The Effects of a 2-Year Physical Education Program (SPARK) on Physical Activity and Fitness in Elementary School Students

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ABSTRACT

Objectives. This study evaluated a health-related physical education program for fourth- and fifth-grade students designed to increase physical activity during physical education classes and outside of school.

Methods. Seven schools were assigned to three conditions in a quasi-experimental design. Health-related physical education was taught by physical education specialists or trained classroom teachers. Students from these classes were compared with those in control classes. Analyses were conducted on 955 students with complete data.

Results. Students spent more minutes per week being physically active in specialist-led (40 min) and teacher-led (33 min) physical education classes than in control classes (18 min; $P < .001$). After 2 years, girls in the specialist-led condition were superior to girls in the control condition on abdominal strength and endurance ($P < .001$) and cardiorespiratory endurance ($P < .001$). There were no effects on physical activity outside of school.

Conclusions. A health-related physical education curriculum can provide students with substantially more physical activity during physical education classes. Improved physical education classes can potentially benefit 97% of elementary school students. (*Am J Public Health.* 1997;87:1328–1334)

Introduction

Regular physical activity during childhood and adolescence is associated with improvements in numerous physiological and psychological variables.[1,2] School physical education is the primary societal institution with the responsibility for promoting physical activity in youth, and 97% of elementary school students take physical education.[3] However, there is evidence that physical education is not adequately filling this role.[4] Observations revealed that physical education specialists provided students with only 3 minutes of moderate to vigorous physical activity per physical education class; that is less than 10% of class time.[5,6] This is far below the national objective that children should be active at least 50% of physical education class time.[7] Well-designed physical education programs have produced significant health benefits,[8–13] so further development and evaluation of health-related physical education programs are needed.

For public health benefit, physical education should promote generalization of physical activity outside of school, because physical activity recommendations cannot be met through physical education alone.[4] Physical education[8,13] and classroom programs[10,14] may increase physical activity throughout the day, but specific programs to promote generalization must be developed and rigorously evaluated.

This paper reports the primary outcomes of 2 years of a health-related elementary physical education program on children's physical activity during physical education and physical activity out of school. Increased physical activity is expected to lead to improvements in health-related physical fitness. The program is titled Sports, Play, and Active Recreation for Kids (SPARK).

Methods

Experimental Design

Seven elementary schools were assigned to one of three conditions. In the specialist-led condition, certified physical education specialists implemented the programs. In the teacher-led condition, classroom teachers were trained to implement the intervention because they are responsible for teaching physical education in most elementary schools.[4] The third condition was control, or usual physical education, as implemented by untrained classroom teachers.

Two consecutive cohorts of students entered the study as fourth graders, and students participated in their respective experimental conditions in the fourth and fifth grades. Self-report and fitness measures were collected near the beginning and end of each school year.

Selection of Schools

The study was conducted in Poway, Calif, a suburb of San Diego. Principals of 12 of the 16 elementary schools in the district were willing to participate in the

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This paper was accepted October 1, 1996.

study and agreed to be randomly assigned to condition. Because of resource limitations, the 7 smallest schools were selected, and they were stratified into two groups by the percentage of minority students. Four schools, ranging from 17% to 19% minority, formed one stratum; 3 schools, ranging from 8% to 13% minority, formed the other. Within each stratum, 1 school was randomly assigned to each of the three experimental conditions. To guard against loss of control schools, the remaining school was assigned to the control condition. All schools completed the study.

Subjects

Approximately 98% of the fourth-grade children during 2 years of recruitment (1990 and 1991) obtained written parental consent in all three conditions. At baseline, 1538 students completed surveys and were considered subjects. The ethnic distribution of subjects was similar to that of the community[15]: 82% European American, 12% Asian/Pacific Islander, 4% Latino, 2% African American. Fifty-three percent were male, and there were no differences in sex or ethnic distribution by condition. There was a significant difference in age by condition ($P < .01$), but the range of means was only 9.49 to 9.62 years.

