Quest, 2009, 61, 114-127

Beyond the Stucco Tower: Design, Development, and Dissemination of the SPARK Physical Education Programs

Thomas L. McKenzie, James F. Sallis, and Paul Rosengard

School physical education plays an important role in public health. Nonetheless, there are few evidence-based, health-related, physical education programs and very little is known about how to disseminate them for widespread use. This article (a) presents background information and a review of the completed research on the SPARK (Sports, Play, and Active Recreation for Kids) programs for elementary and middle schools (1989–2000) and (b) describes the ensuing efforts to disseminate those programs nationally (1994–present). The programs have three important features: an active curriculum, staff development, and follow-up support. Efforts to disseminate the programs nationally have required substantial collaboration among university, public school, and private sector personnel. Procedures used in SPARK may serve as models for others interested in researching and disseminating physical education curricula through staff development.

Members of the Academy are thoroughly grounded in the conduct of quality research in kinesiology and physical education, but not all are familiar with evidence-based research as it relates to bringing about programmatic changes in public health settings. In public health, most researchers who develop and test interventions either explicitly or implicitly intend to disseminate effective programs so they eventually become common practice within the larger population. Academic institutions are often challenged when working collaboratively in the public and private sectors (e.g., with schools and commercial businesses), and university faculty seldom have the skill sets (e.g., social marketing strategies) needed for them to be successful in disseminating programs. Many assume that interventions deemed efficacious within a specific research setting are easily transmitted elsewhere, but that is not the case.

Only a few evidence-based physical education (PE) programs exist (Stone, McKenzie, Welk, & Booth, 1998), and little is known about effective approaches for overcoming barriers to their widespread adoption (Owen, Glanz, Sallis, & Kelder, 2006). The purpose of this article is to (a) present background information and a review of the research on the SPARK (Sports, Play, and Active Recreation for Kids) programs initially developed for elementary and middle schools

McKenzie (AAKPE Fellow #370) is with the School of Exercise and Nutritional Sciences, and Sallis is with the Dept. of Psychology, San Diego State University, San Diego, CA 92182. Rosengard is with The SPARK Programs, San Diego, CA 92108. E-mail: tmckenzie@sdsu.edu

(1989–2000) and (b) to describe approaches being used to facilitate their dissemination nationally (from 1994 to present). The strategies used with SPARK may serve as a model for others interested in researching and disseminating physical education curricula and staff development programs.

Overview of the SPARK Programs

SPARK began as a research-based elementary physical education program; now it also includes middle school and high school PE plus specific programs for after school (active recreation), early childhood (ages 3–5), and coordinated school health (i.e., wellness for staff, nutrition education, and environment, health education). Developed from a public health viewpoint (Sallis & McKenzie, 1991), the SPARK programs were designed in response to a societal need to combat low levels of children's physical activity and physical fitness (Sallis et al., 1997). Existing PE programs had not been thoroughly evaluated to document their effects on health-related variables, so new approaches had to be designed (Sallis & McKenzie, 1991). SPARK is concerned not only with increasing physical activity during PE, but also with promoting the generalization of physical activity beyond classes.

SPARK was initiated in 1989 with a large 7-year grant to San Diego State University from the National Institutes of Health (NIH) to specifically develop and evaluate a health-related PE program for upper elementary students. The initial SPARK program consisted of a PE curriculum designed to provide ample amounts of physical activity in class, a behavioral self-management curriculum to promote physical activity outside of school, and extensive teacher training and support. The PE curriculum was designed to be a practical resource for both classroom teachers and PE specialists. For ease of use, instructional units and lesson plans were sequenced and offered details for managing students and equipment. Lessons were also partially scripted so beginning teachers could use appropriate instructional cues.

The curriculum package included yearly plans divided into instructional units, typically 4 weeks in length. A standard lesson had two parts: activities that had a health–fitness focus and those that had a motor/sport skill focus. The health–fitness activities were embedded in instructional units that included aerobic dance, aerobic games, and jump rope activities. Progression was achieved by modifying the intensity, duration, and complexity of activities. Although the main focus was on developing cardiovascular endurance, activities to develop abdominal and upper-body strength were included. Twelve additional units focused primarily on developing motor skills and included age-appropriate skills used in sports such as basketball, soccer, and volleyball. The skills were those with the most potential for promoting cardiovascular fitness and for generalizing to activities that would be reinforced in the child's community. Low-active games, such as softball and kickball, were modified to make them more active.

