# Obesity-Related Cardiovascular Risk Factors: Intervention Recommendations to Decrease Adolescent Obesity

Kristine S. Calderon, PhD, CHES, BCIAC
Carolyn B. Yucha, RN, PhD, BCIAC
Susan D. Schaffer, PhD, ARNP, BC

The incidence of adolescent obesity is increasing dramatically in the United States with associated risks of hypertension, adverse lipid profiles, and Type II diabetes. Unless reversed, this trend predicts an epidemic of adult cardiovascular disease. Interventions at home, at school, and in the community are required to empower teens to increase physical activity and to modify eating habits. This article describes assessment for obesity-related health problems as well as scientific guidelines and research-based intervention strategies to decrease obesity in adolescents.


RATES OF OBESITY among American children and adolescents have increased 2- to 4-fold over the past two decades, with the highest rates among African American and Latino youth (Williams et al., 2002). More than 25% of American children are considered clinically obese, with weight that is 20% above ideal body weight (Centers for Disease Control and Prevention [CDC], 2001; Sothern et al., 1999). Analyses based on the adult definition of obesity indicate that 11.2% of 12- through 19-year-olds had a body mass index (BMI) of 30 or higher (Ogden, Flegal, Carroll, & Johnson 2002). This development is of particular concern because overweight in childhood has been linked with increased rates of hypertension, hyperlipidemia, Type II diabetes, and early atherosclerotic lesions. Several studies have supported the adolescent obesity–cardiovascular disease (CVD) link. Hoffmans, Kromhout, and deLezenne Coulander (1988) and Must, Jacques, Dallal, Bajema, and Dietz (1992) reported that the strongest associations between morbidity and mortality from CVD in adulthood were found in overweight adults who were overweight as adolescents. Although the specifics of the transition from risk factors in childhood to adult diabetes and CVD are unclear, there is compelling evidence to suggest that lifestyle modification and weight control in childhood and adolescence could reduce the risk of Type II diabetes and CVD in adulthood (Steinberger & Daniels, 2003). Adolescence is a critical period in biologic, social, and psychological development (Meininger, Liehr, Mueller, Chan, & Chandler, 1998). Because it is a transitional phase during which adult patterns of health behavior are established (Langer & Warheit, 1992), it is also a pivotal time in which to intervene.

In this article, we will briefly review the causes of adolescent obesity, the relationship of adolescent obesity to both hypertension and diabetes and how to assess these high-risk conditions among adolescents. Second, we will summarize findings of research-based obesity interventions and provide recommendations that pediatric nurses can make to obese patients and their families in the home, school, and community.

*From the Comprehensive Health Services, Kennedy Space Center, Kennedy Space Center, FL; School of Nursing, University of Nevada, Las Vegas, NV and College of Nursing, University of Florida, Gainesville, FL.*

*Address correspondence and reprint requests to Kristine S. Calderon, PhD, ARNP, BCIAC, Comprehensive Health Services, Kennedy Space Center, CHS-005, Kennedy Space Center, FL 32899. E-mail: Kristine.Calderon@jbosc.ksc.nasa.gov*

*0882-5963/$ - see front matter*

*doi:10.1016/j.pedn.2004.12.001*

## DEFINING OBESITY IN ADOLESCENTS

Obesity is defined according to BMI based on growth charts for age and sex, often referred to as BMI-for-age (Williams et al., 2002). Age- and sex-specific BMI standards for the U.S. population released by the CDC in May 2000 (Kuczmarski et al., 2002) should be used to assess weight in adolescents. The 85th percentile identifies those who are mildly to moderately overweight, and the 95th percentile identifies those likely to benefit from additional assessment and treatment. The 95th percentile roughly corresponds with 130% of ideal weight (Williams et al., 2002).

However, because these classification guidelines use weight to classify overweight status in adolescents, obesity classification can be challenging. As mentioned earlier, the CDC has stated that children are considered clinically obese if weight is 20% above ideal body weight (CDC, 2001). According to the American Heart Association (AHA) Statement for Cardiovascular Health in Childhood (Williams et al., 2002), for clinical purposes, obesity should be defined as a level of overweight that is associated with adverse physical or psychological health problems. Until obesity is "officially" defined, those adolescents who fall above the 90th percentiles should be considered obese or at the very least, at high risk for obesity.