The sample for present analyses consisted of students with complete or nearly complete data for the survey, fitness measures, *and* physical activity monitor. Retention was defined as completing the baseline (fall, fourth grade) and final (spring, fifth grade) surveys and fitness tests. Retained students had to have at least one valid accelerometer measure in both the fourth and fifth grades. Of students with baseline surveys, 78.4% had complete survey data; 73.4% had complete fitness data; and 66.0% had complete data on the weekday accelerometer measure. Of students with baseline surveys, 62.1% (n = 955) met criteria for inclusion. There were 264 students in specialist-led, 331 in teacher-led, and 360 in control conditions.

There were no differences in retention rates by experimental condition. Analyses were conducted to determine whether attrition rates varied by demographic variables. There was no difference in sex distribution between retained students and dropouts ($P < .90$). Although there was a significant difference in age ($P < .01$), retained students were only 0.1 year older than dropouts. Minority students were more likely to be retained in the study than European Americans ($P < .05$).

Intervention Components

Physical education program. SPARK physical education classes were designed to promote high levels of physical activity, teach movement skills, and be enjoyable. Recommended frequency of physical education classes was 3 days a week. A typical SPARK lesson lasted 30 minutes and had two parts: health-fitness activities (15 minutes) and skill-fitness activities (15 minutes).

Ten health-related activity units included aerobic dance, aerobic games, walking/jogging, and jump rope. Progression was developed by modifying the intensity, duration, and complexity of the activities. Although the main focus was on developing cardiovascular endurance, brief activities to develop abdominal and upper body strength were included. To enhance motivation, students self-assessed and recorded their own fitness levels monthly.

Nine sport units that developed skill-related fitness included basketball and soccer. These sports and games had the potential for promoting cardiovascular fitness and generalizing to the child's community (e.g., Frisbee games). Low-activity games, such as softball, were modified to make them more active.

Self-management program. The self-management program taught behavior-change skills[16] to help children generalize regular physical activity outside of school. Self-management was taught in weekly 30-minute classroom sessions, and skills included self-monitoring, goal setting, stimulus control, self-reinforcement, self-instruction, and problem solving. The sessions were guided by scripted fourth- and fifth-grade curricula. Each session included a review of the previous week's goals, introduction of a new skill or topic, and goal setting for the next week.

Homework and monthly newsletters were intended to stimulate parent–child interaction and support for physical activity. During the first part of each school year, students were awarded prizes (e.g., pencils, sports water bottles) for meeting weekly activity goals. Extrinsic rewards were phased out as students learned to use self-reward.

Experimental Conditions

Physical education specialist–led condition. Three certified physical education specialists taught physical education and self-management while receiving ongoing training and supervision from the investigators. The quality of teaching was monitored and enhanced by feedback based on videotapes of physical education and self-management classes.

Trained classroom teacher–led condition. Training was designed to familiarize classroom teachers with the curricula and develop class-management and instructional skills so that teachers could implement the physical education and self-management programs effectively. During each training session, teachers participated in the activities and were assisted in planning a personal program of regular physical activity.

The first year of training was extensive (32 hours over seven sessions) but decreased in subsequent years. Twenty-eight teachers participated in staff development, and attendance was 97%. Substitute teachers were provided to allow classroom teachers to attend training during the school day. About 70% of the time was allocated to physical education and 30% to self-management. A mean satisfaction score of 4.83 on a 5-point scale indicated that teachers evaluated the sessions positively.

Follow-up support was provided during each teacher's physical education classes. A physical education specialist provided feedback, encouragement, and direct assistance during visits that ranged in frequency from biweekly to bimonthly.

Control condition. Principals of control schools were asked to continue with usual physical education programs during the study. All schools, including control schools, were provided with sufficient physical education equipment to carry out the SPARK program.

Measures

Self-reported physical activity. Out-of-school physical activity was assessed with a 1-day recall in a checklist format, which had previously been validated.[17] Children reported participation in 20 activities, and a summary score was based on the intensity weightings of each activity.