In addition to the PE program, SPARK included a self-management program (referred to now as *Lifelong Wellness*). It was designed to teach children the behavior-change skills believed to be important in the generalization and maintenance of regular physical activity and included instruction and practice in self-monitoring, goal setting, behavior contracting, stimulus control, self-reinforcement, self-instruction,

scheduling, and decision making/problem solving. These skills and related topics were taught in 30-min classroom sessions that were guided by scripted curricula. Subsequent manuals contain 10 core self-management lessons, monthly follow-up lessons, and additional optional activities. In each class, students set their own physical activity goals for the coming week, and a point system is used to reinforce participation in regular physical activity. Family involvement is strongly encouraged through monthly newsletters, homework that requires family participation, and extra points for being active with family members. The original Self-Management program is no longer being disseminated; however, its concepts and methods have been integrated into other existing SPARK programs.

Initial Research on the SPARK Programs

The SPARK elementary program is one of the most thoroughly researched PE programs, and the results of different studies have been presented in peer-reviewed publications. Initial SPARK studies involved randomizing seven schools to control (i.e., schools that followed their standard PE programs) and two treatment conditions (classroom teacher-led SPARK and PE specialist-led SPARK). In brief, there was evidence of success with the following variables: (a) physical activity during PE (McKenzie, Sallis, Kolody, & Faucette, 1997; Sallis et al., 1997); (b) physical fitness (Sallis et al., 1997); (c) motor skill development (McKenzie, Alcaraz, Sallis, & Faucette, 1998); (d) academic achievement (Sallis et al., 1999); (e) adiposity (Sallis et al., 1993); (f) student enjoyment of SPARK (McKenzie, Alcaraz, & Sallis, 1994; Prochaska, Sallis, Slymen, & McKenzie, 2003); (g) lesson context and teacher behavior (McKenzie et al., 1997); (h) process measures such as self-management and parent behavior (Marcoux et al., 1999); and (i) program maintenance and institutionalization (Dowda, Sallis, McKenzie, Rosengard, & Kohl, 2005; McKenzie et al., 1997).

MSPAN: Middle School Physical Activity and Nutrition

Following the success of SPARK in elementary schools, the investigators received a second large grant (MSPAN) from the NIH to expand their work into middle schools and to further develop and assess programs for improving physical activity and eating on campus. MSPAN was funded for 5 years (1996–2000) to test a combination of environmental, policy, and social marketing interventions on increasing physical activity and reducing fat intake of students. It was tested in 24 middle school campuses in 5 school districts in Southern California (Sallis et al., 2003). The participating schools were diverse in size, facilities, and population characteristics. They had an average enrollment of 1,109 students, with 45% being nonwhite and 39% receiving free or low-cost meals. Following baseline measures, the schools were stratified by school district and randomly assigned to be measurement-only controls ($N = 12$) or receive 2 years of intervention ($N = 12$). The overall results indicated that changes in total physical activity on campus were significant for boys but not for girls and that the nutrition interventions did not reduce dietary fat intake at school. There was also some evidence of a favor-

able intervention effect on boys' body mass index. The study provided substantial information about the barriers to schools fully adopting health-related programs, particularly those involving policy and environmental changes (Powers, Conway, McKenzie, Sallis, & Marshall, 2002; Sallis et al., 2003; Strelow et al., 2002).

Changes in physical activity were evidenced in specific locations on campus during the school day, as well as before and after school, but the greatest gains for both boys and girls occurred during physical education (McKenzie et al., 2004; Sallis, et al. 2003). The PE intervention was initiated through staff development sessions in which teachers participated on a voluntary basis. This program had four main goals, and these were similar to those of the elementary school SPARK staff development program: (1) create teacher awareness of the need for active, health-related PE; (2) assist teachers to design and implement active PE curricula; (3) develop teachers' class management and instructional skills to enhance physical activity and student learning; and (4) provide ongoing support for change.