## CAUSES OF ADOLESCENT OBESITY

Excessive body fat evolves from a complex interaction of physiologic, metabolic, behavior, and social factors. Obese children often have obese parents, an association that is thought to be at least partially genetic. Lack of physical activity is a significant contributor to obesity. Nearly half of American youths aged 12–21 years fail to be vigorously active on a regular basis and about 14% of young people report no recent physical activity (Department of Health and Human Services [DHHS], 2001). Dietz and Gortmaker (2001) report that less than one third of children who live within a mile of school walk to school. Only 55% of all high school students are physically active for 20 minutes or more, 5 days a week, in physical education classes (CDC, 2001). Daily enrollment in physical education classes dropped from 42% to 25% among high school students between 1991 and 1995 (DHHS, 2001). Other factors contributing to sedentary behavior include unsafe neighborhood environments and the cost of participation in or equipment for sporting activities (McWhorter, Wallmann, & Alpert, 2003).

Television watching is a significant contributor to inactivity. The average child spends 25 hr/week in front of the television, and a positive association between television viewing and obesity has been supported by research (Hernandez et al., 1999; Jeffery & French, 1998; Proctor et al., 2003). Another contributor to adolescent obesity is the percentage of fat calories consumed (Loggie & Sardegna, 1997), with 46% of daily calories for many adolescents comprised of sugar and fat (Brady, Lindquist, Herd, & Goran, 2000). Diets high in fat produce a greater degree of obesity than do those high in carbohydrates or protein (Atkinson, 2002, p. 86). Fat contains more than twice as many calories per gram as protein or carbohydrates, so eating the same volume of food on a high-fat diet with no carbohydrate restrictions versus a low-fat diet will result in a much greater caloric intake. Fatty foods are usually low in dietary fiber, are softer, and require less time to chew and swallow than other types of foods, which may result in an increased intake of these foods at one time. When the diet contains more calories than is necessary for weight maintenance, fat calories are stored more efficiently than carbohydrates or protein. The cost of storing excess fat is only about 3% of ingested energy, whereas the cost of making fat from carbohydrates or protein and storing it is more than 20% of ingested energy (Atkinson, 2002). Increased intake of commercially prepared fast foods can be a major contributor to high fat intake in adolescence. Exposure to television advertising also increases the likelihood that adolescents will snack on high-fat, high-sugar foods. Fast-food items and soft drinks are increasingly available in high school cafeterias with the proliferation of fast-food vendor contracts and are the lunch of choice for many adolescents (Harnack, Stang, & Story, 1999; Story, Hayes, & Kalina, 1996).

## OBESITY AND HYPERTENSION

Obesity and hypertension are significantly linked. Rosner, Prineas, Daniels, and Loggie (2000) pooled data from eight large U.S. epidemiological studies involving over 47,000 children to describe blood pressure (BP) differences in relation to body size. Irrespective of race, sex, or age, the risk of elevated BP was significantly higher for children in the upper compared to the lower decile of BMI, with an odds ratio of systolic hypertension ranging from 2.5 to

3.7. Sorof, Poffenbarger, Franco, Bernard, and Portman (2002) recently reported a three times greater prevalence of hypertension in obese compared to nonobese adolescents in a school-based hypertension and obesity screening study.

### Assessing hypertension in adolescents

All overweight adolescents should be assessed for BP elevation. Because BP rises steadily from infancy until about age 18, there is no single cutoff point denoting hypertension in children and adolescents. Instead, the national BP standards for children and adolescents require plotting each individual's height on standard age-adjusted growth curves to determine the height percentile. The individual's height percentile, age, and sex are then used to ascertain the 90th and 95th percentiles for BP for that individual using tables available from the National High Blood Pressure Education Program Working Group on Hypertension Control in Children and Adolescents (NHBPE Working Group on Hypertension Control in Children and Adolescents, 1996). Systolic and diastolic BPs below the 90th percentile for height, age, and sex are considered normal; an average systolic or diastolic BP higher than or equal to the 90th percentile but less than the 95th percentile is classified as high-normal; an average systolic or diastolic BP higher than or equal to the 95th percentile is classified as hypertensive. Those children or adolescents with a family history of hypertension are considered in need of intervention if their average systolic or diastolic BP is higher than or equal to the 90th percentile. Adolescents whose BP is higher than or equal to the 95th percentile, regardless of family history, should be considered in critical need of intervention and are at risk for possible onset of early CVD. However, the discovery that each increment of 20 mm Hg in systolic BP or 10 mm Hg in diastolic BP doubles the risk of CVD beginning at 115/75 mm Hg and the classification of BP of 120/80 mm Hg as prehypertension in adults (Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation and Treatment of High Blood Pressure) is likely to also change the perceptions of what is considered healthy BP in adolescents.

