

AMERICAN ACADEMY OF PEDIATRICS

POLICY STATEMENT

Organizational Principles to Guide and Define the Child Health Care System and/or Improve the Health of All Children

Committee on School Health

Soft Drinks in Schools

ABSTRACT. This statement is intended to inform pediatricians and other health care professionals, parents, superintendents, and school board members about nutritional concerns regarding soft drink consumption in schools. Potential health problems associated with high intake of sweetened drinks are 1) overweight or obesity attributable to additional calories in the diet; 2) displacement of milk consumption, resulting in calcium deficiency with an attendant risk of osteoporosis and fractures; and 3) dental caries and potential enamel erosion. Contracts with school districts for exclusive soft drink rights encourage consumption directly and indirectly. School officials and parents need to become well informed about the health implications of vended drinks in school before making a decision about student access to them. A clearly defined, district-wide policy that restricts the sale of soft drinks will safeguard against health problems as a result of overconsumption.

BACKGROUND AND INFORMATION

Overweight

Overweight is now the most common medical condition of childhood, with the prevalence having doubled over the past 20 years. Nearly 1 of every 3 children is at risk of overweight (defined as body mass index [BMI] between the 85th and 95th percentiles for age and sex), and 1 of every 6 is overweight (defined as BMI at or above the 95th percentile).¹ Complications of the obesity epidemic include high cholesterol, high blood pressure, type 2 diabetes mellitus, coronary plaque formation, and serious psychosocial implications.²⁻⁶ Annually, obesity-related diseases in adults and children account for more than 300 000 deaths and more than \$100 billion per year in treatment costs.⁷⁻⁹

Soft Drinks and Fruit Drinks

In the United States, children's daily food selections are excessively high in discretionary, or added, fat and sugar.¹⁰⁻¹⁵ This category of fats and sugars accounts for 40% of children's daily energy intake.¹⁰ Soft drink consumers have a higher daily energy intake than nonconsumers at all ages.¹⁶ Sweetened drinks (fruitades, fruit drinks, soft drinks, etc) constitute the primary source of added sugar in the daily diet of children.¹⁷ High-fructose corn syrup, the principle nutrient in sweetened drinks, is not a problem

food when consumed in smaller amounts, but each 12-oz serving of a carbonated, sweetened soft drink contains the equivalent of 10 teaspoons of sugar and 150 kcal. Soft drink consumption increased by 300% in 20 years,¹² and serving sizes have increased from 6.5 oz in the 1950s to 12 oz in the 1960s and 20 oz by the late 1990s. Between 56% and 85% of children in school consume at least 1 soft drink daily, with the highest amounts ingested by adolescent males. Of this group, 20% consume 4 or more servings daily.¹⁶

Each 12-oz sugared soft drink consumed daily has been associated with a 0.18-point increase in a child's BMI and a 60% increase in risk of obesity, associations not found with "diet" (sugar-free) soft drinks.¹⁸ Sugar-free soft drinks constitute only 14% of the adolescent soft drink market.¹⁹ Sweetened drinks are associated with obesity, probably because overconsumption is a particular problem when energy is ingested in liquid form²⁰ and because these drinks represent energy added to, not displacing, other dietary intake.²¹⁻²³ In addition to the caloric load, soft drinks pose a risk of dental caries because of their high sugar content and enamel erosion because of their acidity.²⁴

Calcium

Milk consumption decreases as soft drinks become a favorite choice for children, a transition that occurs between the third and eighth grades.^{12,15} Milk is the principle source of calcium in the typical American diet.¹¹ Dairy products contain substantial amounts of several nutrients, including 72% of calcium, 32% of phosphorus, 26% of riboflavin, 22% of vitamin B₁₂, 19% of protein, and 15% of vitamin A in the US food supply.²⁵ The percent daily value for milk is considered either "good" or "excellent" for 9 essential nutrients depending on age and gender. Intake of protein and micronutrients is decreased in diets low in dairy products.^{19,26} The resulting diminished calcium intake jeopardizes the accrual of maximal peak bone mass at a critical time in life, adolescence.²⁷ Nearly 100% of the calcium in the body resides in bone.²⁷ Nearly 40% of peak bone mass is accumulated during adolescence. Studies suggest that a 5% to 10% deficit in peak bone mass may result in a 50% greater lifetime prevalence of hip fracture,²⁸ a problem certain to worsen if steps are not taken to improve calcium intake among adolescents.²⁹

STATEMENT OF PROBLEM

Soft drinks and fruit drinks are sold in vending machines, in school stores, at school sporting events, and at school fund drives. "Exclusive pouring rights" contracts, in which the school agrees to promote one brand exclusively in exchange for money, are being signed in an increasing number of school districts across the country,³⁰ often with bonus incentives tied to sales.³¹ Although they are a new phenomenon, such contracts already have provided schools with more than \$200 million in unrestricted revenue.