In contrast to the initial SPARK program in which elementary school classroom and PE teachers were provided with structured curricula, MSPAN provided only sample curricular materials and emphasized providing assistance to the middle school physical educators to help them revise their existing programs and instructional strategies to increase student moderate-to-vigorous physical activity. As before, staff development sessions included a balance of didactic instruction and modeling/rehearsal. In addition, the middle school teachers set goals (i.e., "action plans") for modifying PE at their schools, and these goals were revisited at subsequent sessions. The MSPAN PE staff consisted of three part-time, experienced, credentialed PE teachers who were trained to do staff development. In addition to conducting group sessions, they provided on-site consultation visits to schools during which they provided motivation and technical support, modeled lesson segments, and provided recommendations and feedback to teachers.

Planning for Dissemination

The SPARK programs were ready for dissemination because they were created in response to a public health need and were developed by an experienced multidisciplinary team. Despite the many health benefits of physical activity, numerous reports indicate that most segments of the population, including children and youths, do not engage in sufficient activity for health purposes (Pate et al., 2006; Strong et al., 2005). Many agencies and organizations support the involvement of the schools in physical activity promotion, and *Healthy People 2010: Health Objectives for the Nation* (U.S. Department of Health and Human Services, 2000) includes strong support for the promotion of physical activity in schools, both within and outside of PE classes. PE is institutionalized in schools in the United States, and it is one of only five interventions strongly recommended for increasing physical activity by the national Task Force on Community Preventive Service (Kahn et al., 2002). Most children, however, do not participate in PE regularly, and studies suggest that PE is frequently marginalized and suffers from decreased curriculum time allocations, low subject status and esteem, and inadequate financial and personnel resources (McKenzie & Lounsbery, in press; Puhse & Gerber, 2005).

In addition to a need for evidence-based PE, the investigation team was very familiar with the PE profession, the preparation of teachers, and schools and how they operated. Members of the team, for example, had worked in various relevant roles in schools (e.g., physical education and health teacher and supervisor, coach, administrator, curriculum developer) and in universities in the preparation of both preservice and in-service teachers. In addition, the investigators completed a variety of formative studies relevant to the design of the intervention and its potential dissemination (e.g., Faucette, McKenzie, & Patterson, 1990; Faucette, McKenzie, & Sallis, 1992; Faucette, Nugent, Sallis, & McKenzie, 2002; Sallis, McKenzie, Kolody, & Curtis, 1996).

Professional Development of Teachers

For many reasons, including promoting the generalizability of the program throughout the United States, it was not logical for SPARK researchers to be the direct providers of PE to children. Thus, the professional development of those teachers already in schools (aka, staff development and in-service training) became a main feature of both the initial interventions and the dissemination efforts. Staff development is a common feature in public education and has been defined, in a narrow sense, as efforts "to improve teachers' knowledge, skills, and attitudes so that they perform their roles more effectively" (Gall & Vojtek, 1994, p. 1). It is a collaborative effort that typically includes attempts to get instructors to reflect on their work, improve teaching skills and strategies, and implement specialized programs (Garet, Porter, Desimone, Birman, & Yoon, 2001).

In the case of SPARK (see Table 1), children were the ultimate recipients of the SPARK innovations, but the designers of the programs (mostly university faculty) did not meet the children face-to-face. Rather, they designed an extended series of collaborations with school personnel (from district superintendents to PE

Table 1 Categories of Collaboration During SPARK Program Development and Dissemination

Personnel	School personnel	End recipients
1. Development and testing	District administrators	Children
University personnel	School principals	
interventionists	PE specialists	
measurement	Classroom teachers	
support	Food service personnel	
2. Dissemination	Support staff	
SPARK personnel		
promotion		
delivery and support		
workshop trainers		
business office		

teachers and classroom teachers) to ensure the programs were implemented. A goal of SPARK staff development was to consistently deliver a standardized implementation package (to teachers, schools, districts). This involved uniformity in regard to the curriculum, staff development and training, on-site support visits, educational materials, and physical activity supplies and equipment. Because schools are contextually different, however, it was important to accommodate some local variability to provide acceptability and promote the adoption of SPARK. As a result, the staff development process was carefully monitored to ensure standardization and high quality.

