CHILDHOOD OBESITY

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According to a 2004 report in the Journal of the American Medical Association[13], two-thirds of American adults are overweight or obese (extremely overweight). This unfortunate statistic, which represents a 50 percent increase in obesity prevalence over the past 10 years[5], is closely related to undesirable changes in eating habits and exercise behavior. As might be expected, our nation's children are fast following suit, with a full-fledged obesity epidemic among school-age boys and girls. Recent data from the American Heart Association reveals that almost 4 million primary-school children (ages 6 to 11) and more than 5 million secondary-school students (ages 12 to 19) were overweight or obese in 2002[2].

Obese teenagers have a 70 percent chance of becoming obese adults, and obese adults have a significantly greater risk of experiencing a condition known as the *metabolic syndrome*[7]. The metabolic syndrome is associated with the major coronary risk factors of high blood sugar, high blood cholesterol, and high blood pressure, and increases the risk for heart disease, stroke, certain types of cancer, and diabetes[7,12]. However, obese children can experience serious health problems during their school years, as evidenced by an alarming number of young people who have already developed type 2 *(adult-onset, non-insulin dependant)* diabetes. Almost 16 million Americans have diabetes, which is the nation's sixth leading cause of death by disease. The serious complications of diabetes include blindness, amputation, kidney disease, and heart disease[1].

Although genetics plays a minor role in the youth obesity epidemic, the major problem is simply too many *calories in* and too few *calories out*. With respect to *calories in*, healthier home-cooked meals are often replaced with higher-fat fast foods, snack foods, processed foods and sugar-laden soft drinks. Just as important, childrens' caloric output has been sharply reduced by modern society which: (1) favors riding (buses and cars) over walking and cycling; (2) favors indoor pastimes (television, computers, video games) over outdoor play and athletic activities; and (3) favors academic subjects and study sessions over physical education and recess periods.

To address these prevalent problems, many states are attempting to swing the pendulum towards a better balanced and beneficial position from a health and fitness perspective. For example, during the summer of 2005 Massachusetts proposed legislative bills to: (1) mandate physical education classes in public schools (2.5 hours per week for elementary students and 3.75 hours per week for middle/high school students); (2) forbid public schools from selling unhealthy foods/drinks through vending machines or other means; (3) provide public school students with 50 minutes per week of nutrition/wellness education; and (4) create a Department of Health public service campaign to raise awareness of childhood obesity.

EATING GUIDELINES

With respect to nutritional guidelines for preventing obesity in children, the United States Department of Agriculture (USDA) MyPyramid Plan recommends the following foods and servings for minimally active 10-year old boys and girls on a daily basis[18]:

Grains	5 ounces (examples: cereals, rice, bread, bagels, pasta)
Vegetables	1.5-2.0 cups (examples: peas, carrots, corn, potatoes, tomatoes)
Fruits	1.5 cups (examples: strawberries, blueberries, peaches, apples, raisins)
Milk	2-3 cups (examples: milk, yogurt, cottage cheese, swiss cheese, frozen yogurt)
Meat and Beans	4-5 ounces (examples: fish, chicken, beef, black beans, peanuts)

Based on the recommended 1,400-1,600 calorie/day plan for inactive 10 year olds, the USDA Guidelines include 4-5 teaspoons of healthy oils, as well as 130-170 calories from fat and sugar sources (e.g., baked goods). More information on appropriate childhood nutrition and related factors in treating and preventing childhood obesity can be attained in the book, *Obesity: Etiology, Assessment, Treatment and Prevention*, edited by Dr. Ross Andersen[4].

EXERCISE GUIDELINES

According to Professor Avery Faigenbaum, a leading researcher in the field of youth fitness, boys and girls should be physically active at least 30 to 60 minutes on most days of the week in some form of play, sports, recreation or physical education program. While any type of physical activity is better than remaining sedentary, Dr. Faigenbaum and his colleagues recommend that children's exercise programs include some strength training activity[17,19]. In addition to improving muscle strength[10] and increasing bone mineral density[16], sensible strength exercise has been shown to reduce body fat in preadolescent youth[9]. This is an important consideration when designing children's exercise protocols, as physical education programs that do not include strength training have been less effective for enhancing the fitness parameters of muscle strength, bone mineral density, and percent body fat[6,14].