Some superintendents, school board members, and principals claim that the financial gain from soft drink contracts is an unquestioned "win" for students, schools, communities, and taxpayers.^{31,32} Parents and school authorities generally are uninformed about the potential risk to the health of their children that may be associated with the unrestricted consumption of soft drinks. The decision regarding which foods will be sold in schools more often is made by school district business officers alone rather than with input from local health care professionals.

Subsidized school lunch programs are associated with a high intake of dietary protein, complex carbohydrates, dairy products, fruits, and vegetables.¹⁶ The US Department of Agriculture, which oversees the National School Lunch Program, is concerned that foods with high sugar content (especially foods of minimal nutritional value, such as soft drinks) are displacing nutrients within the school lunch program, and there is evidence to support this.²⁶

There are precedents for using optimal nutrition standards to create a model district-wide school nutrition policy,³³ but this is not yet a routine practice in most states. The discussion engendered by the creation of such a policy would be an important first step in establishing an ideal nutritional environment for students.

RECOMMENDATIONS

1. Pediatricians should work to eliminate sweetened drinks in schools. This entails educating school authorities, patients, and patients' parents about the health ramifications of soft drink consumption. Offerings such as real fruit and vegetable juices, water, and low-fat white or flavored milk provide students at all grade levels with healthful alternatives. Pediatricians should emphasize the notion that every school in every district shares a responsibility for the nutritional health of its student body.
2. Pediatricians should advocate for the creation of a school nutrition advisory council comprising parents, community and school officials, food service representatives, physicians, school nurses, dietitians, dentists, and other health care professionals. This group could be one component of a school district's health advisory council. Pediatricians should ensure that the health and nutritional interests of students form the foundation of nutritional policies in schools.

3. School districts should invite public discussion before making any decision to create a vended food or drink contract.
4. If a school district already has a soft drink contract in place, it should be tempered such that it does not promote overconsumption by students.
 - Soft drinks should not be sold as part of or in competition with the school lunch program, as stated in regulations of the US Department of Agriculture.³⁴
 - Vending machines should not be placed within the cafeteria space where lunch is sold. Their location in the school should be chosen by the school district, not the vending company.
 - Vending machines with foods of minimal nutritional value, including soft drinks, should be turned off during lunch hours and ideally during school hours.
 - Vended soft drinks and fruit-flavored drinks should be eliminated in all elementary schools.
 - Incentives based on the amount of soft drinks sold per student should not be included as part of exclusive contracts.
 - Within the contract, the number of machines vending sweetened drinks should be limited. Schools should insist that the alternative beverages listed in recommendation 1 be provided in preference over sweetened drinks in school vending machines.
 - Schools should preferentially vend drinks that are sugar-free or low in sugar to lessen the risk of overweight.
5. Consumption or advertising of sweetened soft drinks within the classroom should be eliminated.

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REFERENCES

1. American Academy of Pediatrics, Committee on Nutrition. Prevention of pediatric overweight and obesity. *Pediatrics*. 2003;112:424–430
2. Freedman DS, Dietz WH, Srinivasan SR, Berenson GS. The relation of overweight to cardiovascular risk factors among children and adolescents: the Bogalusa Heart Study. *Pediatrics*. 1999;103:1175–1182
3. Pinhas-Hamiel O, Dolan LM, Daniels SR, Standiford D, Khoury PR, Zeitler P. Increased incidence of non-insulin-dependent diabetes mellitus among adolescents. *J Pediatr*. 1996;128:608–615
4. Ludwig DS, Ebbeling CB. Type 2 diabetes mellitus in children: primary care and public health considerations. *JAMA*. 2001;286:1427–1430

