
Soft Drink Availability, Contracts, and Revenues in American Secondary Schools

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Background: Soft drinks have been widely available in the nation's schools for some years, but recently, in response to rising concern about the epidemic of obesity among youth, concerns have been raised as to whether they should be available, and if so, under what circumstances. This paper looks at how widespread soft drink availability is at present in schools, as well as the availability of other classes of beverages. Because overweight occurs disproportionately among minorities and those of lower socioeconomic status (SES), this paper also seeks to determine to what extent environmental conditions differ for these students. Differences between middle and high schools are also examined.

Methods: Data for 2004 and 2005 were used from two ongoing United States national surveys: the Youth, Education, and Society (YES) study of school administrators (N=345), and the Monitoring the Future (MTF) study of secondary school students in 8th, 10th, and 12th grades surveyed in those same schools (N=37,543). Data were gathered in YES on the availability of various beverages in schools from vending machines and other venues, as well as about the presence and nature of pouring rights contracts with soft drink bottlers. Data were analyzed in 2006.

Results: The vast majority of high school students today have soft drinks available to them in the school environment both through vending machines (88%) and in the cafeteria at lunch (59%), with middle schools providing somewhat less access. Diet soft drinks are less available, particularly at lunch. Most students (67% in middle and 83% in high school) are in schools that have a contract with a bottler. Revenues to schools generated by soft drink sales are quite modest. Hispanics are most likely to have soft drinks available throughout the school day. The SES of the students correlates negatively with whether the school allows advertising and promotion of soft drinks.

Conclusions: Current school practices regarding soft drink availability, advertising, and sales would seem likely to be contributing to the extent of overweight among American young people, and to some extent to the higher risk faced by Hispanic and lower SES youth.

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Introduction

Increasingly, the appropriateness of the beverage and food industries' commercial presence in schools is being questioned and scrutinized, due largely to concern over the obesity epidemic affecting American youth¹ and the potential contribution of soft drink consumption by students in schools.^{2–10} Results of a recent meta-analysis of studies that have examined the effects of soft drink consumption on children's health provide further evidence of the health-damaging effects of these products.¹¹ The beverage and food industries' commercial presence commonly includes the sale of beverage and food items, advertisements in school classrooms and gyms

and during school events, training of teachers, and, in some schools, having access to the student population to conduct market research.^{12–14} While the beverage industry does not publish the amount of beverage sales to schools, some have estimated it to be less than 1% of their annual sales.¹⁵ Yet, because annual sales in the United States are currently about \$70 billion,¹⁶ that amount is not a negligible sum.

In this school–corporate “partnership,” schools are able to generate revenue to help offset some of the budget shortfalls that they have experienced in recent years; some argue that the beverage and food industry takes advantage of schools where resources are most scarce,¹⁷ and such schools are more likely to have students at high risk for obesity. Even the American Beverage Association has acknowledged, by implication, that it may play a role in encouraging unhealthful behavior by voluntarily withdrawing soft drink sales from elementary schools, and more recently by with-

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drawing soft drink sales during the school day from middle schools.¹⁸ They argue that high school students are more able to make their own decisions about what to drink and eat. Subsequently, in May of 2006, the Alliance for a Healthier Generation, sponsored by the Clinton Foundation and the American Heart Association, announced an agreement with the American Beverage Association, Coca-Cola, Pepsico, and Cadbury Schweppes, in which the industry agreed to implement a number of changes in the beverage offerings in American schools. A key provision of that agreement was a set of guidelines capping the number of calories in beverages in schools at 100 calories per container, “except for certain milks and juices whose nutritional value warrant the high number of calories . . .”¹⁹ Under the terms of the agreement, the industry “will work to spread these standards to 75% of the nation’s schools prior to the beginning of the 2008–2009 school year . . . and will strive to fully implement these guidelines prior to the beginning of the 2009–2010 school year.”¹⁹

The guidelines are most restrictive for elementary schools (only water, 8-oz. calorie-capped servings of certain juices without added sweeteners, and lowfat milk may be sold); followed by middle schools (the same as elementary schools, except that the allowable serving size is 10 oz.); and then high schools (the same as middle schools, except that other low-calorie and no-calorie drinks, including diet soft drinks, may be sold, plus sports drinks and light juices in up-to-12-oz. containers, as long as they contain no more than 100 calories). Interestingly, much of the legislation introduced in various states regarding the availability of beverages in schools also tends to be more restrictive with elementary schools, followed by middle and high schools.²⁰

The Alliance for a Healthier Generation clearly has been working to reduce caloric consumption by removing from the beverage offerings those that are high in calories and that have “empty calories” with little nutritional value. Soft drinks are high on both dimensions, as are fruit juice drinks that are less than 100% fruit juice, and sports drinks. Limiting the fat content of milk, as well as the calories, is also a goal. These goals are consistent with ones recommended by the Beverage Guidance Panel in 2006, which urged movement toward the consumption of beverages with no or few calories.²¹

Clearly, this agreement has the potential to alter the landscape under study here, but whether it in fact will do so remains open to question. Many school districts and individual schools are in the middle of multiyear contracts with bottlers of the various soft drink brands—contracts that may continue to be enforced by the bottlers. Also, some districts and schools may not wish to relinquish the funds derived from beverage contracts. Thus, this paper provides a useful picture of

the relevant conditions in American middle schools and high schools immediately prior to when the agreement was reached, and should therefore provide a good “before” measure against which progress toward accomplishing the goals of the agreement can be gauged. Because the Youth, Education, and Society (YES) study is designed as an ongoing series of national surveys, it should be able to provide comparable “after” measures as well.