Accelerometer. The Caltrac accelerometer (Hemokinetics, Inc, Madison, Wisconsin) is a small electronic instrument that gives a practical objective measure of physical activity. Validity with children has been supported by field and laboratory studies.[18]

Out-of-school physical activity was monitored 1 weekday per semester and 1 weekend per school year. It was not possible to gather a pre-intervention base-

TABLE 1—Observed Minutes per Week of Student Physical Activity in Physical Education Classes and Frequency and Duration of Physical Education, by Condition: Seven Schools in Poway, Calif, 1990 through 1993

	Condition				
	(1) Control Classes (95% CI) (n = 33 classes)	(2) Trained Teachers (95% CI) (n = 38 classes)	(3) PE Specialists (95% CI) (n = 32 classes)	ANOVA *P*	Significant Contrasts between Conditions
Student activity variables					
Moderate to vigorous activity, walking + very active, min/wk	17.8 (13.2, 22.3)	32.7 (29.1, 36.2)	40.2 (36.8, 43.7)	<.001	3 > 2 > 1
Energy expenditure, kcal/kg/wk[a]	3.3 (2.4, 4.1)	5.8 (5.3, 6.3)	7.2 (6.8, 7.6)	<.001	3 > 2 > 1
Amount of physical education					
Lessons per week, no.	1.8 (1.4, 2.3)	2.6 (2.4, 2.9)	2.9 (2.8, 2.9)	<.001	2, 3 > 1
PE per week, min	38.0 (27.9, 48.1)	64.6 (59.0, 70.2)	79.7 (76.3, 83.1)	<.001	3 > 2 > 1

Note. CI = confidence interval; PE = physical education; ANOVA = analysis of variance.
[a]Based on estimates of energy expenditure according to heart-rate monitoring data.[22]

line measure. For weekday measures, 82% were returned with valid data. Frequent reasons for missing data were absence from school (5% of attempts) and forgetting the accelerometer (6% of attempts). Data are presented as "activity counts per hour worn."

Fitness and anthropometric measures. Adaptations of the FITNESSGRAM protocols[19] were used to measure health-related physical fitness.[20] Cardiovascular endurance was measured with the mile-run test. The number of bent-knee sit-ups in 60 seconds was an indicator of muscular strength and endurance. The number of pull-ups was an indicator of upper body strength. The sit-and-reach test was a measure of hamstring flexibility.

Height and weight were measured in stocking feet. Calf and triceps skinfolds were assessed three times using calibrated Lange calipers. The interobserver agreement (intraclass correlations) were .87 for triceps skinfold and .93 for calf skinfold (n = 47).

Observations of physical education classes. Implementation of the school physical education program was assessed by direct observation by means of the previously validated SOFIT instrument (System for Observing Fitness Instruction Time).[21] Four randomly chosen children were observed every 20 seconds during rotating 4-minute blocks throughout the class. Activity codes 1 through 4 described the body position of the student (lying down, sitting, standing, walking), and code 5 (very active) identified when the student was expending more energy than ordinary walking. The caloric cost of activity codes was estimated on the basis of heart-rate monitoring data.[22]

Each year, physical education classes at all schools were observed during 2 full weeks. Interobserver agreement was 91% for activity codes.

Statistical Analysis

Similar analysis methods were used for out-of-school physical activity and fitness outcomes. All measures were adjusted for baseline age. For all measures except the accelerometer, which had no baseline data available, posttest scores were also adjusted for baseline values. Modified one-way analyses of variance (ANOVAs) were performed on the adjusted scores to test for differences among groups. The ANOVAs were modified to account for clustering of values within schools,[23] because school was the unit of assignment.

Methods of adjusting scores were as follows. In a single regression that included students from all three experimental conditions, the raw score for each variable was regressed on baseline age and baseline score (or only baseline age, in the case of the accelerometer), and residuals were computed. The mean of the variable's raw score (across all students, all groups) was also determined. Each student's adjusted score was then calculated as the sum of the overall mean and the student's residual score.

Methods of modifying the ANOVAs were as follows. Within each experimental condition, the sample size, mean, and variance of the adjusted score were calculated. Also within condition, the intracluster correlation of the adjusted score was computed, with schools as clusters.[24] If the computed intracluster correlation was negative, it was set equal to zero. In accordance with Donner et al.,[23] the previously calculated sample variance of the adjusted score was itself adjusted—"inflated" by a function of the intracluster correlation. For each experimental condition, a sample size, sample mean, and adjusted sample variance were computed. These values were inserted into the usual formulas for one-way ANOVA to test for differences among conditions.