5. Dietz W. Health consequences of obesity in youth: childhood predictors of adult disease. *Pediatrics*. 1998;101:518–525
6. Davison KK, Birch LL. Weight status, parent reaction, and self-concept in five-year-old girls. *Pediatrics*. 2001;107:46–53
7. Allison DB, Fontaine KR, Manson JE, Stevens J, VanItallie TB. Annual deaths attributable to obesity in the United States. *JAMA*. 1999;282:1530–1538
8. Must A, Spadano J, Coakley EH, Field AE, Colditz G, Dietz WH. The disease burden associated with overweight and obesity. *JAMA*. 1999;282:1523–1529
9. Blumenthal D. Controlling health care expenditures. *N Engl J Med*. 2001;344:766–769
10. Muñoz KA, Krebs-Smith SM, Ballard-Barbash R, Cleveland LE. Food intakes of US children and adolescents compared with recommendations. *Pediatrics*. 1997;100:323–329
11. Subar AF, Krebs-Smith SM, Cook A, Kahle LL. Dietary sources of nutrients among US children, 1989–1991. *Pediatrics*. 1998;102:913–923
12. Calvadini C, Siega-Riz AM, Popkin BM. US adolescent food intake trends from 1965 to 1996. *Arch Dis Child*. 2000;83:18–24
13. Borrud LG, Enns CW, Mickle S. What we eat in America: USDA surveys food consumption changes. *Food Rev*. 1996;19:14–19. Available at: <http://www.ers.usda.gov/publications/foodreview/sep1996/sep1996d.pdf>. Accessed February 12, 2003
14. Borrud LG, Mickle S, Nowverl A, Tippett K. *Eating Out in America: Impact on Food Choices and Nutrient Profiles*. Beltsville, MD: Food Surveys Research Group, US Department of Agriculture; 1998. Available at: <http://www.barc.usda.gov/bhnrc/foodsurvey/Eatout95.html>. Accessed February 12, 2003
15. Lytle LA, Seifert S, Greenstein J, McGovern P. How do children's eating patterns and food choices change over time? Results from a cohort study. *Am J Health Promot*. 2000;14:222–228
16. Gleason P, Sutor C. *Children's Diets in the Mid-1990s: Dietary Intake and Its Relationship with School Meal Participation*. Alexandria, VA: US Department of Agriculture, Food and Nutrition Service, Office of Analysis, Nutrition and Evaluation; 2001. Available at: <http://www.fns.usda.gov/oane/menu/published/cnp/files/childiet.pdf>. Accessed February 12, 2003
17. Guthrie JF, Morton JF. Food sources of added sweeteners in the diets of Americans. *J Am Diet Assoc*. 2000;100:43–51
18. Ludwig DS, Peterson KE, Gortmaker SL. Relation between consumption of sugar-sweetened drinks and childhood obesity: a prospective observational analysis. *Lancet*. 2001;357:505–508
19. Harnack L, Stang J, Story M. Soft drink consumption among US children and adolescents: nutritional consequences. *J Am Diet Assoc*. 1999;99:436–441
20. Mattes RD. Dietary compensation by humans for supplemental energy provided as ethanol or carbohydrates in fluids. *Physiol Behav*. 1996;59:179–187
21. Bellisle F, Rolland-Cachera M-F. How sugar-containing drinks might increase adiposity in children. *Lancet*. 2001;357:490–491
22. Tordoff MG, Alleva AM. Effect of drinking soda sweetened with aspartame or high-fructose corn syrup on food intake and body weight. *Am J Clin Nutr*. 1990;51:963–969
23. De Castro JM, Orozco S. Moderate alcohol intake and spontaneous eating patterns of humans: evidence of unregulated supplementation. *Am J Clin Nutr*. 1990;52:246–253
24. Heller K, Burt BA, Eklund SA. Sugared soda consumption and dental caries in the United States. *J Dent Res*. 2001;80:1949–1953
25. Gerrior S, Bente L. *Nutrient Content of the US Food Supply, 1909–97*. Home Economics Research Report No. 54. Washington, DC: Center for Nutrition Policy and Promotion, US Department of Agriculture; 2001. Available at: <http://www.usda.gov/cnpp/Pubs/Food%20Supply/foodsupplyrpt.pdf>. Accessed February 12, 2003
26. Johnson RK, Panely C, Wang MQ. The association between noon beverage consumption and the diet quality of school-age children. *J Child Nutr Manage*. 1998;22:95–100
27. American Academy of Pediatrics, Committee on Nutrition. Calcium requirements of infants, children, and adolescents. *Pediatrics*. 1999;104:1152–1157
28. Wyshak G. Teenaged girls, carbonated beverage consumption, and bone fractures. *Arch Pediatr Adolesc Med*. 2000;154:610–613
29. NIH Consensus Development Panel on Osteoporosis Prevention, Diagnosis, and Therapy. Osteoporosis: prevention, diagnosis, and therapy. *JAMA*. 2001;285:785–795
30. Henry T. Coca-cola rethinks school contracts. Bottlers asked to fall in line. *USA Today*. March 14, 2001:A01
31. Nestle M. Soft drink “pouring rights”: marketing empty calories to children. *Public Health Rep*. 2000;115:308–319
32. Zorn RL. The great cola wars: how one district profits from the competition for vending machines. *Am Sch Board J*. 1999;186:31–33
33. Stuhldreher WL, Koehler AN, Harrison MK, Deel H. The West Virginia Standards for School Nutrition. *J Child Nutr Manage*. 1998;22:79–86
34. National School Lunch Program Regulations. 7 CFR §210.11 (2002). Competitive food services

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ARE SOFT DRINKS A SCAPEGOAT FOR CHILDHOOD OBESITY?

