dren can color with crayons. When printed, the poster is supplied in quantity for booths at each fair site in the State. Small children can color posters at booths while their parents examine displayed car seats and discuss safety issues with volunteers manning the booths.

- Local sponsors contact theater groups in their cities and towns for help in developing puppet skits on car-seat safety to be presented at the fairs.
- Local sponsors contact store managers, asking them to provide car seats for demonstrations at fair sites; to discount their prices for car seats, over a specified period, in observance of National Car Seat Safety Day; and to donate car seats to be given to the winners of random drawings at the fairs.

Three months before:

- Local sponsors continue their publicity efforts, developing posters and flyers and displaying and distributing them. An option sponsors might want to consider is involving the art departments of local schools and running poster contests among school children.
- Entry blanks for the drawings for free car seats are designed by local sponsors and printed in appropriate quantities.

Two months before:

- Local sponsors compile lists of loan-a-seat programs in their communities and reproduce the lists in quantity for distribution at fair sites. If no loan-a-seat program is available locally, sponsors distribute information on the National Highway Traffic Safety Administration's "Early Rider" booklet (see reference *10*, page 506), which describes how to set up such a program.
- Local sponsors plan and practice activities and demonstrations for the day of the fair. An activity planned for a shopping mall fair site might feature volunteers in character costumes (for example, E.T., Papa Smurf, a clown, the Easter bunny, or Annie) who would talk with children and their parents about car seats and safety facts. Demonstrations are devised to include small children's participation. A simple demonstration using an egg, elastic bands, and a wooden car and ramp could make a graphic point about the need for restraint systems. (With a crayon, print on the egg the name of a child from the audience. Use elastic bands to restrain the egg in the car, then slide the car down the ramp. The egg should remain intact. Repeat the process, but leave the egg unrestrained so that it shatters.)
- Volunteer workers are trained to encourage small children, on the day of the fair, to try out the various demonstrator car seats on display. Volunteers should thoroughly understand the devices they will be demonstrating. In demonstrations, they will strap the child in properly, explaining how the seats provide protection and demonstrating to parents each step in "buckling up." Volunteers will ask the parents for a repeat demonstration to confirm that they have correctly understood the procedure.

A New Curriculum for Fitness Education

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SYNOPSIS

Regular exercise is important in a preventive approach to health care because it exerts a beneficial effect on many risk factors in the development of coronary heart disease. However, many Americans lack the skills required to devise and carry out a safe and effective exercise program appropriate for a lifetime of fitness. This inability is partly due to the lack of fitness education during their school years.

School programs in physical education tend to neglect training in the health-related aspects of fitness. Therefore, a new curriculum for fitness education is proposed that would provide seventh, eighth, and ninth grade students with (a) *a basic knowledge of their physiological response to exercise,* (b) *the means to develop their own safe and effective physical fitness program, and* (c) *the motivation to incorporate regular exercise into their lifestyle.*

This special 4-week segment of primarily academic study is designed to be inserted into the physical education curriculum. Daily lessons cover health-related fitness, cardiovascular fitness, body fitness, and care of the back. A final written examination covering major areas of information is given to emphasize this academic approach to exercise. Compe-

tition in athletic ability is deemphasized, and motivational awards are given based on health-related achievements. The public's present lack of knowledge about physical fitness, coupled with the numerous anatomical and physiological benefits derived from regular, vigorous exercise, mandate an intensified curriculum of fitness education for school children.

A CONSIDERABLE DECLINE IN CARDIOVASCULAR mortality has been noted since 1968 (*1*). The age-adjusted cardiovascular death rates in the United States fell 25 percent in the decade ending in 1979. Some researchers have noted that these changes are probably not the result of medical advances, but are instead attributable to preventive measures and lifestyle changes adopted by large segments of the American populace (*2,3*). Despite this trend, cardiovascular disease ranks first among the leading causes of death in the United States. Nearly 30 million Americans suffer from diseases of the heart and blood vessels; the observed mortality was 203 per 100,000 in 1978 (*4*). The cost of cardiac care in 1978 exceeded $28.5 billion despite the downward trend of cardiovascular mortality. Further efforts directed toward prevention of heart disease and modification of its risk factors seem appropriate and may result in additional enhancement of health.

