



# **Unlock Research**

## **Research for Physical Educators**

### **Research Report of the Month** **SEPTEMBER 2004**

Van Beurden, E., Barnett, L.M., Zask, A., Dietrich, U.C., Brooks, L.O., & Beard, J. (2003).

#### **Can we skill and activate children through primary school physical education lessons?" Move it Groove it" – a collaborative health promotion intervention**

Preventive Medicine, 36, 493-501.

### **INTRODUCTION**

The study selected for Research Report of the Month in this opening issue of UnlockResearch 2004-2005 comes to us from the far South Pacific. That bit of geographic trivia should serve to remind you that, despite the differences between educational systems in Australia and the USA, some problems in physical education (PE) are everywhere the same (or nearly so).

New South Wales (NSW) is the Australian state in which this investigation was conducted. There, it is official educational policy for primary schools to encourage both children's' acquisition of fundamental movement skills (FMSs) and engagement in exercise at the level of moderate to vigorous physical activity (MVPA). As with the situation in the USA, the instruction required to achieve those goals in NSW is provided by classroom teachers who were trained as generalists. The only difference is that in the USA such an arrangement is predominantly the case. In Australia where elementary level PE specialists are not used, it is exclusively so.

Although the reasoning behind a policy promoting FMS and MVPA as objectives in PE has seemed equally compelling in Australia and the USA, it is apparent that on both sides of the Pacific pond the good intentions have had only a small and uneven impact on what actually happens in school classes. Further, physical educators everywhere have continued to wonder whether it is possible for classroom teachers to achieve both objectives at the same time – given the present context for instruction (low scheduling priority, lack of equipment and facilities, insufficient preservice preparation in the subject field of PE, and inadequate inservice development support for teachers).

Results from some large-scale, carefully designed, and well-financed intervention studies in the USA have encouraged the belief that sound curriculum design and intensive efforts at teacher development and support will allow children in PE classes to have their cake and eat it, too. That is, research suggests that under educationally sound conditions, increased attention to fitness activities need not come at the cost of gains in the area of movement skills. Nevertheless, the suspicion continues among practitioners that it will be difficult for either elementary PE specialists or generalist classroom teachers to achieve such a highly desirable result (to say nothing of near-universal skepticism about the creation of the requisite conditions in schools and teacher education programs). In the interest of full disclosure, I must tell you that I share some of that same suspicion and skepticism.

## THE STUDY

The present study was designed to respond to the question of whether it is possible simultaneously to achieve both improved FMS mastery and increased levels of MVPA. In addition, the intervention was designed to allow the investigators some insight into *how* that dual outcome might best be achieved. Finally, the report makes clear that there was interest in detecting whether a well-designed program could produce evidence of any impact at all, given the limited time allocated to PE in the primary schools. Despite the fact that this study was conducted in another hemisphere, I am sure that none of this will sound foreign to readers in North America .

The program, called "Move it Groove it," (MIGI) was funded by the NSW Health Department and involved the collaboration of a six-person health promotion team from an area health service, 18 rural primary schools (with their classroom teachers and students), and the teacher preparation program at a university in the area. As you probably have detected, the program's title identifies the two main outcome variables in the study – physical activity ("Move It") and acquisition of movement skill ("Groove It").

## DESIGN AND PARTICIPANTS

The design used was that of a quasi-experimental study utilizing a program of multiple interventions as the independent variable. Pre- and post-measurements were applied for several dependent variables. The study involved 1,045 grade 3 and 4 children (aged 7 to 10 years) in 18 primary schools. Nine schools were randomly assigned as intervention sites, and nine as control sites (where MIGI was not provided). The total pupil population at these sites consisted of 53% boys and 47% girls.

The schools had been randomly selected (with stratification for school size) from a pool of primary schools at which staff members had indicated interest in participating. School size ranged from 18 to 575 pupils, and given the "whole school" nature of the treatment protocol, most of the teaching and administrative personnel at the nine intervention schools were participants in the study.

## THE INTERVENTION

The year-long MIGI intervention had two primary parts: (1) supporting teachers in their role as PE instructors, and (2) creating supportive environments and healthy school policies. The latter component of the study was addressed by creation of a whole school Project Team at each of the intervention sites. The team consisted of the principal, participating teachers, parents, the school's preservice teacher (student teacher), and a health worker from the MIGI project staff. Final details of membership were up to personnel at the individual school, but at each site the task for the team was to select and customize policy and environmental strategies for their school.

In addition to participating on the school Project Team, the preservice teachers played a critical role in the program's implementation. They served as "buddies" who were matched with classroom teachers at each intervention school. All buddies were volunteers from the third year of a university education training program. All had received formal preparation (as part of a credit-bearing preservice unit) for their role in the MIGI intervention. As buddy partners they were prepared to suggest strategies and provide support for the classroom teachers' efforts to increase both FMS mastery and MVPA during PE classes. They also distributed printed resources and helped teachers access the web site that had been developed as part of the project's support system.

