4. Elifson K, Boles J, Sweat M, Darrow W, Elsea W, Green R. Seroprevalence of human immunodeficiency virus among male prostitutes. *N Engl J Med.* 1989;321:832–833.
5. Sterk C. Cocaine and HIV seropositivity. *Lancet.* 1988;1:1052.
6. Leonard T, Sacks J, Franks A, Sikes RK. The prevalence of human immunodeficiency virus, hepatitis B, and syphilis among female prostitutes in Atlanta. *J Med Assoc Ga.* 1988;77:162–164, 167.
7. Antibody to human immunodeficiency virus in female prostitutes. *MMWR.* 1987;36:157–161.

The Physical Activity of Fifth-Grade Students during Physical Education Classes

Bruce G. Simons-Morton, EdD, MPH, Wendell C. Taylor, PhD, MPH, Sharon A. Snider, MPH, and Iris W. Huang, MS

ABSTRACT

One hundred fifty-seven fifth-grade students in 20 of the 355 elementary schools in one Texas county were systematically observed during physical education classes. On average, the students spent 8.5% of class time in moderate to vigorous physical activity, 23.3% in minimal activity, and 68.1% in sedentary activity. None of the schools averaged 20% of class time in moderate to vigorous physical activity. The levels of physical activity observed are substantially lower than the levels called for in national health objectives. (*Am J Public Health.* 1993;83:262–264)

Introduction

Childhood physical activity is positively associated with a range of beneficial childhood health and fitness outcomes.[1] Childhood activity also has potential for fostering attitudes, skills, and habits that may increase the likelihood of regular exercise during adulthood,[2–8] although the link between childhood and adult physical activity is not well established.[7]

National health objectives call for increasing the proportions of children obtaining regular physical activity and participating in daily school physical education classes.[9,10] Currently, children obtain 20% to 40% of their physical activity at school,[3,11] but many children are physically active only during physical education classes.[11] Because more than 80% of all students are enrolled in such classes,[3] the nation's public schools potentially can provide the nation's youth with regular physical activity and foster participation in such activity outside of school and later in life. Accordingly, a national health objective calls for physical education classes to engage students in physical activity, preferably in lifetime activities such as tennis and jogging that may conveniently be engaged in by adults, for at least 50% of class time.[9,10]

The purpose of this research was to determine the type of activities and the amount of moderate to vigorous physical activity fifth grade students participated in during physical education classes in a regional sample of schools.

Methods

Excluding 14 schools with special students or programs, the 355 elementary schools from the 20 school districts in one large Texas county were eligible for the study. Stratifying by district size, we randomly sampled 20 schools, including 8 of the 157 schools in the 1 large school district, 8 of the 160 schools in the 10 medium-sized school districts, and 4 of the 38 schools in the 9 small school districts. Consent to conduct the research during the 1991 spring semester was obtained from school district officials.

Sample-size calculations based on pilot data called for a sample of eight classes per school to characterize the semester's activity. For each student observed, a trained interviewer directly entered into a notebook computer the student's sex, activity intensity, type of activity, whether the student was "on task" or "off task," and instructional mode. Observations were entered every 20 seconds for 5 minutes, after which the observer had 1 minute to randomly select a new subject.

The activity intensity categories had been validated previously against measured heart rates.[12] Sedentary activity involved no weight transfer; minimal activity involved nonstrenuous arm, leg, and trunk movement, such as stretching; moderate to vig-

At the time of the study, the authors were with the University of Texas Health Science Center at Houston, Center for Health Promotion Research and Development. Bruce G. Simons-Morton is now with the National Institute of Child Health and Human Development, Bethesda, Md.

Requests for reprints should be sent to Bruce G. Simons-Morton, EdD, MPH, Prevention Research Branch, Division of Epidemiology, Statistics, and Prevention Research, National Institute of Child Health and Human Development, 6100 Executive Blvd N, Room 7B05, Bethesda, MD 20892.

This paper was submitted to the Journal October 28, 1991, and accepted with revisions September 22, 1992.

TABLE 1—Mean Percentages of Class Time by Physical-Activity Intensity Observed during Fifth-Grade Physical Education Classes

	Moderate to Vigorous Activity		Minimal Activity		Sedentary Activity	
	Mean	SD	Mean	SD	Mean	SD
Gender[a]						
Boys (n = 155)	9.9	11.2	24.6	15.3	65.5	19.0
Girls (n = 153)	7.8	10.5	22.1	18.0	70.1	21.1
School district size						
Large (n = 8)	7.9	2.7	23.2	3.7	68.8	5.6
Medium (n = 8)	8.4	4.5	23.2	5.4	68.5	8.9
Small (n = 4)	12.8	6.2	23.9	3.8	63.3	9.2
Overall (n = 20)	8.6	2.4	23.3	2.9	68.1	4.8

[a]One hundred fifty-seven students were observed in 20 schools. Some classes were for boys or girls only.