Rationale for Exercise

In population studies, increased physical activity has been reported to be associated with a decreased incidence of coronary heart disease (CHD) (*5*). The first such report by Morris and coworkers in 1953 showed that London bus conductors had only 70 percent of the age-corrected incidence of cardiovascular disease that presumably more sedentary bus drivers had (*6*). Additionally, Morris reported similar data for London postal workers, with fewer episodes of CHD among the physically active postmen than among the sedentary clerks. In 1959, Zukel and coworkers found the incidence of CHD in North Dakota farmers to be only 48 percent as great as in nonfarmers (*7*). Later analysis of Zukel's data revealed that persons performing 1–2 hours of heavy physical activity per day had only 13 percent of the coronary events experienced by persons who habitually did no heavy work (*8*). More recently, Paffenbarger and Hale studied more than 6,000 longshoremen and found significantly lower death rates from CHD among workers classified in job tasks requiring a high caloric output (*9*). In 1978, Paffenbarger and coworkers found that Harvard graduates with an exercise expenditure of less than 2,000 calories per week suffered 64 percent more deaths from CHD than their more active fellow alumni (*10*).

Despite this compelling evidence, the association of fewer cases of CHD with more physical activity may never be established as a direct cause-and-effect relationship. In fact, a direct cause-and-effect relationship will likely be impossible to document in view of the multitude of variables or risk factors that may predict the rate of development of CHD. The benefit of physical fitness in preventing the early onset of CHD does not appear to result from the direct effect of exercise on the heart. Rather, regular exercise seems to elicit its preventive benefit by controlling the effect of most coronary risk factors. In 1976, Cooper and coworkers reported a consistent inverse relationship between the level of achieved physical fitness, as measured by the Balke treadmill stress test, and resting heart rate, body weight, percent body fat, serum levels of total cholesterol and triglycerides, serum glucose, and systolic blood pressure (*11*). High levels of plasma high-density lipoprotein (HDL) cholesterol have been consistently associated with a decreased incidence of CHD (*12,13*). Haskell and coworkers found in 1980 that those who reported some strenuous physical activity generally had higher HDL cholesterol levels than those who reported a sedentary lifestyle (*14*). Assuming that coronary risk factors are directly related to the incidence of CHD and that physical activity can affect these risk factors, protection from the development of CHD appears to be closely associated with physical activity and the resultant level of cardiorespiratory fitness.

The evidence seems to demonstrate that personal choices of habit and lifestyle can have a pronounced effect on cardiovascular disease processes. Ancillary programs focusing on nutrition, smoking, stress, obesity, and hypertension assist in reducing the coronary risk factors. However, regular exercise appears to have the potential to affect each of the risk areas positively. Therefore, a more active American public, adequately instructed and motivated, may significantly reduce the overall incidence of CHD.

The instructional and motivational emphasis is most appropriately directed toward young Ameri-

cans. Studies have consistently shown that behavior and attitudes are modified most effectively and permanently during the younger years (*15*). Alarmingly, it also appears that children have not joined the recent trend among adults toward more healthy and active lifestyles. As early as 1954, Kraus and Hirshland showed significant deficiencies among American children on the simple Kraus-Weber tests of minimum muscular fitness. Of the more than 4,000 American children tested, 57.9 percent failed, but only 8.7 percent of European children failed (*16*). These results served to provide the impetus for the creation of the President's Council on Physical Fitness and Sports.

Although American adults are exercising as never before, the children are experiencing a resurgence of deconditioning. Reiff conducted nationwide fitness tests in 1975 and found that fully one-third of those children 10 to 17 years old scored poorly (*17*). A recent study in Wisconsin indicated that nearly 60 percent of the children tested may face increased risk of CHD because of high blood pressure, high cholesterol, or obesity (*18*). This lack of fitness among youth is usually perpetuated into adulthood and leads to the multitude of health problems associated with the sedentary lifestyle, such as obesity, hypertension, and premature coronary artery disease (*10,11*).

Recent estimates indicate that more than 20 million Americans jog regularly and as many as 100 million claim some form of regular exercise. Fitness has become fashionable. More people are taking their health into their own hands with the adoption of regular exercise, proper nutrition, adequate sleep, stress control, and other healthful habits (*19*). However, the majority remain far too sedentary. Further, many of those who are active are sadly misinformed regarding the potential benefits of their chosen activity.

Role for Schools

Who leads this movement toward a healthier America? Certainly our educational system has not been a leader in the field of physical fitness and exercise. Too often programs are poorly funded or eliminated altogether. Public knowledge about basic exercise physiology is grossly inadequate. Thus, many fitness counselors are providing information to 50-year-olds who should have learned basic concepts during adolescence.