Effect sizes were calculated to assess the practical significance of the interventions in relation to the control condition. Effect size was the difference between two group means, divided by the underlying standard deviation. Effect sizes greater than 0.4 are considered large; 0.3 is moderate; and 0.1 is small.[25] Separate analyses were conducted for boys and girls.

Results

Physical Activity in Physical Education

Observations revealed substantial differences by condition in the extent to which children were exposed to physical education. As shown in Table 1, students in the control condition had physical education less frequently and spent significantly fewer minutes per week in physical education classes. Most importantly, students in the two intervention conditions spent more time in physical activity in school. Specialist-led students participated in twice as much moderate to vigorous physical activity and expended twice as many calories during physical education each week as control students, with teacher-led students in between.

TABLE 2—Gender-Specific Effects of the Intervention on Physical Activity Outside of School for 2 Years: Results of Analyses of Covariance, Adjusted for Age and Clustering within Schools (and Baseline for Physical Activity Survey)

Variable	Condition	Boys (n = 487) Adjusted Mean (95% CI)	*P*	Effect Size	Girls (n = 468) Adjusted Mean (95% CI)	*P*	Effect Size
Accelerometer activity, counts/h							
Weekday, fifth grade	Specialist-led	8.36 (7.7, 9.0)	.26	.05	6.94 (6.5, 7.4)	.09	.05
	Teacher-led	7.77 (7.4, 8.2)		.13	7.56 (6.9, 8.2)		.13
	Control	8.21 (7.7, 8.7)			7.86 (7.3, 8.4)		
Weekend, fifth grade	Specialist-led	5.98 (4.3, 7.7)	.19	.18	4.75 (4.0, 5.5)	.95	.05
	Teacher-led	4.18 (3.3, 5.0)		.09	4.73 (4.1, 5.4)		.04
	Control	4.78 (3.0, 6.5)			4.54 (3.3, 5.8)		
1-day physical activity recall,[a] spring, fifth grade	Specialist-led	24.3 (18.6, 30.0)	.55	.04	20.3 (18.0, 22.6)	.12	.23
	Teacher-led	22.7 (20.5, 24.9)		.12	21.5 (18.5, 24.5)		.16
	Control	25.3 (23.1, 27.5)			23.9 (21.9, 25.9)		

Note. CI = confidence interval.
[a]1-day physical activity recall is mean of weekday and weekend self-reports.

Out-of-School Physical Activity Outcomes

Accelerometer scores. The accelerometer was considered the primary physical activity measure. No baseline scores were available, so the data were subjected to simple posttest analyses of covariance, with adjustment for age and clustering within schools. The interpretation of these tests differs from that of all other posttest analyses performed here. Whereas the other posttests are conditional on baseline values, the accelerometer analyses are unconditional. There were no significant group differences on any accelerometer measure, and weekday and weekend scores for fifth grade are shown in Table 2.

One-day physical activity recall. Weekday and weekend recalls of physical activity performed out of school were averaged. There was no significant difference among conditions.

Health-Related Fitness Outcomes

Increased physical activity in intervention conditions was expected to result in enhanced fitness. Significant intervention effects were found on two of five fitness measures (Table 3). Girls in the specialist-led condition improved substantially in mile-run time. The mean difference between specialist-led and control conditions of 1 minute at posttest reflected a "moderate" effect size of .32. There was no significant intervention effect for boys. Figure 1 displays results at all four assessment points.

On the sit-up test, girls in the specialist-led condition improved more than those in the control condition. The mean difference of about 11 sit-ups in 1 minute at posttest produced a "moderate" effect size of .31. Although there was not a significant difference for boys at posttest, differences between specialist-led and control conditions were significant at spring of fourth grade ($P < .002$) and fall of fifth grade ($P < .001$). Figure 2 shows that improvements in sit-ups were consistently greater in the teacher-led and specialist-led conditions. There were no significant intervention effects on skinfolds, sit-and-reach, or pull-ups.