Diffusion Efforts

Evidence-based programs, even when shown to be feasible and effective, will have little impact on public health if only a small proportion of the population receives them. In the education literature, the process of getting others to use innovations and programs is referred to as *diffusion of innovation.* Diffusion includes various stages, which sometimes are integrated and overlap, and these have been identified as dissemination, adoption, implementation, and institutionalization (Rogers, 2003). *Dissemination* is the process of creating an awareness of programs among the targeted population (e.g., elementary schools) and includes informing stakeholders (e.g., school principals, PE teachers) about the innovation as well as persuading them to try it. *Adoption* is the decision by an entity (e.g., school district, individual schools or teachers) to commit to a program, usually defined as the purchase of program materials (e.g., SPARK manuals) or training (e.g., teacher staff development). *Implementation* is the process by which the adopter actually carries out the program, and *institutionalization* is the integration of the intervention into the culture of the institution (i.e., school or school district) through continued program implementation and practice (i.e., program sustainability).

The promising results of SPARK in the elementary schools convinced the developers that the program could contribute to improvements in the quality and quantity of physical activity in schools throughout the United States. In 1993, an enterprise was established within the San Diego State University Research Foundation to disseminate SPARK on a nonprofit basis. Over time, the dissemination efforts far exceeded the capacity of both the program designers and the academic institution. Thus, in October 2002 the university licensed the rights to disseminate SPARK programs to SPORTIME (http://www.sportime.com/), an equipment distributor and a long-time corporate sponsor of SPARK. SPORTIME is now part of School Specialty, an education company publicly traded on NASDAQ that provides innovative and proprietary products, programs, and services (http://www.schoolspecialty.com/home.jsp). The third author, an experienced physical educator who gained extensive experience writing and conducting the staff development programs during the initial interventions, has been directing the SPARK dissemination effort since its inception.

Social Learning Theory (SLT; Bandura, 1977) was used to guide the development and implementation of the SPARK program in elementary schools and it guided the initial diffusion efforts. Table 2 displays targeted outcomes, variables

addressed, SLT methods used, and sample specific strategies for each of the four diffusion stages. For example, the primary goals of the dissemination phase were to increase the awareness and knowledge of SPARK, inform potential adopters about the positive attributes of SPARK, and motivate the adoption of the program. Specific targeted outcomes were for school district personnel (e.g., central administrators, principals, and teachers) to discuss the SPARK program, to favorably evaluate it, and to communicate its benefits and expected positive outcomes to colleagues. Components of the dissemination included a colorful brochure, a videotape, and meetings with school personnel. The 8-min videotape showed the successful use of SPARK over 3 years by the initial program users. Its script consisted of critical messages related to the adoption of SPARK, and it documented the curricular implementation, teacher training, and results in terms of both process and outcome variables.

The commercialization of SPARK in 2002 brought about increased resources that permitted making program refinements and improved marketing, training, and distribution. Diffusion efforts with SPORTIME follow a business model, and this has permitted rapid expansion while programs are still able to remain true to the principles of the tested intervention. During fiscal year 2007–2008, SPARK conducted 810 workshops, provided 7 institutes (i.e., 2–3 day in-depth sessions on SPARK methodology), and made 55 professional conference presentations. These workshops had a potential impact on over 1 million children (based on 810 workshops with an average of 30 teachers who were each responsible for 50 children). SPARK currently has 28 full-time and 10 part-time employees (mostly in San Diego) who work on teams related to four specific tasks: program development, dissemination, delivery, and special projects. In addition to the permanent employees, SPORTIME employs about 30 "SPARK-certified" trainers on a contractual basis. These certified trainers are the face of SPARK, and they are primarily responsible for conducting on-site workshops in the states where they are licensed. They are hand-picked, experienced instructors (most with master's degrees), who previously implemented the SPARK program in their own school and then participated in extensive training on how to teach others to implement the program.

The trainers function under policies and procedures identified in the "SPARK Trainer Manual." Part of becoming certified as a trainer includes participating in SPARK workshops, assisting master trainers conduct programs, and assessing their own instruction using videotape analysis. After conducting 20 workshops successfully (e.g., receiving high evaluations from participating teachers) and meeting other established criteria, certified trainers may advance in status to Master Trainer and later to Elite Trainer. These levels bring about increased pay and responsibility. Elite trainers, for example, may be invited to present at professional conferences, conduct marketing presentations, lead media or special events, or respond to public speaking needs. To maintain consistency and keep trainers informed of latest developments, SPARK provides an intensive Train the Trainers workshop in San Diego each summer.

