
Mild Activity (days/week)	3.06	2.45	2.85 – 3.27	2.93 3.21	2.37 2.53	2.65 – 3.21 2.89 – 3.53
Hours of TV/Video (hrs/day)	3.71	2.81	3.47 – 3.95	3.76 3.65	2.74 2.88	3.44 – 4.08 3.29 – 4.02
Instrumental Attitude (scale 1-7)	3.98	.90	3.90 – 4.06	3.94 4.03	.91 .87	3.83 – 4.05 3.92 – 4.14
Affective Attitude (scale 1-7)	5.69	1.36	5.57 – 5.80	5.57 5.81	1.41 1.28	5.41 - 5.74 5.66 – 5.98
Enjoyment (scale 1-5)	3.16	.41	3.13 - 3.20	3.13 3.21	.39 .43	3.08 - 3.17 3.15 - 3.26
Intention (scale 1-5)	3.85	1.00	3.76 – 3.94	3.90 3.78	.97 1.03	3.79 – 4.02 3.65 – 3.91
Subjective Norms (scale 1-5)	3.88	.89	3.81 – 3.96	3.91 3.85	.91 .87	3.80 - 4.01 3.74 – 3.96
Self Efficacy (scale 1-5)	3.01	0.79	2.95 – 3.08	3.03 3.00	.81 .78	2.93 - 3.12 2.90 - 3.10
Fruit Servings	3.55	2.46	3.34 – 3.76	3.42 3.71	2.42 2.55	3.13 - 3.70 3.39 - 4.02
Vegetable Servings	3.00	2.45	2.79 – 3.21	3.06 2.92	2.58 2.30	2.76 - 3.36 2.63 - 3.21

* statistically significant p<.05

The percent of students in each stage of physical activity is depicted in Figure 1a. and for fruit and vegetable consumption in Figure 1b. Both intervention and delayed treatment control schools have comparable percentage of students in each of the stages.

Due to the lack of group differences, the physical activity intensities, intention, attitude, enjoyment, and subjective norm variables are presented by physical activity stage for the entire sample along with the corresponding ANOVA results in Table 4.

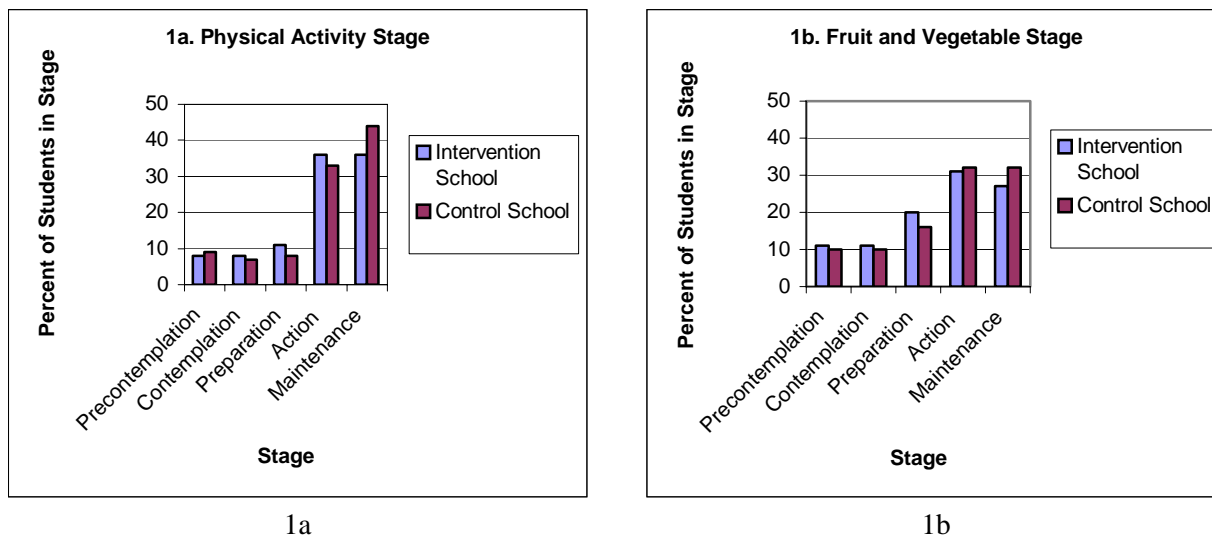


Figure 1
Stage Distributions for Intervention and Control Groups for Physical Activity (1a.) and for Fruit and Vegetable Consumption (1b.).