Two additional components completed the treatment program's design. First, four workshops were conducted for teachers at each intervention school, one to introduce the project, one at mid-year to share progress reports, and two that responded to teachers' expressed instructional development needs in the subject area of PE. Second, and finally, each participating school was given \$375(AU) to purchase equipment to assist in maximizing physical activity in PE classes.

## OUTCOME VARIABLES AND DATA COLLECTION

The test battery of eight FMSs consisted of: static balance, sprint run, vertical jump, kick, hop, catch, overhand throw, and side gallop. Those skills were selected because they could be clearly defined and reliably measured, were essential to subsequent development of more complex movement skills, could be mastered by most children by the end of their 4<sup>th</sup> year in school, and favored neither girls nor boys. For rating purposes, five or six sub components of movement were identified for each skill. Full details for the FMS protocol can be found in references cited in the report.

All children were individually tested by trained program representatives. Each skill was demonstrated and then five trial attempts were taken. Each component of the skill was scored, and was considered to be present if it had been performed correctly on at least four of the five trials. In turn, the skill was considered mastered if all, or all but one, of the components had been rated as present (performed correctly). Periodic interrater reliability checks were obtained in the field for each FMS tester.

Physical activity levels during PE classes were measured by the familiar System for Observing Fitness Instruction Time (SOFIT), for which details can be obtained from items cited in the report. SOFIT involves direct and systematic observation of entire PE lessons and utilizes a sampling system to obtain an estimate of the proportion of class time in which pupils are engaged in MVPA, as well as the relative proportions of class time expended in the five lesson contexts of: management/instruction, skill practice, game play, fitness activity, or, "other" engagements. Again, trained testers were employed, and interobserver reliability checks were obtained in the field.

Overall, during pre- and post-measurements at all 18 schools (intervention and control), 231 lessons were observed. The median number of observed lessons at each school was 12. Of those, 21% were in year 3 classes, 54% in classes that combined years 3 and 4, and 25% in the classes of year 4 pupils.

To complete the picture of PE context it is important to understand that both the frequency and length of PE classes varied across schools. The mean duration of classes was 21 minutes (with a range from 12 to 46 minutes), and the frequency of lessons given each week ranged from 1 to 4. Of the lessons observed, 55% were conducted by female teachers, and 45% by males.

## ANALYSIS

For the unrepentant statistical junkies among you, this section of the annotation may be a disappointment. The form of data analysis employed in this study was hierarchical logistic multiple regression. Neither my skills nor your patience are likely to be sufficient for an explanation of that! With the help of a statistical consultant and an exchange of e-mails with the very helpful primary author, however, I can be confident the main outcomes noted below are both accurate and reasonably complete – even if my Spartan account lacks much of what was elegant in the analysis.

## RESULTS

Baseline FMS pretest results from MIGI showed that fewer than half (47%) of all tests on all children produced a rating of mastery or near mastery. The most commonly mastered were static balance (75%) and side gallop. The poorest performances came in the jump (38%), and sprint run (40%).

At the posttest, children in both intervention and control schools showed improvement in FMS scores (to be expected for maturing children over a year-long period), but the improvements in the intervention group were superior in every case, and significantly so in most. The smallest such superiority in improvement was 7% in throwing among the girls, and the largest was a 26% improvement in the sprint run for boys. For all skills combined, the children in MIGI schools showed a gain of 17%, a large gain with both practical and statistical significance.

For the variable of physical activity, at baseline (before MIGI began) the overall adjusted mean percent of class time in MVPA was 35%. Interestingly, time of day for the lesson start was a significant predictor of MVPA scores, with the vigor of observed activity declining as the day progressed. It was less of a surprise when lesson contexts also were shown to be important, with percent of time in MVPA highest in fitness and game activities and lowest in management and instruction. While that last finding may sound quite innocent, the discussion below will suggest that it might play an important part in understanding what MIGI did and did not accomplish.

A year later, posttest data showed nonsignificant superiority of the gains in MVPA for intervention schools (4.5%) when contrasted with the equally inconsequential gains at control schools. In short, the impressive gains in FMS mastery associated with MIGI were not accompanied by equivalent gains in moderate to vigorous physical activity. In terms of the analysis employed, after a year of intense effort there simply were no MVPA improvements to celebrate.

An analysis of the amount of time spent in each of SOFIT's lesson contexts revealed that over the course of MIGI there had been a shift in time allocation by teachers such that significantly more of each class was spent in skill practice, while less was expended in fitness activities and game play. To my surprise, there was no significant change in time spent on class management and instruction (both of which had been targets of the professional development effort).