Necessary lifestyle changes are potentially most beneficial when instituted in childhood. Yet little has been done in the United States to teach children about proper health habits, particularly regarding exercise and physical fitness. We provide physical activity sessions for children in school without giving them adequate direction for a potential lifetime of fitness. We have neglected to distinguish between physical skills and health. At a certain age, the majority of us become spectators of the gifted few. As we grow older, these few become fewer.

My concern is that the majority of children do not learn the fundamentals of physical fitness. Schools provide the foundation for intellectual development but neglect to lay the foundation for a lifetime of healthy, dynamic exercise. Consequently, only the curious and highly motivated adults seek proper fitness instruction from many excellent books available (*20–23*). The remainder of the populace either continue to be inactive or initiate exercise without an adequate understanding of their endeavor.

A complete battery of beneficial health practices must be taught to children. They need information about smoking, alcohol, diet and nutrition, obesity, drugs, and birth control. These subjects are usually included somewhere in the scholastic curriculum, but they are rarely accompanied by adequate information about physical fitness and exercise. A large body of scientific evidence indicates a substantial degree of health enhancement to the regular exerciser. Yet, despite the health benefits, little is taught about exercise. Physical education has improved in U.S. schools during the past decade. Many enthusiastic young new physical educators are capable of teaching the latest information about exercise physiology, health, and fitness; however, this approach to physical education is rarely taken. Young students appear to learn basic sports skills, but this accomplishment itself is inadequate. Physical fitness must be approached as an academic discipline during a substantial portion of the required physical education curriculum during the formative years before senior high school. Children must acquire an understanding of the importance of a regular exercise program throughout their lives and be given the means to develop exercise habits suitable for their personal needs.

As children learn the various sports skills, it becomes apparent that some are better at these than others. This pattern continues because generally the same group of people excel at a variety of athletic activities. Success breeds interest; the good get better, and the less skilled eventually seek other outlets for their desire to excel. The school system supplies a forum for the athlete to exhibit skill, but the

opportunity is limited to a select few. Those not physically well endowed may become involved in nonathletic pursuits and avoid physical activities completely. These are the children who need to be encouraged to exercise. The proper educational environment will promote physical fitness in children who are not athletes.

I propose a practical plan designed to initiate the educational programs that will give school children (*a*) a basic knowledge of their physiologic response to exercise, (*b*) the means to develop their own safe and effective physical fitness program, and (*c*) the motivation to incorporate regular exercise into their lifestyle. The proposed educational package is focused on the health-related aspects of fitness.

We must reach children with this information early in the educational process, before they turn away from exercise. The junior high school years are the best time for the most intensive study. Most children are still physically active during these years and have not yet been fully segregated by athletic ability. Ideally, some introductory concepts could be incorporated into the grade school curriculum, and the basic concept of the program can be carried on to physical education classes at the secondary level. The teaching of exercise should be approached with intellectual vigor as a cognitive area of learning. A special 4-week segment of the physical education curriculum during the seventh, eighth, and ninth grades should be devoted to defining health-related fitness and encouraging a lifetime of activity.

This proposed program of study is outlined subsequently. The recommended course content has been designed to achieve the previously stated goals. This course is suitable for a class that meets 3 days per week. Ideally, this segment of intensive study should be scheduled near the beginning of the school year. The foundation of knowledge attained will supplement effectively the remainder of the physical education curriculum. The didactic material is suitable for coeducational classes, and activity segments can be conducted either separately or together. Four weeks, though not an ideal length, seems a feasible period for the initial phase of incorporating fitness education into the school curriculum.

Outline of Curriculum

Day 1—the health-related aspects of fitness. Crucial to the understanding of fitness and exercise is an appreciation of the various aspects of physical fitness The five health-related aspects are cardiovascular fitness, body composition, flexibility, muscular endurance, and muscular strength. These are contrasted with the six skill-related aspects of fitness—power, agility, balance, coordination, speed, and reaction time.

Each of these 11 aspects of fitness is separate. One can do well in one aspect and fail in another. Importantly, the health-related aspects of fitness are achievable by nearly every boy and girl. Almost anyone can attain through his own efforts desirable levels of cardiovascular fitness, body composition, flexibility, muscular strength, and muscular endurance. One does not need to excel in the skill-related aspects of fitness to be physically fit.