TABLE 2—Distribution of Moderate to Vigorous Activity during Fifth-Grade Physical Education Classes in 20 Schools

Class Time Spent in Moderate to Vigorous Activity	Number of Schools
0% to <6%	3
6% to <11%	10
11% to <16%	5
16% to <20%	2

orous activity consisted of dynamic large-muscle movement involving weight transfer, such as fast walking, running, jumping, and climbing. The observed child was considered on task when involved in the main activity and off task when engaged in another task, such as fighting with a classmate. Instructional modes included class management, instruction, skills practice, scrimmage (playing a game or sport), and supervised play.

During the study period we conducted a 10-minute telephone interview with each principal concerning physical education class scheduling.

Results

The school principals reported that physical education was scheduled an average of 3.5 times per week, 40 minutes per class—140 minutes weekly. Also, recess was scheduled an average of four times weekly, for a total of 82 minutes. All schools employed certified physical education specialists. Seventeen schools reported conducting annual health-related fitness tests.

Interobserver agreement between the trainer and the observers (each observer viewed 14 classes) was 94% or higher for gender, activity, task, intensity, and mode.

In the average physical education class, 8.6% of the activity was moderate to vigorous and 68.1% was sedentary (Table 1). Differences in average moderate-to-vigorous activity by gender and district size were not significant. The median amount of class time spent in moderate to vigorous activity was 6% to 11% (Table 2).

Children were actually on the field and available for activity an average of 86.4% of the scheduled time (34.7 minutes per class). The 121 minutes of physical education weekly provided an average of 10.4 minutes of moderate to vigorous activity. The proportions of such activity were highest for jogging/walking, football, and dodgeball (Table 3). Transition between activities, dancing, and calisthenics accounted for the most total minutes. The lifetime activities of jogging/walking, dancing, calisthenics, fitness stations, and jumping rope accounted for 35.4% of total class time. By instructional mode, 55% of

TABLE 3—Activity and Instructional Mode by Total Class Time and by Time Spent in Moderate to Vigorous Activity

	Total Time		Time Spent in Moderate to Vigorous Activity	
	min	%	min	%
Activity				
Jogging/walking	323.0	7.0	146.0	55.6
Football	95.0	2.1	10.3	23.1
Dodgeball	8.0	0.2	1.7	20.8
Calisthenics	399.0	8.7	52.3	13.4
Jump rope	142.0	3.1	22.0	13.1
Relays	266.0	5.8	19.0	11.8
Free play	146.0	3.2	10.3	10.2
Kickball	231.0	5.0	17.3	9.8
Soccer	36.0	0.8	2.3	8.6
Basketball	354.0	7.7	26.7	8.3
Baseball/softball	243.0	5.3	10.0	7.6
Badminton	124.0	2.7	6.0	7.4
Games	294.0	6.4	18.3	7.2
Fitness stations	330.0	7.2	13.3	6.9
Volleyball	147.0	3.2	5.7	4.8
Dancing	432.0	9.4	22.0	3.1
Hockey	52.7	1.1	4.0	2.9
Apparatus	166.0	3.6	6.3	2.4
Field events	70.0	1.5	2.0	1.7
Transition[a]	547.0	11.9	6.7	1.7
Gymnastics	159.0	3.5	2.3	0.5
Lessons/tests	41.3	0.9	0.0	0.0
Rope climbing	0.7	0.0	0.0	0.0
Tag	0.3	0.0	0.0	0.0
Total	4608.0	100.3[b]		
Instructional mode				
Scrimmage/trials	2517.0	54.6	346.0	16.0
Supervised play	217.0	4.7	23.7	9.2
Skills practice	335.0	7.3	20.0	5.7
Administration/class management	952.0	20.7	14.0	1.9
Instruction	586.0	12.7	0.7	0.4
Total	4608.0	100.0		

Note. One hundred fifty-seven students were observed in 20 schools.
[a]Transition is the time between physical activities.
[b]The total exceeded 100% because of rounding.

total class time was devoted to scrimmage/trials, 21% to administration/class management, 13% to instruction, 7% to skills practice, and 5% to supervised play. Scrimmage/trials provided the largest proportion of moderate to vigorous activity. Students were on task 99.9% of the time.