## DISCUSSION

The analysis provided a great deal of additional detail that was not presented above. Several of those points, however, may be of particular interest to Unlock readers who remember results from studies reviewed in the previous year. For example, although the data analysis generated the usual lengthy list of gender differences in FMS performance, the ultimate degree of improvement in MIGI schools was similar for boys and girls.

Clearly, the teaching strategies encouraged by MIGI were appropriate to both genders. Further, the data show that substantial gains were made by both boys and girls in their less well performed skills (boys' jumping, sprint run, and side gallop, and girls' sprint run and catching). Taken together, results like those indicate that effective instruction and a supportive social environment in class may make it possible to substantially reduce gender differences in skill performance at the primary school level. My own guess is that the consequences of such improvement might be more far-reaching than is generally imagined.

In contrast, the results for physical activity must have been, by any measure, a severe disappointment to the MIGI team. The small improvement (4.5%) over the baseline of 7 minutes in MVPA (out of the average 21 minute lesson) was inconsequential. The gain would produce only 58 seconds of additional activity that could make any meaningful contribution toward the physical activity goal recommended in NSW policy statements. Even if all classes in NSW met three times each week (which they presently do not), less than three minutes more of MVPA would not seem to justify the resources and effort invested in MIGI.

So what went wrong? The authors of the report proffer some attractive hypotheses on that score, but their report offers no final certainty. The best-guess scenario runs as follows. It had been assumed that the impact of MIGI would be to decrease lesson time devoted to management and instruction (efficiencies of that sort are part of most models for effective PE instruction). The

corollary expectation was that the time thus saved would be invested in class time devoted to fitness activities (in turn, resulting in more MVPA). What actually happened, however, was that management and instruction stayed the same, while time in fitness and (and games) decreased. Why?

Possible explanations include the fact that the MIGI program emphasized the need for children to have time for warm-up and cool-down at the start and end of class (neither of which served to increase MVPA). It appears possible that the time used for those added functions may have been subtracted from fitness activities and games. Even if the fitness segment of the lesson became more vigorous than it had been prior to MIGI (and this, indeed, was the case in many schools), the reduction in total fitness time more than counterbalanced that gain.

The increase in time spent in skill practice probably reflected teachers' putting more emphasis on teaching FMSs, and may have been directly causal in the impressive gains in FMS mastery at MIGI schools. That segment of time, however, did not also become more vigorously active – and consequently did not serve to raise scores for MVPA.

The absence of any decrease in management and general instruction time probably indicates (again) how difficult it is for any PE instructor to reduce time spent on those class functions, and that challenge is particularly strenuous for those without thorough preparation in the pedagogy of PE. When class meeting time is limited to mere minutes per week, such reductions must be substantial if they are to produce any detectable difference in the overall time economy of a year-long PE program.

Taken together, whether any or all of these hypotheses are correct or not, it is clear that there are dilemmas to confront when teachers attempt to keep children active in PE class – while at the same time working intensively to further development of FMS. The two demands interact in ways that are not always predictable – as the MIGI team learned from direct experience.

## CONCLUSIONS

Each reader will have to consider what valuable insights can be derived from the MIGI study. Here are three that struck me as particularly useful. First, there is the simple suggestion that, with appropriate preparation and motivation, student teachers can be used as part of a staff development program for classroom teachers. Before reading this report I would have rejected that idea out of hand. Now, I would give it serious consideration.

Second, if a physical education lesson is going to be more than just an exercise period, include efforts to teach for other outcomes (such as motor skills), and at the same time include a substantial amount of MVPA, then it is evident that the intensity of activity will have to be stepped up in more than just the lesson context of fitness activity. Even with primary school children there must be ways to load MVPA into the contexts of skill practice, game play, and even parts of the class management routines. It follows, of course, that the intensity of teacher planning and on-the-floor effort would have to undergo a corresponding rise. Given the conditions of employment in many schools, sustaining that level of pedagogical intensity might turn out to be more problematic than designing ways to increase children's in-class MVPA.

Third, and finally, the report provided a truly memorable reminder that everyone who designs interventions to be aimed at teachers (and be introduced into the dynamic world of physical education classes) must be alert to the Law of Unintended Consequences. From interventions at the level of a solitary teacher trying out a new instructional strategy in a single class, to a complex, long-term team effort such as MIGI, that simple Law applies without exception. In physical education what you get is not always what you intended, and the surprises are not always helpful or benign.

As with the lively and sophisticated authors of the MIGI report, good program and staff development investigators always examine their results with an eye to spotting (and understanding) those unintended anomalies in the data. By learning from results that were not intended, researchers get smarter -- and ready to try again.

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