Hypertension is currently diagnosed once systolic or diastolic BP has been measured at or above the 95th percentile on at least three separate occasions (Loggie & Sardegna, 1997). In teenagers close to 17 years old, the 95th percentile is close to the 140/90-mm Hg cutoff point used for adults, making hypertension relatively easy to recognize. However, hypertension in younger adolescents and children can be missed because of varying 95th percentile levels (Loggie & Sardegna, 1997). For example, a BP of 128/82 mm Hg would be considered normal for a tall 13-year-old boy but hypertensive for a short 13-year-old boy.

## OBESITY AND DIABETES

Adolescent obesity is also associated with the insulin resistance syndrome that includes hyperinsulinemia, hypertension, hyperlipidemia, and Type II diabetes. Obesity in childhood often precedes a hyperinsulinemic state in which insulin production increases in response to decreased tissue sensitivity to insulin. Insulin increases renal tubular reabsorption of sodium (Baum, 1975; DeForonzo, Cooke, Andres, Faloona, & Davis, 1975), a process that promotes hypertension by raising circulating plasma volume. Insulin also boosts intracellular stores of free calcium in the smooth cells that line blood vessels (Drazin, Kao, & Sussman, 1987). This increase may bolster vascular smooth muscle tone, increasing intravascular resistance. Both genetics and lifestyle (lack of exercise and abdominal obesity) contribute to hyperinsulinemia. Formerly considered a disease of adults, Type II diabetes has increased alarmingly in children (Fagot-Campagna et al., 2000). Weight loss by obese adolescents results in a decrease in insulin concentration and improvement in insulin sensitivity (Steinberger & Daniels, 2003).

### Assessing Type II diabetes in adolescents

According to the AHA's Athlerosclerosis, Hypertension, and Obesity in the Young (AHOY) Committee of the Council on Cardiovascular Disease in the Young (Williams et al., 2002), fasting plasma glucose testing has been recommended for children at risk for the presence or development of Type II diabetes. These are children who (1) are overweight, (2) have a family history of Type II diabetes, (3) have a predisposition according to race/ethnicity (American Indian, African American, Hispanic, or Asian/Pacific Islander), and (4) have signs of insulin resistance or conditions associated with insulin resistance (acanthosis nigricans, hypertension, dyslipidemia, or polycystic ovary syndrome). The AHOY committee adds that plasma glucose testing is an easy and relatively inexpensive tool for office screening. Assessment of hyperinsulinemia by measuring fasting plasma