Once this important concept is explained, the instructor can spend the remainder of the class period on an overview of the 4-week segment. The instructor emphasizes the psychology of this approach to physical fitness—that students need no longer be concerned about comparisons and competition with others. The next 4 weeks will be devoted to self-improvement, fitness education, and motivation for a lifetime of fitness. No one who makes appropriate efforts needs to fear failing. Final scores for this course will be determined by a written test. Knowledge retained, and not physical performance, will be used for grading. This criterion should provide excellent motivation for the less skilled. The 4 weeks will not be used so much to get fit but, instead, to learn about fitness.

Day 2—cardiovascular fitness. The next 2 days provide students with the foundation for a lifetime of fitness by teaching them basic information about cardiovascular endurance, the most important health-related aspect of fitness. The heart, lungs, blood vessels, and oxygen transport system must be well trained. This state can be reached only through a systematic program of exercise. After a brief review of pertinent cardiovascular and pulmonary anatomy and physiology, the instructor introduces the concept of heart rate response to exercise. Initially, the resting heart rate will be evaluated with the student seated. Generally, the lower the heart rate in response to a given workload, the more fit the cardiovascular system. Fewer heart beats are required per minute to satisfy the resting metabolic needs of the trained individual. The students then walk at a moderate pace in a circle around the exercise area. After 2 minutes, they assess their pulse rate by counting for 10 seconds, then multiplying that rate times 6 to obtain the number of heart beats per minute. The students are instructed in the proper procedure for taking both carotid and radial pulse. Those students who are not participating in regular endurance exercise will probably notice more elevated pulse rates at the walking pace. The students then run in place for 1 minute and, again, the heart rate will be obtained to ascertain the cardiovascular response to exercise. Each student will record his or her resting, walking, and running heart rates. This information serves as the impetus for further discussion about cardiovascular fitness.

To conclude this lesson, each student performs the 5-minute step test, using bleachers or benches as steps

(*24*). Use of a metronome in this test provides a fairly accurate estimate of the initial cardiovascular condition of each student. With the metronome set at 120, the student completes a 4-count cycle up and down a single step every 2 seconds. After exercise, the student waits 1 minute to count the pulse for 30 seconds. Norms have been established for this test, and they provide a means for self-assessment by the student. Results are entered in the student's fitness record for use in future evaluations of self-improvement. The students will not notice much improvement during these 4 weeks; it should be emphasized that the goal at this point is fitness education. Significant improvements in cardiovascular fitness may require up to 13 weeks of regular training (*25*).

Day 3—cardiovascular fitness 2. This day's goal is to teach the students to design their own effective cardiovascular conditioning program. Guidelines for training have been established by the American College of Sports Medicine (ACSM) in a position statement concerning the recommended quality and quantity of exercise required for developing and maintaining cardiorespiratory fitness (*26*). The four major components of such a program of exercise include frequency, duration, intensity of training, and mode of activity. Improvements in the oxygen transport system are directly related to frequency, duration, and intensity of proper exercise (*27*).

1. Frequency. The recommended threshold for frequency of training is 3 to 5 days per week. The beginning exerciser must concentrate on forming regular exercise habits. After a regular pattern is established, then the student can proceed to develop proper duration and intensity of exercise.

2. Duration. From 15 to 60 minutes of continuous aerobic activity requiring excess oxygen is required for cardiovascular training. Training at a lower intensity is recommended and should be conducted over a longer interval (45 to 60 minutes). High intensity activities are not recommended for lifetime fitness, although the cardiovascular training effects are substantial. Injuries are more common at higher intensities as are compliance problems. Long, slow training is best for total fitness.

3. Intensity. Several detailed formulas can be used to determine intensity. A simplified version of the ACSM recommendation suggests an exercise training intensity threshold of 60 to 90 percent of the maximum heart rate (that is, 220 beats per minute minus the age in years). Intensity is best evaluated by heart rate response to exercise. Therefore, junior high students should exercise vigorously enough to achieve a heart rate of between 125 and 185 beats per minute in order to produce a training effect on the cardiovascular system. Such vigorous exercise will also help to decrease total cholesterol, increase beneficial HDL cholesterol, control obesity, decrease blood pressure, control psychological stress, decrease fasting blood sugar, and lower triglycerides—all effects that may prove to be beneficial in disease prevention.

4. Mode of activity. Activities which require the body to process large quantities of oxygen requiring substantial cardiovascular and respiratory effort are best for health-related training. Students should choose activities which require continuous rhythmic movements of the large muscle groups (that is, running, jogging, walking-hiking, swimming, bicycling, skating, rowing, cross-country skiing, rope jumping, and so forth). Endurance games (that is, basketball, racquetball, handball, tennis, hockey, and so forth) potentially can be equally beneficial if pursued with appropriate intensity, duration, and frequency. Often, certain sports facilities are not conveniently available to individuals. Also, certain sports cannot be engaged in during later years. Therefore, it is important to teach young people sports skills and offer instruction in endurance games that can be played for years as part of the regular physical education schedule.