A major part of the diffusion process is a comprehensive effort to provide curricula and staff development services to schools, school districts, and other entities on a contractual basis. This effort starts with a consultation and a needs analysis, and this is then followed by the delivery of SPARK manuals and materials, initial staff development sessions, follow-up services, and equipment. A strong

Table 2 Social Learning Theory (SLT) Applied to the Diffusion of SPARK

Diffusion stage	Target outcome	Variables addressed	SLT methods	Specific strategies
Dissemination	Teachers/administrators are aware of SPARK. Teachers/administrators discuss SPARK curriculum. Teachers/administrators view SPARK program favorably.	Preconditions (knowledge and awareness), Outcome expectations, Expectancies	Symbolic modeling, Direct modeling	Brochures, Dissemination videotape, Meetings with district and school personnel, Presentations at conferences
Adoption	Schools/districts adopt SPARK program.	Outcome expectations, Expectancies, Vicarious reinforcement	Symbolic modeling, Incentives, Contracting	Newsletters, Adoption form
Implementation	Teachers use SPARK program with acceptable completeness, fidelity, and proficiency.	Behavioral capability, Self-efficacy	Direct modeling, Symbolic modeling, Guided enactment, Self-directed application of acquired skills	Training workshops, Follow-up visits
Maintenance	After 1 year, teachers continue to use SPARK program with completeness, fidelity, and proficiency.	Self-efficacy, Outcome expectations, Expectancies, Reinforcement	Incentives: social, monetary, status, self-evaluative	Recognition, Material rewards, Special status for school district, Feedback on performance

effort is made to establish a supportive infrastructure at a school or recreation site so the program will be sustainable. After testing numerous delivery options, SPARK now provides two alternatives for in-service training: standard and premium. The standard program includes six face-to-face hours with teachers (one full-day or two half-day workshops) and the premium program includes 12 instructional hours (two full days or four half-days). Sessions are designed to be teacher friendly, nonthreatening, and fun. After being introduced to the goals and philosophy of SPARK, teachers participate in selected physical activities from guidebooks that are appropriate to their grade level. Because many classroom teachers have not previously taught PE, trainers model both PE content and instructional and management strategies. To help solidify a commitment to teaching PE, time is provided during each session for teachers to collaborate with others at their site, schedule lessons for the upcoming semester, and plan follow-up activities with SPARK staff.

The literature on professional development has long indicated that on-site support for teachers can make the difference between adoption and rejection of new programs (Lieberman & Miller, 1991), so school principals and other administrators are invited to participate fully in SPARK sessions. SPARK also provides additional training and materials for an on-site program facilitator (i.e., a "SPARK Star"), who agrees to be an enthusiastic and lead person at a school or recreation site. This on-site facilitator (often an assistant principal or a grade-level coordinator) helps the program succeed by overcoming infrastructure and implementation barriers and by institutionalizing SPARK. The SPARK Star also serves as the initial main contact for SPARK follow-up services.

Assessment of SPARK Diffusion

As identified earlier, a diffusion goal of SPARK is to consistently deliver a high quality, standardized implementation package. Nonetheless, dissemination research has clearly indicated that interventions cannot be transferred into diverse settings without appropriate tailoring and that continued development and assessment is necessary. The physical education that children eventually receive depends heavily on their own teachers' willingness and ability to incorporate SPARK into their programs. Thus, in addition to having a well-researched curriculum that is delivered by certified trainers under similar contractual conditions, SPARK includes numerous process evaluation strategies. These are both informal and formal, and they provide important information concerning aspects of program delivery by identifying what works and what does not (Marcoux et al., 1999; McKenzie, Strikmiller, et al., 1994).

Informal evaluations include follow-up conversations by SPARK full-time staff with workshop trainers and with participating teachers and their administrators. More formal strategies include having participants complete a Workshop Evaluation and a Presenter Evaluation immediately following a workshop and later responding to an Implementation Evaluation questionnaire approximately 6 months after they first implemented the program. In addition, SPARK provides a Lesson Quality Checklist in each curriculum binder, and workshop attendees are instructed on how to use it. The Checklist can be used as a self-, peer-, or evalua-

tive assessment (i.e., administered by a site principal), and it helps provide feedback regarding SPARK compliance and use of instructional methodology.