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In an editorial accompanying the study by Mrdjenovic and Levitsky¹ on the topic of sweetened drinks and childhood nutrition, Schwartz² proposed that Americans “reduce the availability and limit portion sizes of sugar-sweetened drinks sold at school and provided at home.” In the study, 30 children 7 to 13 years of age acted as their own controls, collecting daily diet records and weighing food to estimate intake from a baseline period through 4 to 8 weeks of follow-up. Body mass index was measured regularly. The data showed that not only were those children with the highest intake of sweetened drinks consuming greater daily energy, but also that sweet drinks displaced milk from their diet. The resulting trade-off resulted in lower daily protein, calcium, phosphorus, magnesium, and vitamin A. The authors concluded that excessive sweetened-drink consumption associated with decreased milk intake may be one important risk factor for childhood obesity and nutrient deficiencies.¹ In his editorial, Schwartz² recommended teaching children to drink water for thirst, promoting healthier choices in vending machines in schools and communities, prohibiting advertising of sweetened beverages in schools and daycare centers, and even levying small taxes on soft drinks and snack foods to be used to educate children and fund extra-curricular activities. In light of the accumulating evidence, Schwartz’s recommendations to limit sweetened drinks would seem reasonable. But have we gone too far in making soft drinks the fall guy for obesity?

Some think so. Subsequent letters to the editor, as well as press releases from representatives of the soft drink industry, disagreed with the conclusions of the authors of the study.³⁻⁵ They objected to recommendations from the healthcare community that supported curbing soft drink consumption. The respondents felt that the designation of sweetened drinks as a cause for such a complex, multi-factorial problem as obesity was simplistic. They cited declining physical activity and increasing television and screen time as etiologies with a greater base of research evidence than that for soft drinks. Likewise, frequency of fast food, extreme portion sizes, and other unbalanced patterns of food consumption have had an equal or greater impact than that of soft drinks. They stated that the data on the increase in soft drink consumption are contradictory. Despite several studies based on the USDA’s National Health and Nutrition Examination Survey and the Continuing Food Survey of Food Intakes by Individuals methodologies that showed an increasing trend,⁶⁻¹² not all studies demonstrated this trend.¹³ In their public and private communications, representatives of the soft drink industry cited a study by Park et al¹³ that suggests that carbonated soft drink consumption has not increased, nor has milk consumption fallen, over the past decade, whereas obesity has accelerated. In addition, they state that research has failed to confirm the displacement of milk intake with rising soft drink consumption. Ultimately, they cite evidence that consumption of carbonated soft drinks from vending machines at school is minimal, only 2.5 oz per week, certainly insufficient to account for the obesity crisis.³

Many of their objections are valid. Certainly, soft drinks are not the root cause of obesity. The healthcare community has convinced Americans that there is an obesity epidemic. Now the public wants health professionals to identify the villain. Finding a single culprit would be convenient, but it will not happen with obesity. This disease is wrapped in genetics and culture, behavior and psychology. It is important to recognize that even if soft drink consumption was eliminated through a zealous, latter-day prohibition movement, it is unlikely to eliminate obesity, given the many factors that contribute.¹⁴ However, among those many factors, soft drinks have a prominent place. Although obesity prevention will require many interventions that affect all aspects of children’s lives, curbing the current intake of sugar consumed in the form of sweetened drinks will be one of the most

See related article, p 618.

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important strategies. The objections of the soft drink industry sidestep the intent of the recommendations being made by pediatricians. And in doing so, the industry may miss an opportunity to play a central role in helping to unravel childhood obesity.

IN A CROWDED FIELD, WHY ARE SOFT DRINKS SINGLED OUT?

Far from picking on soft drinks as the sole cause for obesity, the American Academy of Pediatrics (AAP) has issued several policy statements on a broad array of issues surrounding childhood obesity. The AAP Committee on Nutrition statement on "The Prevention of Pediatric Overweight and Obesity" was issued in August 2003, addressing genetics, family dynamics and the home environment, recent societal changes, the decline in physical activity and concomitant rise in television viewing, as well as dietary factors that promote obesity.¹⁴ Previously, the AAP Committee on Nutrition recommended a limitation on juice intake by babies to lessen the risk of overweight.¹⁵ In a clinical report on the prevention and treatment of diabetes type II, the AAP cited the role of the community in helping to prevent the advent of obesity-related diabetes through improved physical activity and nutrition, especially among high-risk populations.¹⁶ The Committee on Sports Medicine called for healthy weight-management practices for children participating in athletics.¹⁷ The Committee on School Health and the Committee on Sports Medicine jointly called on schools to increase opportunities for daily physical activity and recommended several ways to achieve it.¹⁸ The Committee on Public Education urged avoidance of television and media viewing for children under the age of 2 years and urged limiting viewing to 1 to 2 hours for all children above the age of 2 years.¹⁹ It was only in January 2004 that the Committee on School Health (COSH) issued the statement "Soft Drinks in Schools," adding it to the list of statements on obesity.²⁰