**Table 1. Childhood/Adolescent Obesity Interventions (past 10 years)**

| Author (Dates) | No. of subjects | Age | Sex (% Male/ % Female) | Intervention Length | Intervention Components | Outcomes/Results |
|---|---|---|---|---|---|---|
| Duffy and Spence (1993) | 27 | 7–13 | 21/79 | 8-week, 90-minute sessions | Behavioral: Behavior therapy sessions with intervention group receiving additional cognitive self management and control group receiving relaxation training<br><br>Physical Activity and Dietary: Children encouraged to do aerobic exercise and avoid "red light foods." Food intake was recorded for 7 days. | • Significant reduction in percentage overweight pre–posttreatment for both groups and the improvements were maintained at 3- and 6-month follow-ups<br>• No statistically significant difference between treatments over time |
| Epstein, McKenzie, Valoski, Klein, and Wing (1994) | 44 | 8–12 | 26/74 | 26 weekly meetings and 6 monthly meetings | Behavioral: Intervention group: Mastery of behaviors; Control group: Yoke to inter vention—moved on when 50% of intervention group showed mastery of behaviors | • Mean percent overweight decrease in experimental group: 60.6–30.5% at 6 months and to 34.1% at 1 year; control group: 58.8–38.8% at 6 months and to 42.1% at 1 year<br><br>• Results were not maintained at 2 years |
| Epstein et al. (1995) | 61 | 8–12 | 27/73 | 4-month treatment with 1-year follow-up | Physical activity: Three groups: Increasing physical activity versus decreasing sedentary behavior versus both | • Significantly greater decrease in percentage overweight in sedentary group than combination group<br>• Significantly greater decrease in percentage overweight in physical activity group than increase in sedentary group |
| Epstein, Palluch, Gordy, Saelens, and Ernst (2000) | 67 | 9–11 | 48/52 | 6-month treatment and follow-up at 12 and 24 months | Behavioral: Three groups: (1) problem solving taught to parent and child, (2) problem solving taught to child, and (3) standard family-based treatment | • Addition of problem solving did not add to treatment effectiveness beyond standard family-based treatment<br>• Improvements in problem solving but not in weight reduction were observed for parents and children |
| Epstein, Palluch, Gordy, and Dorn (2000) | 90 | 8–12 | 32/68 | 6-month treatment and 2-year follow-up | Physical activity: Two groups: Increasing physical activity versus decreasing sedentary | • Both groups showed similar decreases in percentage overweight, differences not statistically significant |

| | | | | | | |
|---|---|---|---|---|---|---|
| Flodmark, Ohlsson, Ryden, and Sveger (1993) | 94 | 10–11 | 48/52 | 14- to 18-month treatment and 1-year follow-up | Behavioral: Family therapy plus conventional treatment versus conventional treatment only versus untreated control | • Mean BMI increased in all groups<br>• Mean BMI increase was less in treatment combination group than other two groups<br>• Mean BMI difference between conventional treatment and untreated control was not statistically significant |
| Figueroa-Colon et al. (1996) | 19 | 9–13 | 58/42 | 10 weeks | Dietary: Protein-sparing modified fast (PSMF) versus hypocaloric diet<br>Physical activity: 45 minutes, 5 times a week<br>Diet and physical activity versus control | PSMF group had significant decreases in percentage overweight and BMI at 10 weeks (immediate posttreatment) compared to control; decrease in overweight similar between groups at 15 weeks |
| Golan, Fainaru, and Weizman (1998) | 60 | 6–11 | 38/62 | 1 year | Behavioral: Behavioral modification targeted at parents as agents of change (intervention) or children as agents of change (control) | • Significant differences between two groups in reduction of exposure to food stimuli and changes in eating habits<br>• Mean weight reduction significantly greater in experimental treatment group (parent-only treatment) than conventional intervention group (child-only treatment)<br>• Children in both groups showed a significant decrease in degree of overweight although change was significantly greater in the experimental than the conventional treatment |
| Israel, Guile, Baker, and Silverman (1994) | 20 | 8–13 | Not given | 26-week treatment with 1- and 3-year follow-up | Behavioral: Standard treatment: Multicomponent intervention with primary | Both groups achieved significant reduction in overweight and triceps skinfold posttreatment; both groups |

(*continued on next page*)

**Table 1. continued**

| Author (Dates) | No. of subjects | Age | Sex (% Male/ % Female) | Intervention Length | Intervention Components | Outcomes/Results |
|---|---|---|---|---|---|---|
| | | | | | responsibility to parents; child involvement group: Standard treatment plus child self-regulation | showed gain in overweight and skinfold after 3 years |
| Obarzanek, Kimm, Barton et al. (2001) | 663 | 8–10, Follow-up to age 17 | | 1-year treatment with follow-up at 2, 3, and 4–7 years | Dietary: NCEP Step II diet<br>Behavioral: observation, imitation of models, motivational interviewing stages of change, brief negotiation, and behavioral self-management | • Dietary intakes of total and saturated fat significantly lower in intervention versus usual care groups throughout 7 years<br>• LDL-C and total-C were significantly lower in the intervention than usual care group at Years 1 and 3 but not thereafter<br>• Few differences found between intervention and UC groups in HDL-C, triglycerides, and BMI |
| Schwingshandl et al. (1999) | 30 | 6–16 | 38/62 | 12-week treatment and 1-year follow-up | Physical activity and dietary: Physical activity and dietary advice group versus dietary advice alone group | Physical activity and dietary advice group had significantly greater mean change in fat-free mass than dietary alone group |
| Warschburger, Fromme, Petermann, Wojtalla, and Oepen (2001) | 197 | 9–19 | Not given | 6-week treatment with 6- and 12-month follow-up | Behavioral: cognitive–behavioral training<br>Physical activity and dietary: Calorie-reduced diet and exercise<br><br>Experimental group: Behavioral plus physical activity and dietary; Comparison group: Physical activity and dietary plus muscle relaxation | • Both groups had reduction in percentage overweight post treatment<br>• Differences between groups were not significant |

