



Research Report of the Month
DECEMBER 2004

McKenzie, T.L., Sallis, J.F., Prochaska, J.J., Conway, T.L., Marshall, S.J., & Rosengard, P. (2004).

Evaluation of a two-year middle school physical education intervention: M-SPAN.

Medicine & Science in Sport & Exercise, 36, 1382-1388.

The end of the year is an appropriate time to complete unfinished business. For that reason, I want to return to a study already introduced in the Research Report of the Month section of Unlock – the Middle-School Physical Activity and Nutrition study, (best known by its acronym, M-SPAN). More than a year ago (July, 2003), an annotation appeared here for the report of a field trial of the physical activity and nutrition components of the M-SPAN program. You might find it useful to review that earlier study by using the Unlock archive function located on the main page.

I have three reasons for electing to examine a second report from the M-SPAN study: (1) The project is particularly important because it represents the only large scale physical education curriculum and teacher development intervention at the middle school level to be reported in the research literature; (2) because it focuses on what happened in physical education (PE) classes, the present report provides information not made available in the earlier publication, and (3) because July is the calendar point at which Unlock has the lowest level of reader use, you may have missed the first account of the M-SPAN project – and that would be unfortunate.

Since the earlier annotation provided a thorough overview of both M-SPAN and the experimental field trial, that material will be shortened here to a brief review. In that way, prompt attention can be given to the new findings relative to instruction and student physical activity in the PE classes. Again, I urge you to retrieve the July, 2003 Research Report of the Month and read it as a preview to this new addition from M-SPAN.

THE STUDY

The overall purpose of the M-SPAN program was to evaluate the effects of a program intervention on the physical activity and fat intake of middle school students. The present report, however, focuses exclusively on the effort to increase physical activity during PE classes.

PARTICIPANTS, DESIGN, AND CONTEXT

Forty-eight public middle schools (grades 6-8) were invited to participate in the study. The first 24 to indicate agreement were accepted and, after collection of baseline data, were stratified by school district and assigned at random to intervention (n=12) or measurement-only control conditions (n=12).

Participating schools were diverse in size, facilities, and population characteristics. Mean enrollment was 1109 students per school, 49% of whom were female, 45% were nonwhite, and 39% received reduced price school meals. PE was required daily at all grade levels, and most classes were taught by certified specialists. Approximately 90% of the classes were coeducational, and the mean class size was 37 students.

INTERVENTION

Unlike other large scale field trials of specially designed interventions, M-SPAN did not involve the importation of a structured curriculum. Instead, the effort was designed to encourage revision of existing school programs and instructional methods so as to increase student moderate to vigorous physical activity (MVPA).

To accomplish this, the PE intervention staff provided professional development in-service training. Five three-hour sessions were held, three during year 1 and two during year 2. In-service had four main goals: 1) create teacher awareness of the need for active, health-related PE; 2) assist teachers to design and implement active PE curriculum; 3) develop teachers' class management and instructional skills to enhance physical activity and student learning; and 4) provide ongoing support for change.

Staff development sessions included a balance of didactic instruction, modeling, and rehearsal. Teachers made plans and set specific goals for modifying PE at their schools. In addition to in-service group sessions, M-SPAN PE staff provided school site consultation visits twice per month in year 1 and once per month in year 2. On site, they provided motivation and technical support, modeled lesson segments, and offered to give feedback to teachers when requested.

OUTCOME MEASURES

Outcome data for physical activity were collected by an extensively trained and regularly supervised staff of field agents. (All observation measures were monitored through periodic tests of inter-observer agreement). The System for Observing Fitness Instruction Time (SOFIT), a well tested and widely used instrument, was used to record student physical activity (and concurrent lesson context) during a random sample of PE lessons (n=1849) on 72 days throughout the 2-year study. The observed lessons were taught by 214 different teachers, with 7 to 14 coming from each school.

In addition, the researchers employed three measures related to the quality of the intervention and its acceptability to participants. One instrument was designed to assess teacher end-of-project satisfaction with each aspect of M-SPAN; another collected teacher evaluations of the staff development sessions, and a questionnaire was completed (anonymously) by students to indicate their level of enjoyment in PE classes.

DATA COLLECTION AND ANALYSIS

Data were accumulated from the spring of 1997, when baseline information was collected, through two full academic years, 1997-98 and 1998-99. The 12 schools in the control group received no element of the intervention and were observed with SOFIT only as required to assess levels of physical activity in PE classes. For the subsequent inspection of outcome data, the schools served as the unit of analysis (not individual PE classes). This is an important point because using that relatively small number (24) limited the power of statistical tests to detect significant effects of the M-SPAN intervention on student physical activity. Conversely, that conservative decision (one generally considered to be correct) invests great credibility in any outcomes that are found to be statistically significant.