Why were soft drinks singled out in the AAP COSH statement? American children over-consume foods that constitute the tip of the USDA Food Guide Pyramid, the section labeled "discretionary fats and sugars," a term that connotes fats and sugars added to the diet by choice, not inherent in the foods themselves.^{9,12,21-23} Currently, American children and adults consume nearly one third of their daily energy from this class of foods; ie, energy-dense, nutrient-poor foods, also termed snack foods.^{24,25} For the US population as a whole, added sweeteners account for 16% of total daily energy.⁹ Soft drinks are the number one source of added sugars in the American diet and account for 33%. When the number two source, fruit drinks, is added, together they account for 43% of the total added sugars.¹² For children, especially teens, the impact of soft drinks is even greater. As a food group, added sugars constitute 18% to 20% of a child's daily energy.⁹ Sweetened soft drinks amount to 40% of all added sugars in a child's diet and with the addition of fruit drinks, more than 50%.⁹ Americans have been warned to moderate their sugar intake.²² A limit of 6% to 10% of daily

calories from the combined added sugars in the diet has been recommended.^{12,26} With many common food products, such as ketchup and spaghetti sauce, containing added sugars, dietary recommendations are easily exceeded. For a child consuming 1300 kcal per day, this represents only 6 teaspoons of added sugars, and for a teenager consuming 2800 kcal per day, 18 teaspoons of sugars, excluding sugars inherent in fruits and dairy products. Such a modest amount can be consumed at a single sitting in the form of a large soft drink at a fast food restaurant. Daily adolescent intake of sweetened soft drinks averages nearly two 12-oz servings per day, or the equivalent of 20 teaspoons of sugar and 300 kcal.^{10,27} This would be less of a problem if soft drink intakes were offset by decreases in energy intake elsewhere in the diet. However, studies suggest that such calories are added to the daily total.^{28,29}

IS THE PROPOSED CONNECTION BETWEEN OVER-CONSUMPTION OF SOFT DRINKS AND OBESITY SUPPORTED BY RESEARCH?

Besides the study by Mrdjenovic and Levitsky already cited,¹ two other longitudinal, randomized studies have been done using late elementary school and middle-school children. Both showed an effect of soft drink consumption on weight.^{30,31} In the first study, Ludwig et al³⁰ followed 548 children 11 to 12 years of age prospectively for 19 months. Soft drink consumption increased 57% as obesity rose 9.3%. When diet, activity, television, and anthropometrics were controlled for, each soft drink consumed daily was shown to increase the child's risk of obesity by 60%. In the second study, James et al³¹ sought to determine whether reducing consumption of carbonated beverages had an impact on weight gain. The authors followed 644 children 7 to 11 years of age for 1 school year. Using a focused intervention program meant to promote alternate drinks, the control group increased 0.2 glasses (50 mL), whereas the treatment group decreased carbonated soft drink intake by 0.6 glasses per day (150 mL). At 12 months, the percent overweight and obese children among controls increased by 7.5% but decreased by 0.2% in the intervention group. Eliminating just a few ounces of sweetened drinks is likely to affect the risk of childhood obesity substantially. Investigators suggest that small alterations in daily energy consumption may have significant implications. Even small amounts of sweetened drinks consumed at home, at school, and in the community may have a cumulative effect. Hill and colleagues³² calculated that altering the energy gap by only 0.42 MJ/day (100 kcal/day)—which, ironically, is the equivalent of one 8-oz serving of sweetened soft drink—would prevent excessive weight gain in most Americans. In a review of sugar consumption in the American diet, Krebs-Smith¹² concluded that even though added sugars are not the sole cause of obesity and that both energy intake and expenditure also are suspects, the fact that large segments of the population are experiencing an energy surplus makes it difficult to justify regular intake of soft drinks because of the additional, nutritionally empty calories.

Soft drink industry representatives cite the National Family Opinion World Group Share of Intake Panel (SIP) study, which they funded, as evidence for their claim that soft drinks are not over-consumed and are rarely consumed in schools, certainly not in amounts that would contribute to obesity.^{3-5,13} When children 1 to 5 years of age in the study were examined as a group, only 3.7 oz of carbonated soft drinks were consumed per child per day, a fall from 5.2 oz in the 1987-88 survey, according to their data. However, even the Park survey data showed that teen females consumed 16 oz per day and teen males 23 oz per day, amounts similar to those reported in other surveys.^{8,10} The SIP survey is a mail marketing survey that utilized 2-week family diaries from 12,000 persons per year to monitor total beverage intakes. The data were weighted quarterly to be representative of the US population, but it was not a randomized sampling. The study group was further biased by self-selection. Instructions were given in writing and not reviewed with participants by trained research assistants using multiple pass methodologies through onsite or phone contact, as was the case for larger, randomized national surveys. Park¹³ cited a single decade of data, eliminating the acceleration of soft drink consumption that occurred in the 1970s and 1980s. Park's frequently cited statistics on consumption of carbonated soft drinks neglects other, faster growing segments of the sweetened drink market.¹³ Park's data on fruit drinks, eg, showed an increase across all age groups and both genders.¹³ Irrespective of the validity of the SIP study, the question for the AAP COSH was whether soft drink contracts in schools promoted further soft drink consumption by students. No study to date has examined the effects on student consumption patterns of introducing a soft drink contract into a school district. But current levels of consumption suggest that students do not need further encouragement.

ARE THERE NUTRITIONAL CONSEQUENCES FROM OVER-CONSUMPTION OF SOFT DRINKS?