insulin levels is an acceptable measure of insulin resistance (range: normal <15 mU/L, borderline high 15–20 mU/L, high >20 mU/L) (Williams et al., 2002).

## HOW CAN WE ADDRESS THIS PROBLEM?

Adolescence is a time of transition from childhood to adulthood, when adult patterns of health behaviors (Langer & Warheit, 1992) and risk profiles for heart disease (Lauer & Clarke, 1989) accelerate. Because even small increments in BP can have substantial effects on hypertension-related morbidity and mortality (MacMahon et al., 1990; Stamler, 1991) and weight loss may result in decreases in BP, insulin concentration and improvement in insulin sensitivity (Steinberger & Daniels, 2003), greater attention to BP and weight loss early in life may ultimately lead to considerable improvements in cardiovascular health (Sinaiko, 1996). The American Heart Association Guidelines for Primary Prevention of Atherosclerotic Cardiovascular Disease Beginning in Childhood (Kavey et al., 2003) cite health promotion goals in diet, physical activity, and smoking. An increasing body of research now documents the safety and success of intervention to reduce cardiovascular risk factors in childhood. Table 1 summarizes significant research-based and randomized control trial interventions from the past 10 years that have targeted modifiable risk factors for obesity in children and adolescents.

The prevalence of obesity among adolescents indicates that dietary adjustments, regular physical activity, and targeting behavioral change are critical for intervention. Combinations of these components are listed for each research-based obesity intervention in Table 1. However, pediatric nurses need to know how to apply these interventions and assess their outcomes in advising adolescent patients and their parents. The following sections summarize current guidelines for both diet and physical activity, integrating those successful intervention activities and recommendations from Table 1. Thus, they provide recommendations for parents and adolescents as to what they can do at home, at school, and in their community to reduce obesity and CVD risk factors.

## DIETARY INTERVENTION

Other than the Dietary Guidelines for Americans, which was jointly issued by the U.S. Department of Agriculture (USDA) and DHHS that currently present 10 general guidelines for dietary health (USDA, 2000), the USDA's *Food Guide Pyramid* is the only official set of guidelines that recommends a certain number of servings from each food group based on energy intake. Table 2 outlines the recommended number of servings from each food group based on three levels of energy intake. The challenges with these recommendations are that (1) adolescents and parents tend to be unfamiliar with serving sizes, (2) fruit, vegetables, and dairy are often underconsumed where meat and "grains" (or in reality, starchy carbohydrates) are often over consumed, and (3) energy level intakes mostly exceed what is recommended for normal adolescent growth.

The AHA Guidelines for Primary Prevention of CVD in Childhood advocate consumption of a variety of fruits, vegetables, whole grains, dairy products, fish, legumes, poultry, and lean meat. Limiting foods high in saturated fats (less than 10% of calories per day), cholesterol (less than 300 mg/day), and *trans*-fatty acids, and salt intake to less than 6 g/day are also recommended.