Discussion

Physical education classes in elementary schools have the potential to provide 97% of children in the United States with regular physical activity[3] that has multiple health benefits in youth.[1,2] To achieve public health goals, elementary physical education programs should promote physical activity during physical education classes as well as outside of school. If the increases in physical activity are sufficient, physical fitness should be improved.[26] The SPARK health-related physical education program increased physical activity during physical education classes but not out of school. This increase in physical activity was sufficient to improve two components of health-related fitness in girls significantly. The stronger intervention effect in girls may be explained in part by their lower levels of fitness at baseline.

The health-related physical education program provided children with substantially more physical activity than the control condition. It is estimated that during a 36-week school year, students in specialist-led classes spent about 13 more hours in moderate to vigorous physical activity than students in control classes.

National[7] and international[2] groups recommend that young people should participate in at least 30 minutes of moderate to vigorous physical activity on most days. Physical education classes can play a role in providing some of this physical activity for young people. Data from the control condition suggest that physical education is supplying only 18 (12%) of the recommended 150 minutes of physical activity per school week. The teacher-led condition supplied 22%, and the specialist-led condition supplied 27%. Although it is not possible for school physical education to provide all the recommended daily physical activity, physical education should be judged in part on how it contributes to national health objectives. Extracurricular programs, community programs, and family involvement are needed to ensure that children receive adequate amounts of physical activity.

One of the goals of the SPARK program was to promote regular physical activity outside of school through behavioral skills training, parent involvement, and a reward system. Neither objective nor self-report data indicated that this goal was achieved. It is possible that the physical activity measures were insensitive to changes that occurred, but there are

TABLE 3—Gender-Specific Effects of the Intervention for 2 School Years on Health-Related Fitness Measures: Results of Analyses of Covariance, Adjusted for Baseline Values, Age, and Clustering within Schools

