

Exercise and Fitness Guidelines for Elementary and Middle School Children

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Abstract

In 1986, the President's Council on Physical Fitness and Sport released results showing that American youth were not in good physical condition and that schools needed to reemphasize physical education. Within the last 15 years, researchers have obtained reliable data on the effects of physical exercise and activity on the physiological functions (including cardiorespiratory fitness) of children. As a result, basic guidelines for exercise and fitness have been developed in the following areas: exercise prescription, alternative fitness activities (walking and aerobics), considerations for teachers and principals, and testing. In this article, we discuss those guidelines and some of the research on which they are based.

A publication from the surgeon general titled *Promoting Health/Preventing Disease: Objectives for the Nation* (Surgeon General, 1980) listed specific measurable objectives as priorities for intervention in 15 areas of health. Many of these objectives involved children and adolescents 1–14 years of age. Physical fitness and exercise was one of the areas, and it included 11 objectives directed to both youth and adults. Throughout the twentieth century, physicians, educators, and even political leaders have expressed support of physical fitness for children (Pate, 1983). Only within the last 15 years, however, have researchers obtained reliable data on the effects of physical exercise and activity on the physiological functions of children. As a result, information about physical fitness for children is relatively new, and ongoing studies are constantly providing additional information.

The term "fitness" has been operationally defined in so many ways that confusion often exists when it is discussed. Bar-Or

(1987) reported that fitness has become synonymous with aerobic or cardiorespiratory fitness, especially when discussed in the context of health because aerobic fitness lowers the risks for coronary artery disease. He also indicated, however, that this approach ignores several other components of fitness that are relevant to health, particularly in pediatric populations. These include muscle strength, muscle endurance, flexibility, and body adiposity. According to Pate (1983), components of superior ability, such as speed, power, and agility are not essential to health-related physical fitness, and they are interrelated as they are taught in most public school physical education classes. A better understanding of physical conditioning for children is important (Sady, 1986).

The President's Council on Physical Fitness and Sport released the results of a nationwide study (Murphy, 1986) that revealed that American youth were not in good physical condition and that schools need to reemphasize physical education. According to Simons-Morton, O'Hara, Simons-Morton, and Parcel (1987), physical education is an important vehicle for promoting cardiorespiratory fitness through increased physical activity. The Sunflower Project of the Shawnee Mission, Kansas School District (Greene & Osnes, 1979), was a 3-year study of the effects of aerobic exercise on children in grades K-6. Prior to this study, little information was available on what children could do in terms of physical activity that would affect their cardiorespiratory systems. Guidelines for training effects and training progression in relation to children and for extended physical exercise were not specific prior to the Sunflower Project. One goal of the project was to determine whether or not aerobic exercise and training could be incorporated into school physical education programs. One recess per day was used to meet the objectives of the project successfully.

School physical education programs cannot be completely responsible for pro-

moting health and fitness experiences for children, however. Raithel (1988) believes the onus is on society to intervene by encouraging children to be more active. Still, no community agency involves as many children in physical activity as do physical education classes. Logically, school is the place to begin promoting health-related fitness as well as fitness in general for the nation's children.

Research on Fitness

Although considerable research on fitness in children has been conducted in the last 15 years, not all findings are conclusive. Some results, however, have added new meanings to fitness for children and yielded guidelines for educators to follow. Moreover, discussion of research results is imperative for better understanding of how to develop successful fitness programs.

According to Corbin (1987), only in the last 20 years have we dispelled the "child's heart myth." Research has demonstrated that vigorous activity is not harmful to a child's cardiovascular system. In support of vigorous activity for children, Tuckman and Hinkle (1986) conducted a study involving 154 boys and girls. One group was in a running program of 30 minutes three times per week for 12 weeks. The other group was in regular physical education classes. The runners had an average score on the 800-meter run that was 18 seconds better than the nonrunners. The runners also had a significantly better pulse rate at the end of the study. Male runners had a significant loss of fat as compared to their counterparts, although this was not true for female runners. Rowland (1986) conducted research on pediatric exercise physiology and found that oxygen delivery to exercising muscles is higher (per unit of body mass) during childhood and adolescence than at any other time in life. That is, children are superlative aerobic machines. Pate (1983) reported that cardiorespiratory endurance had been identified as a prime determinant of physical work capacity, and, combined with aerobic

exercise, reduced risk for coronary heart disease. Cardiorespiratory endurance is clearly related to health or disease prevention or both.