Besides excess sugar consumption as a source of unnecessary daily energy, the AAP COSH also considered the corresponding decline in milk consumption as soft drink intake increased and its effect on the daily nutrient profile of children. Milk is a nutrient-dense food. Its elimination from a child's diet is not without consequences. Risk of future osteoporosis and bone fractures because of inadequate daily calcium is only the most prominent clinical issue associated with declining milk consumption. Based on National Health and Nutrition Examination Survey data from 1999-2000, several nutrients have become "problem nutrients" because of consumption rates falling below the daily recommended intakes.³³ Corresponding to this phenomenon, milk intake also has fallen as the intake of sweetened drinks has risen. Several studies have shown that the two are closely connected.^{1,22,34-36} This reciprocal relationship suggests that displacement of milk by sweetened drinks is one of the principle factors that fuels some nutritional deficiencies noted

in children.^{6,37,38} When soft drinks are chosen in place of milk in school lunches, intake of protein, calcium, zinc, vitamins A and C fall, a finding seen in several previous studies^{34,39} and reiterated by Mrdjenovic and Levitsky.¹ In addition, those with the highest soft drink intakes in the diet also have the highest energy intakes.⁴⁰ Guthrie et al⁹ looked at the displacement phenomenon a different way. By examining women with adequate calcium intakes, they were able to show that these women had lower intakes of sweetened soft drinks and greater intakes of milk. Displacement can even be identified in the first 24 months of life. In the Feeding Infants and Toddler Study, Skinner et al⁴¹ found that as fruit juice, fruit drink, and carbonated drinks increased, calcium density in the diet fell. So, rather than being a consolation that fruit drinks represent the second greatest source of vitamin C among children of all ages as Park suggests, this fact is disturbing.¹³ Fortification of a sugared drink is no substitute for fruit consumption.

IS IT THE DRINK OR THE MARKETING THAT IS THE PROBLEM?

When they wrote the policy statement, the members of the AAP COSH were faced with a new marketing strategy aimed at children termed "exclusive soft drink contracts," contracts between representatives of the soft drink industry and school authorities. Fearing that one consequence of these lucrative school contracts was going to be the promotion of even greater over-consumption of sugar, the COSH recommended that pediatricians work with their local school districts to eliminate sweetened drinks from schools, substituting instead water, milk, and fruit and vegetable juices.²⁰ The committee's fears proved well founded. The recent School Health Policies and Programs Study, conducted in 2000, surveyed all 51 state education agencies, 523 school districts, 841 school food service representatives, and 927 schools about current policies. The survey showed that 49.9% of districts had a soft drink contract and that of these, nearly 80% received a specified percentage of the sales receipts. Almost two thirds of the schools were given incentives once sales achieved a specified amount. One third of the schools allowed advertising in their buildings. Of elementary schools, 58% allowed students to purchase beverages from vending machines, of middle schools 83%, and of high schools 93%.⁴² Despite current USDA guidelines to discourage sales of "foods of minimal nutritional value," which includes soft drinks, the survey found that 70% of schools allowed students to purchase them during the lunch period.

The public looks to physicians as their most trusted source for nutrition guidance.^{43,44} With their statement, the AAP COSH urged pediatricians to take an active role in shaping the second most important environment for child development, the schools. Every day 55 million children attend school, offering society an unparalleled opportunity to address their nutrition and fitness in an efficient and cost-effective way.⁴⁵ By strengthening existing programs such as the school breakfast program, the national school lunch program,

classroom nutrition instruction, daily physical fitness instruction, intramural sports, and after-school programs, we can improve the health of the nation's children. Any practices and policies that dilute these programs need to be reconsidered.^{7,45,46} To ensure that the school promotes the health of its students, each school district should draft a nutrition policy with the guidance of parents and health professionals, especially pediatricians, dietitians, and dentists. Vended and a la carte foods, school stores, fund-raisers, school parties, and booster sales at sporting events should all conform to the stated goals of the policy.

WHAT CAN WE CONCLUDE?

Obesity is a multi-factorial problem. Any recommendation that singles out one activity or dietary change can be criticized as "simplistic" and is unlikely to be effective in isolation. Yet that does not mean that factors should be ignored; the cumulative effect of many small changes across a child's environment can be synergistic. This is as true for attempts to create societal change through a public health agency, a professional organization, or a school as it is for personal change, such as that directed from a physician to a patient. It is only by making such changes, one at a time if necessary and more if possible, that we are likely to contain a problem of the magnitude of obesity.

Obesity is America's biggest threat to child health.⁴⁷ One study found that as many as 25% of obese children already showed signs of early glucose intolerance, a precursor to type II diabetes.⁴⁸ Further, it has been estimated that a child who is diagnosed with type II diabetes mellitus at age 10 years will lose between 17 and 26 life-years to the disease, depending on gender and ethnic background.⁴⁹ Not only will the duration of their lives be cut short, but the quality of their lives also will be drastically worsened by chronic disease. The psychological ramifications of early obesity, important in the near-term for young children, may last a lifetime.^{50,51} With the public now aware that obesity-related morbidity and mortality is poised to exceed that from tobacco, pediatricians have a responsibility to develop effective solutions and aggressively advocate for them.