Discussion

The weekly schedule of 140 minutes of physical education in the study schools was similar to the national average of 141 minutes.[3] The average of 8.6% of moderate to vigorous activity per class, providing only 10.4 minutes per week, is similar to other findings.[13] No school provided the recommended 50% of class time in moderate to vigorous activity.[9,10]

Traditional team sports and games accounted for most of the class time, but lifetime activities such as dancing, calisthenics, jogging, and jump rope were represented. All activities, however, could have been better organized to engage a larger proportion of children in activity more of the time. Children were on task, but the task was often to wait or to watch rather than to be active.

In contrast, we have observed exceptional elementary physical education programs elsewhere in which the children arrived on the field promptly and became active immediately. The teachers provided rapid transitions from one activity to another, with minimal transition time. Teachers organized the students into small groups, maximized equipment sharing and participation, and provided extensive individual instruction and reinforcement. The results of a small intervention study indicate that it is possible to achieve averages of 40% to 50% of class time in moderate to vigorous activity.[14]

This is the first random-sample survey of moderate to vigorous activity during elementary school physical education classes. The results, although limited by the regional sample and seasonal variation, suggest that providing daily physical education to children will not appreciably increase the amount of activity children engage in unless a larger proportion of each physical education class is devoted to moderate to vigorous activity. Teacher training and school policies that emphasize a high percentage of class time devoted to moderate to vigorous activity are needed, as is research concerning methods of increasing children's activity and improving the efficiency and effectiveness of elementary physical education classes.

Elementary physical education is firmly embedded in the public education curricula and public support remains high. Health promotion is the contemporary rationale for physical education, and the health of children is best served by physical education programs that provide substantial amounts of moderate to vigorous activity and promote out-of-school and lifetime physical activity.[9,10,14,15] □

Acknowledgments

This work was supported by a grant-in-aid from the American Heart Association, Texas affiliate.

References

1. Rowland TW. *Exercise and Children's Health.* Champaign, Ill: Human Kinetics Books; 1990.
2. Powell KP, Dysinger W. Childhood participation in organized school sports and physical education as precursors of adult physical activity. *Am J Prev Med.* 1987;3: 276–281.
3. Ross JG, Gilbert GG. The national children and youth fitness study: a summary of findings. *J Phys Education Recreation Dance.* 1985;56:45–50.
4. Sallis JF, McKenzie TL: Physical education's role in public health. *Res Q Exercise Sport.* 1991;62:124–137.
5. Simons-Morton BG, O'Hara NM, Simons-Morton DG, Parcel GS. Children and fitness: a public health perspective. *Res Q Exercise Sport.* 1987;58:295–302.
6. Simons-Morton BG, Parcel GS, O'Hara NM, Blair SN, Pate RR. Health-related physical fitness in childhood: status and recommendations. *Annu Rev Public Health.* 1988;9:403–425.
7. Blair SN, Clark DG, Cureton KJ, Powell KE. Exercise and fitness implications for a lifetime of health. In: Gisolfi CV, Lamb DR, eds. *Perspectives in Exercise in Sports and Exercise, Volume 2: Youth, Exercise, and Sport.* Indianapolis, Ind: Benchmark Press, Inc.; 1989.
8. Sallis JF, Simons-Morton BG, Stone EJ, et al. Determinants of physical activity and interventions in youth. *Med Sci Sports Exerc.* 1992;24(6):S248–S257.
9. US Public Health Service. *Healthy People 2000: National Health Promotion and Disease Prevention Objectives.* Washington, DC: US Government Printing Office; 1990.
10. McGinnis JM, Danner L, DeGraw C. Physical education's role in achieving national health objectives. *Res Q Exercise Sport.* 1991;62:138–142.
11. Simons-Morton BG, O'Hara NM, Parcel GS, Baranowski T. Children's participation in moderate to vigorous physical activity. *Res Q Exercise Sport.* 1990;61:307–314.
12. O'Hara NM, Baranowski T, Simons-Morton BG, Wilson BS, Parcel GS. Validity of the observation of children's physical activity. *Res Q Exercise Sport.* 1989;60:42–47.
13. Parcel GS, Simons-Morton BG, O'Hara NM, Baranowski T, Kolbe LJ, Bee DE. School promotion of healthful diet and exercise behavior: An integration of organizational changes and social learning theory intervention. *J School Health.* 1987;57: 150–156.
14. Simons-Morton BG, Parcel GS, Baranowski T, O'Hara N, Forthofer R. Promoting a healthful diet and physical activity among children: results of a school-based intervention study. *Am J Public Health.* 1991;81:986–991.
15. Simons-Morton BG. Health-related physical education. In: Wallace HM, Parcel GP, Igoe J, Patrick K, eds. *Principles and Practices for School Health.* Oakland, Calif: Third Party Publishing Company; 1992.