Another variable associated with fitness in children is weight control. This may be one of the most critical factors related to the need for vigorous physical activity. Ross and Gilbert (1985) studied 8,800 fifth- to twelfth-grade children whose skinfolds were 2–3 millimeters greater than those of youths in the 1960s. They concluded that this was probably caused by poor nutrition and inactivity. Childhood obesity or weight problems can lead to emotional stress, elevated blood pressure, and adult obesity. For example, Lloyd, Wolff, and Whelan (1961) reported that fatness during infancy correlated with fatness in young adulthood. Physical exercise is an excellent means of controlling weight (Raithel, 1988; Ross & Pate, 1987).

One factor that contributes to lack of childhood fitness is inactivity. Raithel (1988) reported that, of 4,678 first to fourth graders enrolled in physical education classes, only 36.4% were taking physical education daily. Half of the students in daily physical education were tested for fitness, but motor-performance tests for skills in sports were used instead of health-related fitness tests. It is difficult to motivate children to participate in health-related fitness activities when incorrect tests are being used that give less than valid data.

Physical fitness components (i.e., power, strength) related to athletic ability must be considered in the overall scheme of physical development. We do not discuss research on these variables because of their indirect relationship to health-related fitness, although the relationship between these variables and health-related fitness is greater than educators previously believed. Speed and power are heavily dependent on genetic factors (muscle fiber type) and are not particularly responsive to training. In contrast, health-related fitness variables are

quite responsive to change (Costill, Daniels, & Evans, 1976).

Research offers substantial evidence that children are in need of physical fitness activities that contribute toward a healthy lifestyle (Cureton, 1987; Kirchner, 1989). Decrease in children's fitness during the last 20 years suggests that actions taken by schools have not had much effect. The federal government recommended that by 1990 the percentage of children and adolescents ages 10–17 participating in appropriate physical activities, particularly cardiorespiratory fitness programs that can be continued into adulthood, should be greater than 90%. These objectives, which were clearly delineated in the Surgeon General's report (1980) for the 1980–1990 decade, were not achieved and hence were carried forward to the year 2000.

Guidelines for Exercise

The development of exercise programs for children requires careful selection of activities, which must be safe and within a child's capabilities. Children should participate in a variety of exercises. Intensity and duration are factors to consider because children spontaneously prefer short-term intermittent activities with a high recreational component. It is as important to consider the physiological functions and limitations of children as it is the types of activities.

The following guidelines may be followed in the development of an effective exercise program (Blair, Falls, & Pate, 1983; Gilliam, Freedson, Geenen, & Shahraray, 1981; Rowland, 1986; Sallis, 1987; Simons-Morton et al., 1987).

1. Exercise training should be gradual and progressive.
2. Children can perform endurance tasks reasonably well on an intermittent basis.
3. Children possess sufficient cardiovascular capacity for long-distance running or jogging, and they can progressively run or jog 1–1.5 miles at a time under normal conditions.

4. Based on findings from training programs, frequency, intensity, and duration standards for children's fitness programs are the same as for programs for adults.
5. Brief bursts of moderate to vigorous physical activity (MVPA) should be used rather than continuous MVPA.
6. At least 30 minutes daily of MVPA are recommended.
7. At the onset, children must know the difference between recreational running and jogging, and competitive running.
8. Most children tend to have a fast recovery after exercising.
9. The child who progressively trains to run or jog 1-2 miles, three times a week, is obtaining enough exercise to promote cardiovascular fitness or to control weight with no appreciable risk.
10. Competitive running is not necessary to attain the health benefits of regular exercise.
11. There is greater chance of fatigue in prolonged high-intensity tasks (running, walking).
12. Children have a low tolerance for extreme heat. Under this condition activities should not last longer than 30 minutes.
13. Activities to develop strength and endurance of the upper extremities should be part of an exercise program.
14. Young children (K-grade 1) can safely participate in MVPA for up to 30 minutes at one time.
15. Individual goals that are attainable should be developed for each child.
16. The child's opinions should be considered.

Another aspect of physical fitness programs is associated with sports participation. Although a school fitness program is related to fitness training for sports, it differs somewhat since each sport requires a unique form of fitness training. According to Rowland (1986), the following considerations apply to intense training for sports participation:

1. Too much intensity should not occur in a short time. Children should be

- physically fit prior to practicing for active sport participation.
2. During training, adult supervision must be available. This person should be knowledgeable concerning proper equipment use and training techniques.
3. Children should be monitored for early signs of burnout, fatigue, depression, insomnia, poor performance, and indifference to physical exercise.
4. Training and competition must not exceed fitness and skill levels.
5. The idea to participate should be the child's.