Many of the trials cited in Table 1 used Epstein's "traffic-light" diet (Duffy & Spence, 1993; Epstein et al., 1995; Epstein, Paluch, Gordy, & Dorn, 2000). The traffic-light diet is a structured eating plan (900–1300 kcal) used to guide participants' eating patterns to meet age recommendations provided by the food guide pyramid, increasing the nutrient density of the diet. The traffic-light diet groups foods into categories: green foods (go) may be consumed in unlimited quantities; yellow foods (caution) have average nutritional value for the foods within their food group; red foods (stop) provide less nutrient density per calorie because of

**Table 2. Recommended Number of Servings for Each Food Group for Three Levels of Intake**

| Food Group | Energy Level | | |
|---|---|---|---|
| | 1600 kcal | 2200 kcal | 2800 kcal |
| Grain (servings) | 6 | 9 | 11 |
| Vegetable (servings) | 3 | 4 | 5 |
| Fruit (servings) | 2 | 3 | 4 |
| Dairy (servings) | 2–3 | 2–3 | 2–3 |
| Meat (oz) | 5 | 6 | 7 |

Note: Servings for each food group: grain = 1 slice of bread, 1 cup of cooked pasta, 1 cup of cooked rice, 1 small potato; vegetable = 1 cup (fit into palm of adult hand); fruit = 1 cup or 1 medium piece of fruit (size of a baseball); dairy = 1 ounce of cheese (size of 4 dice), 1 cup of milk, 1 cup of yogurt; meat = 4 medium shrimp, 2–3 oz of steak, chicken, or fish (size of deck of cards), 1/3 cup of peanuts, walnuts, or pecans (size of two "C" batteries).

high fat or simple carbohydrate content. Thus, children are encouraged to eat more fruits and vegetables and low-fat diary and other protein sources. In turn, they are discouraged from eating high-fat foods such as fried food and fatty meats and foods with high sugar content. Most interventions using the traffic-light diet as part of a comprehensive treatment have produced a significant decrease in obesity in adolescent children (Duffy & Spence, 1993; Epstein et al., 1995). Moreover, Duffy and Spence (1993) reported significant changes in eating patterns when combining comprehensive obesity treatment with the traffic-light diet, specifically, in reductions in "red foods" and decrease in percent of overweight.

Other dietary protocols among the studies in Table 1 included the National Cholesterol Education Program (NCEP) Step II diet, which includes total fat intake of 28% energy, with less than 8% from saturated fat, up to 9% from polyunsaturated fat, and less than 75 mg/1000 kcal of cholesterol, not to exceed 150 mg/day. Saturated fat-containing foods were primary targets for intervention and were collectively designated as "WHOA" foods whereas lower fat/cholesterol alternatives, including fruits and vegetables, were "go!" foods. This diet resulted in lower intake of total and saturated fat but little impact on BMI (Obarzanek et al., 2001). Finally, a protein-sparing modified fast consisting of 600–900 kcal and 1.5–2.5 g of high-biological-quality protein per kilogram of ideal body weight per day (usually provided as lean meat) was compared to a hypocaloric diet (800–1000 kcal); however, both were considered ineffective in reducing weight in the long term (Figueroa-Colon, Franlin, Lee, von Almen, & Suskind, 1996).

## Home recommendations

Obarzanek et al. (2001) suggest that children can make healthy dietary changes at home once equipped with practical information and behavioral skills and with parental support and guidance. There are several basic home-based dietary strategies that pediatric nurses can recommend to adolescents and their families. Adolescents and parents should be encouraged to shop for groceries together after having received instruction in reading nutrition labels. Children and adolescents need to be educated to choose lower-fat and low-sugar snack foods and read labels of packaged foods more carefully to determine fat content. This can be challenging with the marketing strategies that are used for fast-food restaurants and high-fat snack-food advertising targeted toward youth. Pediatric nurses need to instruct families to specifically avoid purchasing high-fat foods and instead purchase healthy foods. Parents can avoid arguments about high-fat, high-sugar foods by not bringing them into the house. With this strategy, adolescents will have healthy snacks to choose from at home and not be as tempted to eat unhealthy foods. Snacks such as air-popped popcorn, pretzels, sliced fruit (cut up in pieces), and precut vegetables with low-fat salad dressing for dips can be enticing snack foods for teens. Keeping cut-and-cleaned vegetables and fruits in the refrigerator encourages teens to eat these foods regularly during trips to the refrigerator.