Soft drinks are not tobacco. The majority of Americans drink them. Like other energy-dense, nutrient-poor foods, they may have a place in everyday nutrition, albeit only in moderation and, in the opinion of the AAP COSH, not in schools. To be successful in our efforts to prevent childhood obesity, we need the cooperation of the beverage, restaurant, and vended and snack foods industries. We should not make any one of them the scapegoat for obesity. On the other hand, with obesity assuming the mantle of number one preventable disease in the nation, these industries should expect pediatricians and parents to hold them accountable for marketing practices that worsen an already deleterious health situation for children.

REFERENCES

1. Mrdjenovic G, Levitsky DA. Nutritional and energetic consequences of sweetened drink consumption in 6- to 13-year-old children. *J Pediatr* 2003; 142:604-10.
2. Schwartz RP. Soft drinks taste good, but the calories count. *J Pediatr* 2003;142:599-601.
3. Sutherland LA. Soft drinks and obesity. *J Pediatr* 2004;144:554-7.
4. Ginevan ME. Soft drinks and obesity. *J Pediatr* 2004;144:555-6.
5. Allport JH. Soft drinks and obesity. *J Pediatr* 2004;144:554-5.
6. Ballew C, Kuester S, Gillespie C. Beverage choices affect adequacy of children's nutrient intakes. *Arch Pediatr Adolesc Med* 2000;154:1148-52.
7. French SA, Story M, Fulkerson JA, Gerlach AF. Food environment in secondary schools: a la carte, vending machines, and food policies and practices. *Am J Public Health* 2003;93:1161-7.
8. French SA, Lin BH, Guthrie JF. National trends in soft drink consumption among children and adolescents age 6 to 17 years: prevalence, amounts, and sources, 1977/1978 to 1994/1998. *J Am Diet Assoc* 2003;103:1326-31.
9. Guthrie JF, Morton JF. Food sources of added sweeteners in the diets of Americans. *J Am Diet Assoc* 2000;100:43-51, quiz.
10. Harnack L, Stang J, Story M. Soft drink consumption among US children and adolescents: nutritional consequences. *J Am Diet Assoc* 1999;99:436-41.
11. Borrud L, Enns W, Mickle S. What we eat in America: USDA surveys food consumption changes. *Food Rev* 1996;Sept-Oct:14-9.
12. Krebs-Smith SM. Choose beverages and foods to moderate your intake of sugars: measurement requires quantification. *J Nutr* 2001;131:527S-35S.
13. Park YK, Meier ER, Bianchi P, Song WO. Trends in children's consumption of beverages: 1987 to 1998. *Fam Econ Nutr Rev* 2003;14:69-79.
14. American Academy of Pediatrics, Committee on Nutrition. Prevention of pediatric overweight and obesity. *Pediatrics* 2003;112:424-30.
15. American Academy of Pediatrics. The use and misuse of fruit juice in pediatrics. *Pediatrics* 2001;107:1210-3.
16. Gahagan S, Silverstein J. Prevention and treatment of type 2 diabetes mellitus in children, with special emphasis on American Indian and Alaska Native children. American Academy of Pediatrics Committee on Native American Child Health. *Pediatrics* 2003;112:e328-47.
17. American Academy of Pediatrics. Committee on Sports Medicine and Fitness. Promotion of healthy weight-control practices in young athletes. *Pediatrics* 1996;97:752-3.
18. American Academy of Pediatrics. Physical fitness and activity in schools. *Pediatrics* 2000;105:1156-7.
19. American Academy of Pediatrics. Children, adolescents, and television. *Pediatrics* 2001;107:423-6.
20. American Academy of Pediatrics, Committee on School Health. Soft drinks in schools. *Pediatrics* 2004;113:152-4.
21. Kantor LS. A dietary assessment of the US food supply: comparing per capita food consumption with food pyramid serving recommendations. Agricultural Economic Report 772. 1998. Washington, DC: US Dept of Agriculture.
22. Johnson RK, Frary C. Choose beverages and foods to moderate your intake of sugars: the 2000 dietary guidelines for Americans—what's all the fuss about? *J Nutr* 2001;131:2766S-71S.
23. Morton JF, Guthrie JF. Changes in children's total fat intakes and their food group sources of fat, 1989-91 versus 1994-95: implications for diet quality. *Fam Econ Nutr Rev* 1998;11:44-57.
24. Kant AK. Reported consumption of low-nutrient-density foods by American children and adolescents: nutritional and health correlates, NHANES III, 1988 to 1994. *Arch Pediatr Adolesc Med* 2003;157:789-96.
25. Brady LM, Lindquist CH, Herd SL, Goran MI. Comparison of children's dietary intake patterns with US dietary guidelines. *Br J Nutr* 2000; 84:361-7.
26. Diet, nutrition and the prevention of chronic diseases. World Health Organ Tech Rep Ser 2003;916:i-149, backcover.
27. Gleason P, Sutor, C. Children's diets in the mid-1990s: dietary intake and its relationship with school meal participation. Available online at: <http://ww2.fns.usda.gov/oane/menu/published/cnp/files/childdiet/pdf>. 2001. Alexandria, VA: US Dept of Agriculture. Accessed June 2004.
28. Mattes RD. Dietary compensation by humans for supplemental energy provided as ethanol or carbohydrate in fluids. *Physiol Behav* 1996;59:179-87.
29. Bellisle F, Rolland-Cachera MF. How sugar-containing drinks might increase adiposity in children. *Lancet* 2001;357:490-1.