Table 4
Psychosocial Variables by Stage of Exercise Change

Variable	Stage of Exercise Change					F _(4, 528)	Sig	Tukey
	PC	C	P	A	M			
Strenuous Activity								
Mean	2.98	3.12	2.77	3.61	4.73	16.34	.00*	PC, C, P, A<M
Standard Deviation	2.35	1.99	2.01	2.13	2.11			
Moderate Activity								
Mean	2.14	2.60	2.92	2.72	3.79	9.29	.00*	PC, C, A<M
Standard Deviation	2.13	2.22	2.13	2.19	2.23			
Mild Activity								
Mean	2.48	2.98	2.87	2.72	3.54	3.74	.01*	A<M
Standard Deviation	2.48	2.69	2.37	2.26	2.51			
Hours of TV/Video								
Mean	4.20	3.76	3.60	3.64	3.65	12.66	.00*	PC<M (p=.055) P<M
Standard Deviation	3.12	2.88	2.47	2.79	2.83			
Instrumental Attitude								
Mean	3.76	3.86	3.72	3.94	4.15	.41	.80	
Standard Deviation	1.01	0.98	1.03	0.85	0.82			
Affective Attitude								
Mean	4.72	5.45	5.50	5.66	6.01	4.23	.00*	PC<P,A,M
Standard Deviation	1.54	1.37	1.49	1.29	1.23			
Enjoyment								
Mean	3.07	3.00	3.18	3.18	3.20	2.85	.02*	C<M
Standard Deviation	0.40	0.50	0.43	0.37	0.41			
Intention								
Mean	3.11	3.71	3.69	3.77	4.15	12.66	.00*	PC<C,P,A,M

Variable	Stage of Exercise Change						Sig	Tukey
	PC	C	P	A	M	F _(4, 528)		
Standard Deviation	1.02	0.95	0.92	0.96	0.96			P,A<M
Subjective Norm								
Mean	3.54	3.65	3.77	3.93	4.02	5.56	.00*	PC<A,M
Standard Deviation	0.90	1.01	0.95	0.85	0.85			
Self Efficacy								
Mean	3.00	2.90	2.93	2.97	3.10	1.16	.33	
Standard Deviation	0.85	0.74	0.68	0.77	0.84			

Discussion

This is one of a very few studies that addresses physical activity levels outside of school for elementary school children. With the increasing number of obese young people in the country and the related health risk factors, after-school programs can be fundamental in promoting physical activity levels.

The purpose of this intervention is to promote life-long physical activity among all children who participate in an after-school program. The System of Observing Fitness Instruction Time was conducted at twelve schools to assess the activity level of students. Our analysis demonstrated that students are sedentary during the majority of time spent in the after-school program. On average, students spend almost 90 minutes standing, sitting and lying down. In contrast, students spend less than 17 minutes engaging in moderate and vigorous physical activity. Our findings illustrate similarity between the activity levels of children in both the intervention and control schools. These numbers suggest that there is an opportunity for increasing the physical activity levels of students by incorporating organized physical activities through the Sports Play and Active Recreation for Kids program.

A total of 533 students completed surveys to address questions relating to physical activity related attitude, enjoyment, intention, subjective norm, confidence, physical activity behavior, and fruit and vegetable consumption. Students reported being strenuously active an average of 3.89 days per week, moderately active an average of 3.12 days per week, and mildly active an average of 3.06 days per week. The mean

number of hours the students reported spending watching television or playing video games was 3.71 hours per day. This average is comparable to other studies that assessed television viewing to prevent obesity (Robinson, 1999). Grouping precontemplation, contemplation, and preparation as “pre-action” stages, and action and maintenance as “post-action” stages, 25% of students are in “pre-action” and 75% of students are in “post-action”. This result is consistent with other study findings, which focused on fifth and sixth graders (Walton et al., 1999). Students reported eating an average of 3.55 servings of fruits and 3.00 servings of vegetables each day. Grouping precontemplation, contemplation, and preparation as “pre-action” stages, and action and maintenance as “post-action” stages, 40% of students are in “pre-action” and 60% of students are in “post-action” for fruit and vegetable consumption. No comparable data was found in other literature.

The survey results indicate that there is a significant association in a number of behavioral and psychosocial variables. Behavioral validation of physical activity stage was evident with strenuous and moderate activity. The fact that hours of TV and video watching did not differ by stage confirms previous literature which illustrates that sedentary behaviors are independent of activity (Buckworth & Nigg, 2004). Students who enjoy participating in activities, have a positive attitude toward physical activity, believe that other people important in their lives believe in the benefits of physical activity, and plan to be physically active tend to be the most active. Students’ confidence in participating in activities given different barriers did not have a significant

association with the physical activity stage. This finding was surprising considering the documented stage effect of self-efficacy in other studies (e.g., Marcus, Selby, Niaura, & Rossi, 1992; Nigg & Courneya, 1998). Children may not have control over their physical activity involvement, as it may be controlled by the availability of an adult for supervision or transport.

A limitation of this study is that the survey did not include questions regarding physical activity that was less than 30 minutes of continuous activity. Corbin and Pangrazi (1998) noted that children typically exercise in short bursts of activity rather than being continuously active. Another factor must be considered with regard to the generalizability of the findings. This study concentrated on elementary schools located in Hawaii. Therefore, the temperate climate allows children to be physically active outdoors year-round. Thus, schools in other locations around the country may have more indoor and fewer outdoor activities.

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Conclusions

In this paper, we have described the study design and described the baseline characteristics and behavior and psychosocial variables of our sample. The description of our baseline characteristics and behavior and psychosocial variables includes a comparison of the students at the intervention and delayed treatment control schools and shows minimal group differences. This study reports data from a specific elementary school age group and provides data that will allow comparisons among other samples. Psychosocial determinants also differentiate students in different stages of physical activity, indicating interventions addressing these variables could be effective in facilitating behavior change. Our data shows that there is a need and opportunity for physical activity promotion in after school activities, which will lead to more children meeting the Surgeon General's Guidelines for Physical Activity levels (USDHHS, 2001).

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