Additional recommendations for healthier shopping include purchasing leaner cuts of meats and poultry, electing to buy fish more often (to lower fat intake), and choosing whole grain breads, fiber cereals, brown rice, corn tortillas, and wheat pitas (to increase folate and fiber intake) instead of flour-based or higher glycemic index grain products. In addition, cutting back on drinking soda and other sugar-filled drinks will decrease caffeine intake and empty sugar calories. Wiser beverage alternatives for teens are fat-free or low-fat milk, water, unsweetened decaffeinated iced tea, and other water-based low-sugar (or sweetener alternative) drinks. Diluting fruit juice with seltzer water is a palatable, lower-calorie alternative to straight fruit juice.

Healthier food preparation can lead to dietary improvements as well. Teens, parents, and other family members can be encouraged to fry food with nonfat cooking sprays and to bake and broil food as much as possible. Cooking with spice-based condiments and low-fat and cholesterol-lowering butter substitutes will lower overall fat intake. A caution should be made with butter substitutes containing *trans* unsaturated fatty acids. Intake of these *trans*-fatty acids may lead to abnormal lipoprotein production. A better choice may be to try cholesterol-lowering margarine substitutes containing plant sterols or stanols. In addition, eating family meals together will foster family-based social support for better eating. Epstein et al. (2001) recommend that by reducing access to low-nutrient-dense foods in the shared family environment, modeling healthier eating habits, and sharing positive food-related family experiences that reinforce eating high-nutrient-dense foods, parents may reduce the risk of their adolescents becoming overweight or obese.

### School recommendations

At school, encouraging teens to make smart food choices in the school cafeteria and vending machines is critical. For teens participating in the Federal School Lunch Program, every school must offer at least one meal per day that meets the dietary guidelines that they can choose. An example of this meal includes 2 oz of meat or meat alternative, 2 servings of vegetables and/or fruit, 1 serving of bread/grains/cereals, and 1 cup of milk. This dietary guideline-approved meal is offered among several other types of meals to not only paying teens but also those participating in the Federal Lunch Program. All teens have many choices of food items such as hamburgers, French fries, and pizza that could be eaten everyday if so desired.

Encouraging teens to share with you and their parents as to what food items are offered at school can encourage dialogue about choosing as a team what some of the best food choices may be for that teen. Teens can also be encouraged to bring their own healthy lunch to school. Encouraging parents and teens to pack lunches together for healthy eating at school and work may foster social support when eating lunch away from home. In addition, pediatric nurses need to encourage parents to get involved in parent–teacher associations and other parent interest groups to urge school cafeterias to offer healthier food choices to balance those offered by fast-food vendors.

### Community

Obarzanek et al. (2001) suggest that a comprehensive, environmental approach can help to maximize adherence and reduce exposure to the less desirable dietary behaviors by eliciting community support. Pediatric nurses can advocate that parents lobby for fast-food chains and popular restaurants to provide information about the sodium, fat, and caloric content of foods. This may be done through community and national organization advocacy efforts to target restaurant chain owners. Until restaurant chains are forced to take more responsibility for the health of the public, a more realistic approach may be to advice parents to allow kids to eat fast food once a week or as a treat rather than everyday. Parents should also be encouraged to promote more healthful eating among teens by increasing their exposure to community establishments that offer more healthy food choices and by encouraging them to select healthier food choices in places where teens commonly eat. For instance, some fast-food restaurants are now publishing their menus that list the nutrient content of all menu items. With this information, parents and teens can make informed decisions about which menu items have less fat, sodium, and total calories. These lists can be found at participating restaurants or on the World Wide Web.

## PHYSICAL ACTIVITY INTERVENTION

Getting teens to engage in regular physical activity is becoming ever more challenging, with decreased physical education time in schools, insufficient safe areas for after-school outdoor recreation, and competition with indoor, sedentary activities such as television viewing, computing, and video games. AHA recommends that youth participate in at least 60 minutes of moderate to vigorous physical activity every day. For adolescents, AHA states that resistance training (10 to 15 repetitions at moderate intensity) can be combined with aerobic activity in an overall activity program and that television and video game time should be limited.