RESULTS

The intervention resulted in significant overall increases in the time students spent in MVPA. From baseline to the end of year 2, the increase of MVPA in the 12 intervention schools was 18%. The change in Control schools was a non-significant 3% over the same time period. The effects were cumulative in that the improvement was progressively larger in the intervals between baseline and year 1 and between year 1 and year 2. The overall improvement in physical activity scores would yield the equivalent of about 3 minutes more of MVPA in each lesson. Over a 36

week school year of classes that averaged 35 minutes in length, that works out to almost 8 hours of additional moderate to vigorous activity or, over the three years of middle school, to about 2 pounds of weight gain prevention.

The impact of M-SPAN was greatest for boys and much more modest for girls, (Their gains were not statistically significant.) Their MVPA scores rose progressively but started out lower than those for boys, and by the end of year 2 had only reached a level equal to that for boys in the control schools.

Measures for student enjoyment did not reflect any change as a result of the intervention, nor did the average weekly attendance rates (for either boys or girls) shift over time. Teacher evaluations for various aspects of the group staff development sessions were uniformly high (between 4 and 5 on five-point Likert-type scales). At the end of the project, measures of teacher satisfaction with the program indicated that the participants were positive and would highly recommend it to others. They were particularly satisfied with the quality of materials and the M-SPAN instructors. The data indicated that they believed the program would improve the status of PE in their school and had improved their own instructional skills.

An additional analysis examined the lesson contexts in which student MVPA was increased (fitness activities, game play, skill drills, free play, knowledge, and management). Much to the surprise of the investigators, teachers in the intervention schools did not make any substantial shifts in how they distributed class time into those six contexts. They had anticipated that the increases in MVPA would be accompanied by (and related to) changes in lesson structure such as increasing time for fitness and cutting down on management time (both encouraged by the professional development sessions). But there was no evidence of such structural changes. Instead, teachers simply had increased the proportion of time students were active within (particularly) game play, free play, and fitness activities. Even the management component showed some gain in MVPA as teachers did such things as call roll or distribute equipment during time devoted to warm ups.

DISCUSSION

In their discussion of the results, the authors repeatedly emphasize one point. I will let them speak for themselves.

A staff development program increased physical activity in middle school PE without requiring increases in class frequency or duration. An 18% increase in physical activity during PE classes was attained without hiring new teachers or taking more time away from other curricular areas (p.1386).

Quite properly, I think, that statement was carefully crafted for maximum political utility, so we might add, "And all of that without costing the local community taxpayers a single dime!"

While the M-SPAN project group had every reason to be cheered by the clear evidence that the intervention had worked to produce indisputable gains (for boys), there were disappointments and reservations. First, the absolute magnitude of gain was modest. If M-SPAN were the only agency through which to promote higher levels of physical activity, the gains would better have been called "insignificant" for any practical purpose. In consequence, the authors used the report to call for the design and testing of more comprehensive approaches to physical activity promotion. At the best, it appears that PE can be used to contribute only a small part of the increases needed in the daily activity levels of adolescents.

A second, and perhaps more disappointing, finding was the indication that M-SPAN had not produced equivalent physical activity gains for girls. This was despite the fact that most of the classes were coeducational where, putatively, girls had been exposed to the same curriculum and teaching methods (in the same classes) as had the boys. There are no data in the report to

suggest, directly or indirectly, were the problem might lie. There is hope, however, in a new project already underway, and this time it is a study in which the interventions were specifically designed to impact the physical activity levels of girls.

The Trial of Activity for Adolescent Girls (TAAG), with funding from the National Heart, Lung, and Blood Institute, is underway in six states (California, Arizona, Louisiana, South Carolina, Minnesota, and Maryland). The purpose of the project is to design and test a program that fosters school and community environments that encourage and support full involvement of girls in every aspect of physical activity including physical education, recreation, leisure time activities, and sport.

Already a year and a half underway, the data collection cycle will begin next month, and reports of the baseline measures should appear during 2005. If you are interested in the problem of declining MVPA for girls during the middle school years (the problem so painfully underscored by the M-SPAN results), you can go online to <http://www.cscg.unc.edu/taag/>. The TAAG website contains lists of personnel, sponsoring institutions, basic project descriptions, and a map which allows the user to identify participating schools in each of the trial states.

The M-SPAN report contains some cautionary points to be considered by anyone planning a similar project. The study was conducted in schools where PE is required every day. In the far more common situation (in the USA) of only one to four lessons per week, it would be much more difficult to achieve the same results. Also, one year clearly was not sufficient to produce robust gains. It takes time for an intervention of that magnitude to take root, and support has to be continuous over the entire period. The cost of such extensions is not trivial. Finally, we have once again seen the failure of an intervention designed to help PE teachers decrease the time devoted to class management activities. That MVPA gains were achieved, nonetheless, should not obscure the fact that teachers can be remarkably resistant to manipulation of that particular aspect of their pedagogy.

Your comments on this annotation will be welcome at lflocke@hotmail.com.

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