Process evaluations completed during dissemination are typically for internal purposes, such as making adjustments to curricula, instructional procedures, and workshop delivery. Based on feedback from teachers, for example, the SPARK manuals have been revised (e.g., improved graphics and diagrams, additional activities, specification of how activities match national standards) and music CDs have been created and made available. Currently work is in progress to create instructional media disks and to make the curricula available online.

Results from two studies using process data collected over a 3-year period are presented here for illustrative purposes (McKenzie, Dart, Sallis, & Rosengard, 2003). In the first study, questionnaires completed after professional development sessions were analyzed to determine whether participants' (N = 1,500 teachers from 257 schools) perceptions of session components differed by (a) program grade level (K–2 versus 3–6), (b) teacher type (PE specialists versus classroom teachers), (c) year of in-service, (d) which of 16 certified trainers delivered the workshop, and (e) level of in-service. Teachers rated sessions on 12 variables using a five-point Likert-type scale and responded to open-ended questions. Over the 3 years, mean responses on all 12 variables were high (ranging from 4.5 to 5.0) and standard deviations were low, indicating teachers were highly favorable toward session components. Low scores were generally related to uncontrollable environmental variables (e.g., space, temperature).

In the second study, 421 teachers from 72 schools in nine states completed follow-up questionnaires after implementing SPARK with their own students. They responded to 12 questions on a seven-point Likert-type scale and to open-ended questions. Means for all 12 variables were high (ranging from 4.7 to 6.8), indicating teachers were positive toward the program and its implementation. There were few statistically significant differences by grade level, teacher type, and year. PE specialists, however, found it easier to implement the curriculum than classroom teachers (mean = 6.38 versus 5.48, p = .002). Overall, teachers were highly supportive of both staff development and the program they adopted. There were few differences on variables by year of implementation, teacher type, and grade level, suggesting the program was highly generalizable and continued to be found suitable and well liked by teachers.

Finding few differences in responses between classroom teachers and PE specialists was important. During the initial development of SPARK, the investigators were well aware that much of PE in elementary schools is delivered by classroom teachers who often have little background in the subject matter. Thus, we made considerations in the (a) curricula and supporting materials (e.g., unit and lesson content and sequencing, provision of management and instructional strategies, provision of precise instructional cues), (b) content and conduct of training workshops, and in (c) strategies needed for the program to be sustained in schools after SPARK personnel left. Some specific classroom teacher concerns and how they were resolved have previously been described in the literature (Faucette et al., 2002).

A study of the maintenance stage of SPARK diffusion was recently published (Dowda et al., 2005), and in it the sustainability of SPARK was evaluated

in 111 elementary schools in seven US states. Surveys, developed and compiled by an independent evaluator, were mailed to schools that had received SPARK curriculum materials, training, and follow-up (response rate = 47%). Up to 80% of schools that had adopted SPARK PE reported sustained use of the program at least 4 years later. Schools using SPARK held more frequent PE classes, and sustained use of the program was related to support provided by the school principal, the school previously not having a standard PE program, the availability of adequate equipment, and the teachers themselves being physically active. Program sustainability was similar in advantaged and disadvantaged schools.

Additional formal studies are ongoing, including an effort to assess the adoption stage of the diffusion process. In that study, personnel in 200 elementary schools in 34 states are being assessed in an effort to determine enablers and barriers to the adoption of evidence-based physical education programs (Lounsbery & McKenzie, 2008). The responses of principals and physical educators in 100 schools that have adopted SPARK will be compared with those in 100 matching schools in the same districts that have not adopted the program.

Continued Diffusion Development

Dissemination methods continue to evolve, and diverse strategies are in place to communicate with PE instructors, principals, district officials, health department staff, and parent groups. These include presentations, activity demonstrations, and displays at diverse conferences; advertising in the widely distributed SPORTIME catalogs and in targeted publications; a SPARK Web site; invitations to school staff to observe training at nearby schools; and personal contacts and word-of-mouth referrals. Maintenance strategies also continue to develop and currently include schools and teachers receiving certificates, a quarterly newsletter, grade-level benchmarks booklets, and online support materials.

The SPARK programs were originally tested in the upper elementary and middle school grades (i.e., grades 4–8), but because of market demand, matching curricula were developed for an early childhood program and for grades K–3. In addition, an Active Recreation program, based on experiences with the before- and after-school programs in MSPAN, was designed, and a SPARK program for high schools was just implemented in seven schools in Pittsburgh. These new programs are based on SPARK principles and methods, but they are have not yet been subjected to scientific scrutiny at a level of the initial intervention programs in upper elementary and middle schools.