The lesson closes with another test of cardiovascular conditioning. Students are asked to run, jog, or walk 1.5 miles. Time of completion is recorded and used for later comparisons to evaluate personal improvement. Age and sex-related norms have been developed and can be used by the student to determine present levels of cardiovascular fitness (*22*).

Day 4—body composition 1. During the next two sessions, the interactions between diet, exercise, and body composition are discussed. Initially, one must distinguish between being overweight and overfat. Traditional height-weight charts measure weight, not fat. Total body weight can be misleading and does not always provide an accurate assessment of the fat content of the body. For this reason, body composition should be introduced as a more health-related method of determining one's body fat content. Ideally, less than 16 percent of a man's total body weight should be fat, and women should maintain their body fat level below 20 percent. Body composition can be determined for each student with standard methods of measurement. Waist girth, pectoral skinfold thickness, and right-wrist diameter are used to estimate the percent of fat in males by a formula developed by Zuti and Golding (*28*). Prediction of the percent of body fat in females can be accomplished using a method described by Sloan and coworkers using iliac crest and triceps skinfold thickness (*29*). The equipment used to secure these important measurements can be purchased for less than $10. Students record these data and their resultant percent body fat calculation. Students are shown how to calculate their ideal body weight based on fat content, using these data.

The instructor should emphasize that both exercise habits and dietary intake determine body composition. Exercise maintains the lean body tissue (that is, muscle, bones, ligaments, and tendons) while it burns excess calories stored in fat cells. Diet and exercise together facilitate weight loss and also have a positive effect on body composition. Diet alone, however, may promote weight loss but does nothing to maintain lean tissue and thus has less of a positive impact on body composition.

Day 5—body composition 2. Students are introduced to the concept of the calorie. Maintaining a certain weight requires balancing caloric intake and expenditure. A 3,500 calorie imbalance causes the gain or loss of 1 pound. Weight may fluctuate daily due to water imbalance, timing, or seasonal variation, but the calorie is the key component of weight control. The body stores excess caloric intake primarily in the subcutaneous fat compartments. Crash diets or crash exercise may produce temporarily desirable results by creating a favorable caloric imbalance, but such programs rarely alter long-term behavior. Most successful weight control programs emphasize gradual modifications in daily diet and exercise habits that cause lifestyle changes to enable the person to maintain the desired result. A decrease of 100 calories in intake per day would result in a 1-pound weight loss every 35 days. Exercise that expends 100 additional calories per day would double the rate of weight loss.

Overfatness is the result of a chosen lifestyle. Harvard nutritionist Jean Mayer has found that obese persons actually eat less than many of their thin counterparts. His studies have shown that the obese tend to be sedentary (*30*). Also important to note is that exercise has not been implicated as a stimulus for overeating. In fact, moderate exercise has been shown in some cases to decrease the appetite (*31,32*). Mayer has concluded that human beings can maintain ideal body weight by being (*a*) physically inactive but often hungry or (*b*) physically active while eating as much as desired (*33*).

At the conclusion of the session, proper nutrition is briefly discussed—the necessity of choosing food from the basic four food groups, the caloric content of various common foods and snacks, and the caloric value of various exercises and activities. Discussion of reducing fallacies and fad diets can also be helpful.

Day 6—flexibility. Flexibility, defined as the range of a joint, is included as a health-related aspect of physical fitness because of its effect in reducing muscle injury and leg, back, and neck pain. Flexibility is determined by a number of factors. For example, tissue mass can affect flexibility. Extremely obese persons lack flexibility because excess tissue surrounding their joints limits motion. Muscle length also affects flexibility. If muscles are not periodically stretched, their resting length will decrease, and their ability to reach maximum length will likewise decrease. Muscles hold joints in position and, if muscles lose the ability to stretch fully, they limit flexibility at the joints. The ultimate factor limiting flexibility is skeletal structure and the types of articular development of the particular bones involved. Two of these three limiting factors can be improved; tissue mass can be changed by weight loss, and muscle length can be changed by passive stretching. Passively stretching a muscle to its maximum length and holding it in position for several seconds seems to have a maximum positive benefit in increasing flexibility. Dynamic or ballistic stretching may, in fact, decrease overall flexibility as it activates protective mechanisms within the muscle that promote contraction and muscle shortening.