RECOMMENDED EXERCISE PROTOCOLS FOR YOUTH

One of the key components in successful youth fitness programs is *fun*. Generally speaking, children's exercise programs must be perceived as enjoyable or preadolescent participants will quickly lose their enthusiasm. Numerous youth fitness studies conducted at the South Shore YMCA have used a so-called *sandwich* protocol[15] The hour-long classes begin with 15 to 20 minutes of active games (emphasizing locomotor movements and aerobic exercise), followed by 15 to 20 minutes of strength training (8 to 10 basic exercises that address all of the major muscle groups), followed by 15 to 20 minutes of active games (again emphasizing locomotor movements and aerobic exercise).

Based on the most relevant youth fitness research studies, Professor Gregory Anderson recently published general exercise recommendations for aerobic conditioning in children. As shown in the following table, these recommendations include 15 minutes of relatively vigorous large muscle activities performed 3 or 4 days/week, with an interval training format[3].

Table 1. Aerobic Exercise Recommendations for Children

Training Exercises	Large-muscle, locomotor activities and games
Training Intensity	Increase heart rate to 170 beats/minute or higher
Training Duration	15 minutes or longer
Training Frequency	3 or 4 days per week
Training Format	Interval training (intermittent higher effort and lower effort)

Children should perform strength exercise in accordance with the National Strength and Conditioning Association's (NSCA) position statement on youth resistance training[17]. Chaired by Dr. Avery Faigenbaum and Dr. William Kraemer, the NSCA youth strength training recommendations emphasize careful instruction and close supervision by qualified fitness professionals. As presented in the following table, these guidelines call for several upper and lower

body exercises for the major muscle groups, beginning with one set of 12 to 15 repetitions per exercise, 2 or 3 non-consecutive days per week, and allowing for appropriate training progression based on the developmental goals.

Table 2. Strength Training Recommendations for Children

Training Exercises	Several upper and lower body exercises for the major muscle groups
Training Repetitions	Begin with 12 to 15 repetitions; after introductory period may change to 6 to 15 repetitions depending on training goals
Training Progression	Gradually increase resistance by 5 to 10% as strength improves
Training Sets	Begin with one set of each exercise; after introductory period may change to 2 to 3 sets depending on training goals
Training Frequency	Two or three non-consecutive days per week

More recent research by Dr. Faigenbaum has demonstrated that children participating in an introductory strength training program achieve better results with higher repetition-moderate load training (13 to 15 repetitions) than with lower repetition-heavy load training (6 to 8 repetitions)[11]. Another finding by Dr. Faigenbaum is that children can make significant strength gains training just one day per week. However, the strength improvement for one day per week training was only 67 percent as great as that for two day per week training, thereby supporting two strength training sessions per week for most practical purposes[8].

Although both strength training and aerobic exercise are recommended for all boys and girls, obese youth typically prefer the former. This is because children with excess bodyweight generally have low exercise endurance and fatigue quickly during aerobic activity. However, heavier youth can usually lift heavier weightloads than their lighter peers, which provides positive reinforcement for their strength training efforts.

Regardless of age or activity, young exercise participants should be carefully instructed and supervised by properly trained and credentialed fitness instructors. Enthusiastic and energetic adult leaders are essential for ensuring safe, effective and enjoyable youth exercise experiences. Likewise, fitness instructors, teachers and parents must be good role models in the area of food selections and eating behavior. When respected adults set appropriate fitness examples, provide opportunities for

effective exercise and sound nutrition, and reinforce children's efforts at health enhancement, the present epidemic of childhood obesity should diminish accordingly.

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