Summary

Given the problems associated with sedentary living, there is need for the development and widespread use of evidence-based PE programs. The SPARK programs for elementary and middle schools have been subjected to numerous scientific tests, and they are among only a few programs to have been disseminated nationally. Additional programs need to be developed and assessed, and when

proven effective, should be made available to others. The procedures used in SPARK may serve as models for other researchers, particularly those interested in disseminating their programs through staff development.

Note

The SPARK programs were initially funded by NIH grants HL44467 and HL54564.

During the past 20 years many individuals and organizations have contributed to the development and diffusion of SPARK, and these include SPORTIME, Kecia Carrasco, and Julie Frank. Information on the SPARK Programs is available at www.sparkpe.org; spark@sparkpe.org, and 1-800-SPARK PE (619-293-7990).

References

Bandura, A. (1977). *Social learning theory*. Englewood Cliffs, NJ: Prentice Hall.

Dowda, M.C., Sallis, J.F., McKenzie, T.L., Rosengard, P.R., & Kohl, H.W. (2005). Evaluating the sustainability of SPARK physical education: A case study of translating research into practice. *Research Quarterly for Exercise and Sport, 76,* 11–19.

Faucette, F.N., McKenzie, T.L., & Patterson, P. (1990). Descriptive analysis of nonspecialist elementary physical education teachers' curricular choices and class organization. *Journal of Teaching in Physical Education, 9,* 284–293.

Faucette, N., McKenzie, T.L., & Sallis, J.F. (1992). Self-contained versus team teaching: An analysis of a physical education intervention by classroom teachers. *Journal of Teaching in Physical Education, 11,* 268–287.

Faucette, N., Nugent, P., Sallis, J.F., & McKenzie, T.L. (2002). I'd rather chew on aluminum foil: Overcoming classroom teachers' resistance to teaching physical education. *Journal of Teaching in Physical Education, 21,* 287–308.

Gall, M.D., & Vojtek, R.O. (1994). *Planning for effective staff development. Six research-based models*. Eugene, OR: ERIC Clearinghouse on Educational Management.

Garet, M.S., Porter, A.C., Desimone, L., Birman, B.F., & Yoon, K.S. (2001). What makes professional development effective? Results from a national sample of teachers. *American Educational Research Journal, 38,* 915–945.

Kahn, E., Ramsey, L., Brownsen, R., Heath, G., Howze, E., Powell, K., et al. (2002). The effectiveness of interventions to increase physical activity: A systematic review. *American Journal of Preventive Medicine, 22*(Suppl. 4), 73–107.

Lieberman, A., & Miller, L. (Eds.). (1991). *Staff development for education in the '90s: New demands, new realities, new perspectives* (2nd ed.). New York: Teachers College Press.

Lounsbery, M.F., & McKenzie, T.L. (2008). *Discovering obstacles to physical education (Do PE)*. Las Vegas, NV: University of Nevada, Las Vegas. [Research proposal funded by Active Living Research, Robert Wood Johnson.]

Marcoux, M.F., Sallis, J.F., McKenzie, T.L., Marshall, S., Armstrong, C.A., & Goggin, K. (1999). Process evaluation of a physical activity self-management program for children: SPARK. *Psychology & Health, 14,* 659–677.

McKenzie, T.L., Alcaraz, J.E., & Sallis, J.F. (1994). Assessing children's liking for activity units in an elementary school physical education curriculum. *Journal of Teaching in Physical Education, 13,* 206–215.

McKenzie, T.L., Alcaraz, J.E., Sallis, J.F., & Faucette, F.N. (1998). Effects of a physical education program on children's manipulative skills. *Journal of Teaching in Physical Education, 17,* 327–341.

McKenzie, T.L., Dart, J., Sallis, J.F., & Rosengard, P.F. (2003). Evaluation of a widely disseminated physical education and professional development program by in-service teachers. *Research Quarterly for Exercise and Sport, 74*(Suppl. 1), A50–A51.

McKenzie, T.L., & Lounsbery, M.F. (in press). School physical education: The pill not taken. *American Journal of Lifestyle Medicine*.