Passive stretching of all muscle groups is important, but especially so in the large muscle groups of the legs and back. Passive stretching of these areas can help reduce muscle injury and soreness while decreasing the likelihood of developing chronic back pain. Flexibility exercises are most effectively performed both before and after the vigorous cardiovascular portion of the daily workout. Additional passive flexibility exercises can be directed toward particular muscle groups used in the chosen exercise or sport. Back hyperextension and contortionist movements should be avoided. The students are instructed in the performance of a daily flexibility routine for their personal use. Standardized tests for trunk, shoulder, and static hip flexibility are also conducted. Students record their scores for future motivation and education.

Day 7—muscular endurance. The ability of a muscle group to endure repeated submaximal contractions is an important component of total body fitness. Sufficient levels of muscular endurance are needed in varying degrees by all people to perform normal daily functions. The exertion of submaximal strength over an extended period is important to both occupational and recreational pursuits. The primary health benefit derived from training for muscular endurance is seen in the prevention and treatment of back pain. Much of the chronic, nagging back pain in America is due to physical deconditioning and, therefore, students need to be aware of the importance of muscular endurance in the prevention of low back pain. Improving the endurance of the abdominal musculature tends to restore the proper tilt of the pelvis in relation to the spine. Preventive muscular endurance exercise, properly taught and coupled with passive flexibility training, may have a profound effect on the incidence of chronic low back pain.

Three types of muscle tissue are found in the body. The smooth muscles are the involuntarily controlled movers of the internal organs and blood vessels. The cardiac muscle also operates involuntarily and will respond positively to the training described in the previous section on cardiovascular fitness. The third type

of muscle is skeletal muscle, which operates voluntarily and provides the force necessary for body movement. Training to develop muscular endurance is designed for the skeletal muscles. Students need to understand three basic principles about muscular strength and endurance development.

1. *Principle of overload.* A muscle must perform at a workload greater than that to which it is normally accustomed to gain in strength and endurance. More muscle fibers are recruited as the overload increases.

2. *Principle of progression.* A muscular strength and endurance program must consist of progressively increasing workloads as strength and endurance progressively increase.

3. *Principle of specificity.* Strength and endurance will improve only in specific muscles used in the resistive exercises.

With these principles in mind, endurance training programs can be developed with or without the use of weights or other devices designed to overload the skeletal muscles. Students should focus mainly on various ways of using their own body weight to provide adequate resistance. Contrary to the frequency of training recommended for cardiovascular fitness, strength and endurance training for the skeletal muscles should not be performed on a daily basis. In fact, an every-other-day regimen provides the best development. Muscular endurance training should be performed with a submaximal resistance load using many repetitions of the muscular movement. The resultant improvement in muscle tone improves appearance, decreases soreness, increases work efficiency, reduces the incidence of back pain, and provides greater effectiveness and responsiveness during emergencies. The Kraus-Weber tests of minimum muscular fitness are performed and recorded at the conclusion of the session (*16*). Additional muscular endurance testing is performed as outlined in "Concepts in Physical Education" to evaluate upper extremity and abdominal endurance (*34*).

Day 8—muscular strength. Most of the material on muscular endurance applies to muscular strength as well. They are, however, distinct entities. Muscular strength describes the maximum total force that a muscle can exert. Training for muscular strength differs from endurance training in that near-maximal effort is required to develop strength; however, fewer repetitions are necessary for adequate strength training. An every-other-day routine is also best for strength development. Muscular strength training increases the size and mass of the muscle; muscular endurance training primarily improves muscular tone. Muscular strength is the least important of these health-related aspects of physical fitness, but it should not be neglected. Adequate strength is needed for a healthy back. Job performance and emergency readiness are also enhanced by strength training.

Physical fitness is not synonymous with bulging muscles, yet strength is important. It should be evaluated on the basis of strength per pound of body weight. Such an evaluation defines strength more precisely in relation to individual needs. Strength in selected muscle groups can be measured. The sum is totaled and then divided by the student's body weight to obtain strength per pound of body weight. This testing can be performed with strength dynamometers or standard barbell equipment. The smallest person in the class may actually be the strongest if these health-related criteria are used to evaluate strength.

Females need not fear training their muscles for strength and endurance. Developing excessive musculature requires the male hormone testosterone. Morover, women need the health and cosmetic benefits of muscular strength and endurance training.