According to the American College of Sports Medicine (1978), the reasonable approach taken for adults can be used as a guideline for children. However, one should be aware that the training may need to be increased for some children who have high fitness and habitual activity levels. These guidelines are:

- Frequency: 3-5 days per week;
- Intensity: 50%-85% maximal oxygen uptake (heart rate reserve);
- Duration: 15-60 minutes;
- Mode: any activity that uses large-muscle groups and that can be maintained continuously and is rhythmic and aerobic in nature; examples: running/jogging; walking/hiking; swimming/skating; bicycling; rowing; cross-country skiing; rope skipping; various endurance games and activities.

These guidelines could be applied to both physical fitness programs and preparation for sports participation, with modifications as needed. Berg, Sady, Beal, Savage, and Smith (1983) recommended that a typical 30-minute physical education class have the components shown in Table 1 if children's fitness is to be developed and maintained. According to this plan, the physical education teacher would use about one-half of the time for physical fitness development. This could affect the time available for

TABLE 1. Components of a Physical Education Class

Activity	Time (minutes)
Presentation of fitness or health concept:	
Teacher discussion and explanation	1-2
Student participation and related activity	1-2
Brief discussion	1-2
Warm-up or muscular fitness exercise	2-3
Aerobic exercise	6-10
Skill development	9-17
Cool down	2

teaching other skills; therefore a teacher may need to use a recess period in order to implement a well-balanced physical fitness program.

Stephens, Jacobs, and White (1985) reported that activities in childhood programs that students are most likely to continue as adults are ones that closely approximate adult exercise. These include vigorous continuous activities such as brisk walking, swimming, aerobic dance, calisthenics, bicycling, and jogging. These activities are similar to the ones recommended for adults by the American College of Sports Medicine. A problem in the selection of activities that promote health-related fitness in children is that the types of activities are limited. For some time, physical educators could only use running, jogging, or aerobic dance. Many children did not respond favorably to these activities. There are now alternatives for developing and maintaining good fitness (health or performance-related) in elementary and middle school children.

Alternative Activities

Only within the last few years have researchers examined the effects of alternative activities that promote physical fitness in children. Adults had participated in some of these activities, but children in physical education programs had not.

According to Cooper (1983), walking is a convenient activity because there is always a street or sidewalk within reasonable distance from a school. Three studies have been completed since 1987 on the effects of

walking on aerobic fitness in children. Stal-naker (1988) reported that 7- and 8-year-old children who participated in a 15-minute brisk walking program 5 days a week for 4 weeks were equal in aerobic fitness to children who jogged for the same amount of time. For some time, jogging was considered to be the more effective activity, with better effects in a shorter time. Fletcher (1989) completed a similar study involving 11- and 12-year-old children. Those in the walking group improved their aerobic fitness at a rate equal to children in the jogging group. She used only a 10-minute exercise period, 3 days a week for 12 weeks. A 9-minute run/walk test and a 1-mile run/walk test were used, respectively, in these studies to measure aerobic fitness. Marsh (1989) reported that 12-year-olds who participated in a structured walking program for 15 minutes 3 days per week for 10 weeks were equal in aerobic fitness to other 12-year-old children who participated in regular physical education classes. The mile run/walk was used to assess aerobic fitness. All three studies involved predetermined walking routes of 1.0-1.5 miles. These routes were through neighborhoods or around the perimeter of the school grounds.

It appears that walking may be an appropriate activity for improving aerobic fitness in children of all ages. The walking must be at a brisk pace and cover a distance of 1-2 miles at least 3 days a week. Walking can easily be modified for indoor exercise or can be done to music.

Another alternative activity is sport-specific aerobics (Greene, 1989). This concept was developed in 1986 with over 100 sport aerobic routines tested in several physical education classes and sport camps for children ages 9–17. Sport aerobics is a combination of sport-specific skills choreographed to music. For example, one routine involves making different basketball passes while moving to music. This is an excellent way for children to practice sport skills on the move and to improve their aerobic fitness at the same time. The intensity of the routines is high, with each lasting 8–15 minutes. The design of sport aerobic routines makes them easy to teach, learn, and perform. Regardless of the activity used to develop and maintain a healthy state of fitness, variety is the key. Children need exposure to many different activities.