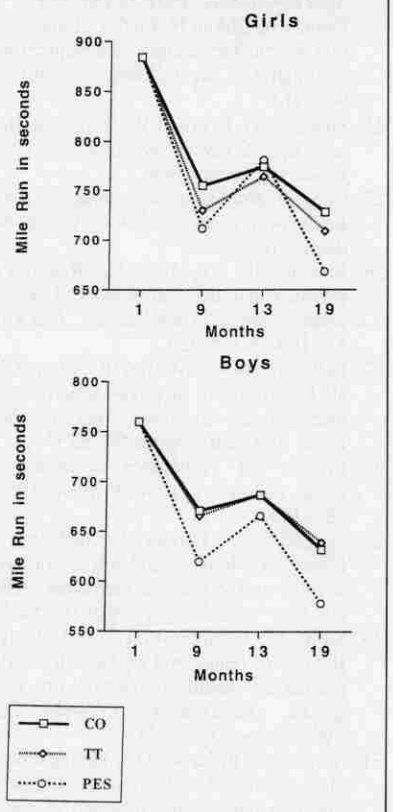
Fitness Variable	Condition	Baseline Mean (95% CI)	Adjusted 2-Year Posttest Mean (95% CI)	*P* (Pairwise Comparisons[a])	Effect Size vs Control
		Boys (n = 487)			
Mile run, sec	(3) Specialist-led	819.2 (763.2, 875.3)	578.1 (517.3, 638.8)	.33	.144
	(2) Teacher-led	697.8 (634.8, 760.9)	639.0 (587.8, 690.4)		.018
	(1) Control	775.0 (717.7, 832.3)	632.4 (565.4, 699.3)		
Skinfolds, calf + tricep, mm	(3) Specialist-led	26.9 (19.6, 34.1)	26.4 (23.7, 29.1)	.55	.076
	(2) Teacher-led	26.8 (24.2, 29.4)	25.5 (20.8, 30.1)		.119
	(1) Control	27.1 (25.4, 28.9)	28.0 (26.3, 29.6)		
Sit-ups, no. in 1 min	(3) Specialist-led	28.3 (26.6, 30.0)	43.2 (31.1, 55.4)	.29	.183
	(2) Teacher-led	33.1 (28.4, 37.9)	38.3 (34.7, 42.0)		.070
	(1) Control	30.5 (27.7, 33.3)	35.3 (30.9, 39.7)		
Pull-ups, total no.	(3) Specialist-led	1.6 (1.1, 2.1)	1.8 (1.4, 2.1)	.47	.085
	(2) Teacher-led	1.5 (1.2, 1.8)	1.9 (1.3, 2.6)		.131
	(1) Control	1.6 (1.2, 1.9)	1.6 (1.3, 1.8)		
Sit-and-reach, in inches	(3) Specialist-led	9.8 (9.1, 10.4)	9.4 (9.1, 9.8)	.38	.015
	(2) Teacher-led	10.2 (9.9, 10.6)	8.4 (6.5, 10.3)		.139
	(1) Control	9.8 (8.9, 10.7)	9.5 (9.0, 10.1)		
		Girls (n = 468)			
Mile run, sec	(3) Specialist-led	927.3 (793.0, 1061.6)	668.0 (629.3, 706.6)	.03 (3 < 1)	.318
	(2) Teacher-led	814.9 (761.1, 868.6)	709.2 (677.5, 740.9)		.099
	(1) Control	916.3 (849.2, 983.4)	727.8 (703.9, 751.7)		
Skinfolds, calf + tricep, mm	(3) Specialist-led	28.7 (24.5, 33.0)	30.0 (28.8, 31.2)	.14	.008
	(2) Teacher-led	30.4 (27.4, 33.4)	28.0 (25.6, 30.4)		.201
	(1) Control	31.2 (28.7, 33.7)	30.1 (29.0, 31.1)		
Sit-ups, no. in 1 min	(3) Specialist-led	25.3 (23.9, 26.7)	40.9 (31.5, 50.2)	.03 (1 < 3)	.308
	(2) Teacher-led	28.8 (23.6, 34.0)	35.6 (31.3, 39.9)		.160
	(1) Control	26.7 (24.3, 29.1)	30.0 (26.5, 33.4)		
Pull-ups, total no.	(3) Specialist-led	1.1 (0.4, 1.7)	0.9 (0.4, 1.4)	.75	.030
	(2) Teacher-led	1.0 (0.5, 1.5)	1.1 (0.1, 2.1)		.084
	(1) Control	0.7 (0.4, 1.0)	0.8 (0.4, 1.1)		
Sit-and-reach, in inches	(3) Specialist-led	10.9 (10.1, 11.7)	11.6 (11.2, 11.9)	.33	.030
	(2) Teacher-led	11.3 (11.0, 11.7)	9.7 (6.7, 12.8)		.132
	(1) Control	10.9 (10.3, 11.5)	11.2 (10.9, 11.6)		

Note. CI = confidence interval.
[a]Numbers refer to conditions.

alternative explanations. First, the self-management curriculum could be poorly designed or not developmentally appropriate. Second, the intervention may have been well designed but not adequately implemented. Preliminary data suggest that some components of the self-management lessons were not consistently implemented. Third, children may have learned effective self-management skills but have been unable to use them. Anecdotal reports suggest that many children are told to stay indoors after school because of safety concerns. Fourth- and fifth-grade children may not have sufficient control over their schedules to implement the behavioral skills they learned. Self-management may be more effective with older children, who are making more autonomous decisions. A fourth explanation is an inability to show improvement over baseline. The children in this suburban setting may have more access to sports and activity programs than many other children. Over 75% reported being involved in a sports team or activity program at baseline.