Spot reducing is a myth. Students need to understand that each fat cell enlarges as it is engorged with excess calories that are stored for future use. When fat is lost due to diet or exercise, all fat cells decrease in size uniformly. Through muscular strength and endurance programs it is possible, however, to firm and tone the underlying musculature in a particular region. Spot toning of selected muscle groups can have a pleasing cosmetic effect even in the absence of significant fat loss.

Day 9—skill-related aspects of fitness. The first portion of the class is devoted to a brief review of the health-related aspects of fitness. The remainder of the period centers on a series of challenging tests and games, outlined in "Concepts in Physical Education," designed to evaluate the skill-related aspects of fitness—power, agility, balance, coordination, speed, and reaction time. Students rotate from station to station at their own pace during this enjoyable class period. Scores are recorded but not emphasized. At the conclusion, class members briefly discuss how they can use various skills in selecting future lifetime sports.

Day 10—care of the back and other matters. This class will be devoted to teaching students about the proper care of the back and other important fitness facts. Recommended lifting techniques are demonstrated. In addition, the instructor reemphasizes the passive flexibility exercises and the abdominal strengthening exercises so important to a healthy back (*35*). Spinal anatomy can be briefly discussed so that students will understand how these exercises help to prevent lordosis and restore proper pelvic tilt.

Next, the class discusses proper exercise attire, including footwear, and the effects of weather conditions on exercise.

Throughout this course of study, the instructor demonstrates the proper way to do any proposed exercise.

In this session, the instructor explains the consequences of improperly performed exercises. For example, straight leg situps and straight leg raises should be avoided because of their potentially adverse effects on back muscles. Hyperextension of the back should likewise be avoided. Situps are most effectively performed with the knees bent.

Finally, students are reminded to continue movement after the completion of the cardiovascular portion of the workout in order to cool down properly. Continued movement of the exercising musculature promotes venous return of the blood to the heart, relieves pressure on the venous valves, and reduces potential for the development of venous varicosities. Cool-down movements should be continued until the heart rate dips below 100 and begins to approach the resting level.

To close this session, further discussion about other fitness topics can be entertained. The instructor reminds the students to think about their personal fitness programs.

Day 11—the personalized program of exercise. Each student is required to submit his or her proposed program of exercise. The proposed exercise program should adequately fulfill the minimum threshold of training for each health-related aspect of fitness. Grading is based on the achievement of this objective. Ideally, boys and girls should include a warmup period for flexibility exercises followed by the brisk cardiovascular exercise segment. A cool-down segment should be included as the exerciser tapers off following the workout. The last part of class is a sharing time for students to learn about the various choices other class members have made in their personal fitness programs.

Day 12—final examinations. A written examination concludes the course. A final test provides further evaluation of the student and serves again to highlight the need for an intellectual approach toward physical fitness as well as offering even the unskilled a chance to succeed in physical education class. Students may then regard exercise and fitness as an academic discipline that requires knowledge in addition to physical effort. Although the course content remains relatively the same throughout junior high, tests can be made progressively more demanding with each year of study.

The personal fitness programs submitted for evaluation during the previous class period are returned to the students. Test results are available at a subsequent awards ceremony.

Awards ceremony. At a convenient time during the next 10 school days, a special awards ceremony completes the motivational component of the proposed curriculum. All data collected by the students regarding the health-related aspects of fitness have been recorded in the physical education office and are used to generate awards. Students can be publicly recognized for the following health-related achievements:

1. lowest resting heart heart rate;
2. best score on the 5-minute step test;
3. best time in the 1.5 mile run-walk test;
4. lowest estimated percent body fat;
5. greatest strength per pound of body weight;
6. best abdominal endurance;
7. best upper extremity endurance;
8. best scores on the Kraus-Weber tests of minimum muscular fitness;
9. best static hip flexibility;
10. best personal fitness program;
11. highest written test score.

These are a few categories that could be used for the generation of awards. During the second year of the program and thereafter, awards for personal improvement and consistency of participation could be given to eighth and ninth graders. Accurate records are necessary for such motivational yearly awards. The goal of the ceremony is to reward personal fitness improvement and health enhancement with recognition similar to that given to the swiftest, strongest, and most skillful athletes. Personal improvement should be highly praised at the award recognition event.