McKenzie, T.L., Sallis, J.F., Kolody, B., & Faucette, N. (1997). Long term effects of a physical education curriculum and staff development program: SPARK. *Research Quarterly for Exercise and Sport, 68,* 280–291.

McKenzie, T.L., Sallis, J.F., Prochaska, J.J., Conway, T.L., Marshall, S.J., & Rosengard, P. (2004). Evaluation of a 2-year middle school physical education intervention: M-SPAN. *Medicine and Science in Sports and Exercise, 36,* 1382–1388.

McKenzie, T.L., Strikmiller, P.K., Stone, E.J., Woods, S.E., Ehlinger, S., Romero, K.A., et al. (1994). CATCH: Physical activity process evaluation in a multicenter trial. *Health Education Quarterly,* (Suppl. 2), S73–S89.

Owen, N., Glanz, K., Sallis, J.F., & Kelder, S.H. (2006). Evidence-based approaches to dissemination and diffusion of physical activity interventions. *American Journal of Preventive Medicine, 31*(4S), S35–S44.

Pate, R.R., Davis, M.G., Robinson, T.N., Stone, E.J., McKenzie, T.L., & Young, J.C. (2006). Promoting physical activity in children and youth: A leadership role for schools. (AHA Scientific Statement). *Circulation, 114,* 1214–1224.

Powers, H.S., Conway, T.L., McKenzie, T.L., Sallis, J.F., & Marshall, S.J. (2002). Participation in extracurricular physical activity programs in middle schools. *Research Quarterly for Exercise and Sport, 73,* 187–192.

Prochaska, J.J., Sallis, J.F., Slymen, D.J., & McKenzie, T.L. (2003). A longitudinal study of children's enjoyment of physical education. *Pediatric Exercise Science, 15,* 170–178.

Puhse, U., & Gerber, M. (Eds.). (2005). *International comparison of physical education: Concepts, problems, prospects*. Oxford, UK: Meyer & Meyer.

Rogers, E.M. (2003). *Diffusion of Innovations*. New York: Free Press.

Sallis, J.F., & McKenzie, T.L. (1991). Physical education's role in public health. *Research Quarterly for Exercise and Sport, 62,* 124–137.

Sallis, J.F., McKenzie, T.L., Alcaraz, J.E., Kolody, B., Faucette, N., & Hovell, M.F. (1997). The effects of a 2-year physical education program (SPARK) on physical activity and fitness in elementary school students. *American Journal of Public Health, 87,* 1328–1334.

Sallis, J.F., McKenzie, T.L., Alcaraz, J.E., Kolody, B., Hovell, M.F., & Nader, P.R. (1993). Project SPARK: Effects of physical education on adiposity in children. *Annals of the New York Academy of Sciences, 699,* 127–136.

Sallis, J.F., McKenzie, T.L., Conway, T.L., Elder, J.P., Prochaska, J.J., Brown, M., et al. (2003). Environmental interventions for eating and physical activity: A randomized controlled trial in middle schools. *American Journal of Preventive Medicine, 24,* 209–217.

Sallis, J.F., McKenzie, T.L., Kolody, B., & Curtis, P. (1996). Assessing district administrators' perceptions of elementary school physical education. *Journal of Physical Education, Recreation, and Dance, 67*(8), 25–29.

Sallis, J.F., McKenzie, T.L., Kolody, B., Lewis, M., Marshall, S., & Rosengard, P. (1999). Effects of health-related physical education on academic achievement: Project SPARK. *Research Quarterly for Exercise and Sport, 70,* 127–134.

Stone, E.J., McKenzie, T.L., Welk, G.J., & Booth, M.L. (1998). Effects of physical activity interventions in youth: Review and synthesis. *American Journal of Preventive Medicine, 15,* 298–315.

Strelow, J.S., Larson, J.J., Sallis, J.F., Conway, T.L., Powers, H.S., & McKenzie, T.L. (2002). Factors influencing the performance of volunteers who provide physical activity in middle schools. *The Journal of School Health, 72,* 147–151.

Strong, W.B., Malina, R.M., Blimkie, C., Daniels, S., Dishman, R., Gutin, B., et al. (2005). Evidence-based physical activity for school-age youth. *The Journal of Pediatrics, 146,* 732–737.

U.S. Department of Health and Human Services. (2000). *Healthy People 2010* (Conference ed., in 2 vols.). Washington, DC: U.S. Government Printing Office.