30. Ludwig DS, Peterson KE, Gortmaker SL. Relation between consumption of sugar-sweetened drinks and childhood obesity: a prospective, observational analysis. *Lancet* 2001;357:505-8.
31. James J, Thomas P, Cavan D, Kerr D. Preventing childhood obesity by reducing consumption of carbonated drinks: cluster randomised controlled trial. *BMJ* 2004;328:1237-41.
32. Hill JO, Wyatt HR, Reed GW, Peters JC. Obesity and the environment: where do we go from here? *Science* 2003;299:853-5.
33. Institute of Medicine. *Dietary Reference Intakes. Dietary Reference Intakes for Calcium, Phosphorus, Magnesium, Vitamin D, and Fluoride*. Washington, DC: National Academy Press; 1997; 21-37.
34. Johnson R, Panely C, Wang MQ. The association between noon beverage consumption and the diet quality of school-age children. *J Child Nutr Management* 1998;22:95-100.
35. Cavadini C, Siega-Riz AM, Popkin BM. US adolescent food intake trends from 1965 to 1996. *Arch Dis Child* 2000;83:18-24.
36. Lytle LA, Seifert S, Greenstein J, McGovern P. How do children's eating patterns and food choices change over time? Results from a cohort study. *Am J Health Promot* 2000;14:222-8.
37. Rampersaud GC, Bailey LB, Kauwell GP. National survey beverage consumption data for children and adolescents indicate the need to encourage a shift toward more nutritive beverages. *J Am Diet Assoc* 2003; 103:97-100.
38. Skinner JD, Carruth BR. A longitudinal study of children's juice intake and growth: the juice controversy revisited. *J Am Diet Assoc* 2001;101: 432-7.
39. Frary CD, Johnson RK, Wang MQ. Children and adolescents' choices of foods and beverages high in added sugars are associated with intakes of key nutrients and food groups. *J Adolesc Health* 2004;34:56-63.
40. Forshee RA, Storey ML. Total beverage consumption and beverage choices among children and adolescents. *Int J Food Sci Nutr* 2003;54: 297-307.
41. Skinner JD, Ziegler P, Ponza M. Transitions in infants' and toddlers' beverage patterns. *J Am Diet Assoc* 2004;104:S45-50.
42. Wechsler H, Brener ND, Kuester S, Miller C. Food service and foods and beverages available at school: results from the School Health Policies and Programs Study 2000. *J Sch Health* 2001;71:313-24.
43. Kreuter MW, Chheda SG, Bull FC. How does physician advice influence patient behavior? Evidence for a priming effect. *Arch Fam Med* 2000;9:426-33.
44. van Dillen SM, Hiddink GJ, Koelen MA, de Graaf C, van Woerkum CM. Understanding nutrition communication between health professionals and consumers: development of a model for nutrition awareness based on qualitative consumer research. *Am J Clin Nutr* 2003;77:1065S-72S.
45. Foods sold in competition with USDA School Meal Programs: a report to Congress. Alexandria, VA: US Department of Health, Food and Nutrition Service; 2001.
46. Cullen KW, Zakeri I. Fruits, vegetables, milk, and sweetened beverages consumption and access to a la carte/snack bar meals at school. *Am J Public Health* 2004;94:463-7.
47. The Surgeon General's call to action to prevent and decrease overweight and obesity. Alexandria, VA: US Department of Health and Human Services, Public Health Service, Office of the Surgeon General; 2001.
48. Sinha R, Fisch G, Teague B, Tamborlane WV, Banyas B, Allen K, et al. Prevalence of impaired glucose tolerance among children and adolescents with marked obesity. *N Engl J Med* 2002;346:802-10.
49. Narayan KM, Boyle JP, Thompson TJ, Sorensen SW, Williamson DF. Lifetime risk for diabetes mellitus in the United States. *JAMA* 2003;290: 1884-90.
50. Sargent JD, Blanchflower DG. Obesity and stature in adolescence and earnings in young adulthood: analysis of a British birth cohort. *Arch Pediatr Adolesc Med* 1994;148:681-7.
51. Park J. Adolescent self-concept and health into adulthood. *Health Rep* 2003;14(suppl):41-52.