Establishing the Course

The ease of implementing this brief course of fitness education will vary from State to State and community to community. Clearly, it requires the support of the local school board members responsible for the junior high school curriculum. Balancing the costs of such a program against the potential benefits to the students' quality of life strongly supports the argument for implementing it. If key people in the community can be approached by the city or State supervisor of physical education with information on the fitness curriculum, the likelihood of starting the program might be enhanced. Its monetary costs are minimal. The thrifty school system could conduct the complete program by spending as little as $50 for equipment. The excuse to procrastinate due to lack of funds can thus be negated. Well-funded schools could choose to spend thousands of dollars on special testing equipment and develop a similarly good program.

Some classroom physical educators may not be completely prepared for the proposed course of fitness education. Therefore, a special inservice training program can be designed by State or community

physical education leaders to assist classroom physical educators in the development of their lectures, activities, and lesson plans. The school system's supervisor for physical education may also serve as the community resource person to arrange special classroom appearances and provide information about the more difficult topics. Each State supervisor for physical education can recommend textbooks for use in preparing the course of study.

"Concepts in Physical Education" and the "Instructor's Handbook for Concepts in Physical Education" contain abundant material useful in fitness education along with visual aids and fitness test norms (*24,34*). These books are excellent resources for instructors and can be used as texts for the in-service training program.

Evaluation of the impact of this new curriculum for fitness education is important. It should be possible to follow many students through their senior high school years to obtain information about their attitudes and habits regarding physical fitness. These results can be compared with those for control students not exposed to this new curriculum. More ambitious research designed to follow students into adulthood would provide even more comprehensive information about the effect of this program on future decisions about health-related lifestyles.

The benefits of fitness education can be immense. The staggering cost of medical care today mandates that preventive interventions receive the highest priority during the formative years of growth and development. Exercise has been shown to assist substantially in the control of many risk factors that may lead to the development of coronary heart disease. For this reason, exercise may be the preventive intervention of choice to discourage the early onset of cardiovascular disease. The anatomical and physiological benefits derived from regular vigorous exercise merit the enthusiastic endorsement of intensified fitness education for young people. Students must realize that their choice of lifestyle substantially affects their future health. But of more immediate concern to them is that the quality of their lives can also be enhanced and vitalized within a relatively short period of time by a regular program of vigorous exercise. In most school systems, students are not provided with the information necessary to make intelligent decisions regarding their physical fitness. However, if this curriculum for fitness education is added to physical education courses, students who are becoming young adults will be able to engage appropriately in a program of healthy exercise with specific guidelines and direction.

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ABSTRACTS OF SEMIFINALISTS' PAPERS

Teenvision: a Community Action Project Involving the Adolescent Parent

RAHEMAH AMUN WRICE

Teenvision is a proposed adolescent health care project emphasizing public education and peer education training in the areas of adolescent sexuality, pregnancy, childbirth, and parenthood. The program's main goal would be to decrease the incidence and prevalence of adolescent pregnancy, especially among low income minority youth. To do this, the program would use the medium of television and also peer counseling in the areas of adolescent growth, development, and sexuality.

In the first phase, 12 adolescent parents, including both mothers and fathers, would be trained 20 weeks in peer education and be involved in creating educational tools and materials for use in local schools and social service agencies. Exposed to a variety of community resources, programs, and people, the parents would develop an outreach activity such as a panel discussion, a mini-conference at schools, or group discussions.

Teenvision would also develop six 30-minute video tapes, suitable for television, in which a group of teenage parents would dramatize and discuss their own experiences with pregnancy. Each tape would explore a topic on adolescent health care, sexuality, pregnancy, childbirth, and social values. Peer education through video tapes would be effective, yet incur minimal costs and find a wide distribution. To evaluate the effectiveness of the tapes, three groups of high school students would be used: those exposed to the tapes and family life education classes, those exposed to family life education classes only, and those exposed to neither. The idea for Teenvision originated from a group of pregnant adolescents in a continuing education program.

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Back School: Guidelines for a Preventive Program

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An estimated 70–80 percent of all people in industrialized societies will suffer from some form of back pain. The author presents guidelines for a program designed to educate the public in the proper use and care of the low back. Stressing preventive measures, the paper outlines important areas to consider when conducting a preventive back care seminar. Through instruction in basic anatomy, biomechanical principles, and exercise, people can be made aware that they are primarily responsible for preventing injury to the low back.

Private companies with programs of instruction on the back have realized cost savings by decreasing time lost and medical costs incurred by such injuries. This type of program could also be made available to the community through adult schools or presentations to local organizations. Only when programs such as this are offered widely in business, industry, and the community can we expect the incidence of back pain to decrease.

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