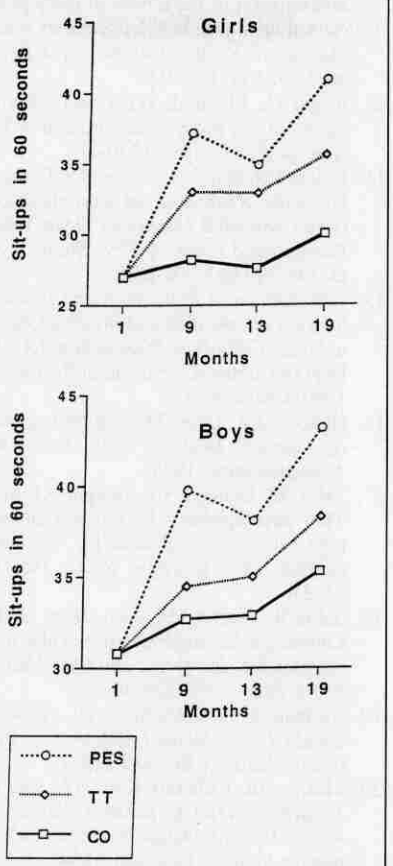
Present findings of a failure to increase physical activity out of school are generally consistent with previous studies of self-management,[27] although some programs have been effective.[10,14] Programs that increased children's physical activity relied mainly on external control, such as physical education classes[8,13] and parental reinforcement.[28,29] More effective self-management interventions or supervised programs are needed to promote children's physical activity.

Consistent with observed physical activity during physical education classes, the largest fitness gains were found in specialist-led students. The intervention led to improvements on fitness components that were emphasized most in the curriculum, notably cardiorespiratory fitness. The significant effects for fitness only in girls extends recent findings from other physical activity and dietary change programs that girls seem to be more responsive to these interventions.[30,31] It is difficult to demonstrate significant improvement in boys, because they had higher fitness and activity levels at baseline.



Note. CO = control condition; TT = trained teacher condition; PES = physical education specialist condition.

FIGURE 1—Gender-specific mile run times at four measurement points, by experimental condition (mean time in seconds is adjusted for baseline score, age, and clustering).



Note. PES = physical education specialist condition; TT = trained teacher condition; CO = control condition.

FIGURE 2—Gender-specific sit-up scores at four measurement points, by experimental condition (mean sit-ups in 60 seconds are adjusted for baseline score, age, and clustering).

The teacher-led condition had no apparent effect on mile-run time for boys or girls. The increase of only 7 minutes per week of vigorous physical activity in the teacher-led condition, compared with the control condition, would not be expected to produce a cardiorespiratory training effect.[26]

It is likely the specialists were more consistent than trained classroom teachers in carrying out abdominal strength and endurance activities during physical education, which may explain why there were significant effects only in the specialist-led condition. The effect was significant for girls at the 2-year posttest, but the significant group differences for boys at intermediate measurements suggest an intervention effect for boys. SPARK physical education classes probably included insufficient strength and flexibility activities to produce fitness improvements in these components. Previous studies found few effects of school-based health promotion programs on adiposity or body weight,[32] so present results support earlier findings.

Physical education specialists were superior to trained classroom teachers in most outcomes. Specialists spent more time in physical education classes, provided students with more physical activity, and enhanced female students' fitness. These results support position statements calling for certified physical education specialists at all grade levels.

Present results also support the conclusion that elementary classroom teachers, with adequate training and support, can improve their teaching of physical education. Compared with control teachers, trained classroom teachers taught more physical education and provided students with more physical activity. These outcomes support the effectiveness of the SPARK teacher-training program.

Limitations include the small number of schools, the quasi-experimental design, the restriction of the study to a single school district, and the lack of baseline measures for the accelerometer. Owing to an inability to remeasure all variables in all subjects assessed at baseline, it is possible that intervention effect sizes were smaller for subjects who were dropped from the analyses. All these factors limit the generalizability of the results.

Elementary physical education can be improved with a program that is feasible in real-world settings. Health-related physical education curricula, with effective teacher training and support, have the potential to provide children with much more physical activity than they receive in typical physical education classes,[5,6] and this increased physical activity is expected to contribute to multiple health benefits in youth.[1,2] Further work is needed to promote generalization of physical activity throughout the child's day and to evaluate similar programs in more ethnically and socioeconomically diverse schools. Elementary school administrators and teachers are encouraged to adopt health-related physical education programs that are effective in providing children with substantial amounts of physical activity. □

Acknowledgments

This work was supported by NIH grant HL44467.

The assistance of the Poway, Calif, Unified School District is gratefully acknowledged, with special thanks to Romeo Camozzi. Julia J. Roby, Paul Rosengard, Kathleen J. Goggin, Colin Armstrong, Kecia Carrasco, and May Tai contributed substantially to this study.

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