As shown in Table 1, Epstein et al. (1995) demonstrated that reinforcing a decrease in sedentary behavior resulted in greater weight loss than reinforcing an increase in activity or reinforcing both behaviors—for example, encouraging children to watch less television is more effective than encouraging them to participate in sports or other organized activities. However, in a later study (Epstein, Paluch, Gordy, & Dorn, 2000), increasing physical activity compared to decreasing sedentary behavior showed no significant difference. Schwingshandl, Sudi, Eibl, Wallner, and Brokenstein (1999) showed that adding physical activity to dietary advice resulted in greater mean change in fat-free mass than dietary advice alone.

### Home recommendations

In terms of increasing physical activity, social support from family members and friends is critical. Adolescents and their families should be encouraged to plan regular periods of exercise and engage in shared family activities. The initial goal should be to make exercise a fun, habitual activity (Daniels & Loggie, 1992). For instance, female teens may enjoy exercising to an aerobics videotape or DVD with their mothers or female family members at home. All teens may enjoy playing sports or other recreational activities with family members after school and on weekends. To

decrease sedentary activity, parents and guardians need to be instructed to decrease the amount of television viewing, computer time, and video game playing by teens. Teens could also be asked to assist with active duties and/or chores around the home to keep up caloric expenditure.

### School recommendations

Schools can offer many opportunities for teens to engage in regular activity. Pediatric nurses need to encourage teens to participate fully in any physical education classes and any physical activities offered after school. Reminding teens that even 20 minutes of cardiovascular activity can be beneficial to their health may send a message that they do not have to engage in a very long duration of intense physical activity to achieve health benefits.

### Community recommendations

Parents should be encouraged to investigate community physical activity programs with their teens. Programming in such places as city recreation centers and parks and community YMCAs can provide fun places for teens to engage in physical activity. Parents and teens should also explore their communities for any biking and walking trails, in-line skating, and other recreation areas for fun physical activity alternatives. Even such activities as volunteering with elementary school children's programs will result in a higher activity level than watching television while eating snacks at home.

## BEHAVIORAL LESSONS FROM RESEARCH-BASED OBESITY INTERVENTIONS

Many studies in Table 1 used behavioral strategies to influence obesity outcomes (Duffy & Spence, 1993; Epstein et al., 1994; Epstein, Paluch, Gordy, Saelens et al., 2000; Flodmark et al., 1993; Golan et al., 1998; Israel et al., 1994; Obarzanek et al., 2001; Warschburger et al., 2001). However, the benefits of these strategies resulted in mixed obesity efficacy. There may be some additional benefit to behavior therapy where parents, rather than the child, are given the primary responsibility for behavior change (Golan et al., 1998; Israel et al., 1994). In addition, stress reduction activities promoting relaxation may be as effective as behavioral therapy (Duffy & Spence, 1993; Warschburger et al., 2001). Epstein et al. (1994), Epstein, Paluch, Gordy, Saelens et al. (2000), and Flodmark et al. (1993) tested behavior mastery, problem solving, and family therapy, respectively. However, none of these strategies led to any difference in percentage overweight or BMI. These results suggest proceeding with caution when recommending behavioral strategies to parents of obese teens. Perhaps, the lesson with behavioral strategies is to have parents take responsibility and provide support for dietary and physical activity behavior changes among their teens. Despite the belief among some parents that they no longer have the ability to influence their teens' decisions, parents need to be reminded that they continually serve as role models and can alter the home environment.

## CONCLUSIONS

Despite mixed results regarding what specific strategies are most useful in combating adolescent obesity to influence cardiovascular risk factors, pediatric nurses have "power or leverage" with parents and teens in influencing basic health decisions such as increasing physical activity or decreasing sedentary activity, lowering fat intake, or eating outside of the home less often. Health-care providers are regarded a primary source of health wisdom by most patients. This phenomenon causes patients and their families to at least listen carefully to recommendations for changing cardiovascular risk factors.

In the near future, we may see an epidemic of CVD as increasing numbers of obese, hypertensive, diabetic, and/or hyperlipidemic adolescents reach young adulthood. It is imperative that BP and diabetes screenings be increased among children and adolescents. The ability to detect high BP and insulin levels at an early age will foster urgency for prevention efforts. Moreover, pediatric nurses and other health professionals need to become more aware of strategies and recommendations for those adolescents at risk for CVD and become more involved in public advocacy efforts to address the impending obesity epidemic.

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