Sallis (1987) indicated that the major purpose of increasing childhood physical activity is not to produce health benefits in childhood, but to begin a life-style pattern that can be carried into adulthood, where the behavior has demonstrated health effects. Sport-specific aerobics started during childhood years can provide health benefits that will extend into adulthood.

Guidelines for Physical Education Teachers

Any physical fitness or health-related fitness program should include a component of knowledge. Children need to know and understand why they are doing physical activity and exercise and how these experiences will help them lead healthy life-styles. Without this component, a program's goal of promoting a lifelong, healthy life-style may not be achieved. Guidelines for developing this component are (Butcher et al., 1988; Lee, Carter, & Greenockle, 1987; Pate, 1983; Simmons, 1986):

1. Stress the importance of aerobic conditioning and total body fitness and understanding the physiological concepts of fitness.

2. Teach children to become responsible for their own fitness. Demonstrate to them the importance of physical activity that is sufficient to stimulate normal growth and development.
3. Provide experiences that will enable children to understand the necessity of maintaining good health-related fitness.
4. Incorporate motivational schemes to promote positive attitudes toward physical fitness.
5. Discuss with students the immediate and long-term effects of health-related fitness.
6. Provide information on running economy and pacing oneself when exercising.
7. Allow children to test their knowledge about health-related fitness and total fitness.

These guidelines imply that instruction must occur in the classroom or in physical education classes during activities. Most health-related physical fitness programs that have been field tested and were successful used knowledge-based units to meet established objectives. This type of program should be both a cognitive and behavioral educational experience.

Guidelines for Principals

In reviewing the status of a physical fitness program, a school administrator should ask the following questions:

1. Do all children participate in daily physical education classes?
2. Is the physical education teacher a specialist?
3. Are physical education classes comparable in size to other classes?
4. Do the children participate in vigorous (maintains a heart rate near 150–160 beats per minute for 15–30 minutes) activity 3–5 times per week?
5. Do the children receive instruction in lifetime fitness activities as well as sports?
6. Are children punished for disobedience with running or calisthenics?

Answers to these questions can provide direction for the development of effective

physical fitness programs. According to Simons-Morton et al. (1987), children need not obtain all of the recommended activity during physical education, but teachers should involve children in moderate to vigorous activity for reasonable periods. Kardong (1986) thought that physical fitness programs should follow the concept of the "Iron Kids" triathlon program (sports may vary). This approach is not grueling but, rather, combines fun and physical fitness. Its theme is that every finisher is a winner.

Testing Physical Fitness

A number of physical fitness tests that most physical educators know how to use are available. Kendall (1987) discussed eight criteria for selecting a test: evidence of validity and reliability, ease of administration, economy of time, standardization of directions, availability of norms, measurement of important abilities, level of interest, and safety of children who take the test. The appropriate test can reveal results that may motivate children toward improvement and will let the teacher know whether or not class activities have been effective. Children need to see improvement, and a test is one way to demonstrate it.

One of the best testing programs developed in recent years is the Physical Best program (1988) developed by the American Alliance for Health, Physical Education, Recreation, and Dance. Physical Best is more than an assessment program; it is an educational approach to physical fitness. There are three program components: a health-related fitness assessment, an educational component, and a set of awards to reinforce positive behavior change. The test measures aerobic endurance, body composition, flexibility, muscular strength and endurance, and upper-body strength. Important features of this program are the setting of individual goals and the use of minimum standards. For example, the minimum number of pull-ups required for the upper-body strength test for ages 5–18 is one. Children are encouraged to achieve

this standard and then to improve from that level. Because of this use of minimum standards, the test is worth considering for any physical fitness program.

Conclusion

The health benefits associated with regular physical fitness and exercise, especially among today's youth, have not been fully documented. Nevertheless, research shows that substantial physical, social, emotional, and educational benefits, both direct and indirect, are possible. Yet many American youth do not engage in appropriate physical activity.

The prevention of chronic adult physical or emotional problems depends on what can be done now to help youth develop healthy life-styles. Exercise and physical fitness programs begun in the early years are part of a preventive strategy for later life. Moreover, the earlier prevention starts, the more likely it is to be effective because habits related to chronic illnesses are formed early and become increasingly difficult to change.

The promotion of exercise and fitness in youths should involve educational and informational efforts. Physical fitness and exercise programs should be provided to school children, and such programs must emphasize activities for all children rather than competitive sports for a few. Legislative and regulatory approaches should embrace school-mandated physical and health education programs that focus on health-related physical fitness.

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