To acquire a greater understanding of the degree of penetration that the beverage industry has had in schools, this study examines the percent of students whose schools have contracts with soft drink bottlers, the amount of revenue generated by these contracts, the types of related advertising and promotion to which students are exposed in schools, and the extent to which students are given access to various types of beverages. Because black and Hispanic students, as well as low-socioeconomic status (SES) students, have higher observed rates of overweight than majority white students or higher-SES students, respectively,^{1,22–25} a reasonable question is whether the nature of the food and beverage environment offered to minority students and/or low-SES students differs in ways that may help to explain some of those differences. Therefore, the extent to which these conditions vary by the students’ grade level, racial/ethnic background, and SES are examined here.

The current study extends the work done by the Centers for Disease Control and Prevention (CDC) School Health Policies and Programs Study (SHPPS) in several ways.¹⁴ It is conducted annually, rather than every 6 years; can link school information gathered on schools to student outcome measures; and focuses on the percent of students having various environmental characteristics rather than the number of schools having them.

Methods

Samples and Survey Methods

Nationally representative samples of schools and students from the 2004 and 2005 YES study, funded by the Robert Wood Johnson Foundation (RWJF), and the Monitoring the Future (MTF) study, funded by the National Institute of Drug Abuse (NIDA) were used. Data were analyzed in 2006.

Both studies were conducted at the University of Michigan’s Institute for Social Research. The schools selected to be surveyed in YES came from the national samples of schools in grades 8, 10, and 12, cycling out of the MTF student surveys conducted in 2004 and 2005. At each grade, an independent sample of schools, drawn with probability proportionate to school size, originally had been selected to participate for 2 years in the MTF study. The design and methods for the MTF project are summarized briefly; a detailed description is available elsewhere.²⁶ At each of the three grade levels, a multistage sampling design was used to obtain nationally

representative samples of students in both public and private schools from the 48 contiguous states. Data have been collected annually from 12th graders since 1975 and from 8th and 10th graders since 1991. The stratified random sampling procedure involved three stages²⁷: (1) geographic regions were selected; (2) schools were selected within region with probability proportional to the estimated number of students in the target grade (approximately 420 schools each year total); and (3) students were selected within schools, usually by means of randomly selecting whole classrooms (between 42,000 and 49,000 students per year across grades). Sample weights were assigned to each student to take into account variations in selection probabilities. The half-samples being recruited for the first time each year, as well as the half-samples participating in their second year were nationally representative replicate samples.

School administrator data for the current study came from questionnaires in 345 schools studied in the 2004 and 2005 half-samples participating in their second year of MTF data collection, in which random samples of over 37,000 students also were surveyed. As a part of the MTF study, students in the same schools completed a self-administered, machine-readable questionnaire during a normal class period. School administrator response rates averaged 85%, while student response rates averaged 90%, 86%, and 84% for grades 8, 10, and 12, respectively. Absence on the day of data collection was the primary reason that students were missed; it is estimated that less than 1% of students refused to complete the questionnaire. Combined across grades, the student sample is 69% white, 11% black, 9% Hispanic, and 11% from other racial/ethnic backgrounds.

Measures

School administrator data. School administrators completed a self-administered questionnaire containing questions related to student levels of physical activity, school and district policies concerning contracts with soft drink bottlers, and detailed questions about the types of foods and beverages available to students. For one section of the questionnaire, it was recommended that a person other than the school administrator (in particular, the food services manager) answer if they would be more likely to know the relevant information. Over 85% of respondents were school administrators (mostly school principals or vice-principals), followed by teachers and other school personnel.

One section of the questionnaire dealt with the types of foods and beverages made available to students in vending machines (including when in the day they were available), in à la carte offerings at lunch, and in the standard school lunch menu. This section was answered by the food service manager or other food worker in 73% of the schools. In the remaining schools, the principal usually answered these questions.

Respondents were also asked whether their schools had contracts with specific soft drink bottlers. Those who responded affirmatively were then asked five questions intended to provide details about the types of contracts: whether the contract was with the individual school or the school district, whether the school received a specified percentage of sales, whether the school received incentives with increased sales, whether the soft drink was advertised on school grounds or during school events, and approximately

how much revenue was generated for the school each year through soft drink sales.

Respondents were then asked the source of the revenue sales—(1) vending machines, (2) school/student stores, (3) snack bars/carts, or (4) à la carte sales in the cafeteria. The type of advertising and promotion allowed in the school was also measured. Student access to various beverages through vending machines was determined using a set of questions about whether each class of beverage was available to students from vending machines and, if so, at what times of day. For each beverage class the respondent indicated as being offered in vending machines, he or she was asked to indicate when it was available. Finally, respondents were asked if, during a typical week, the same beverages listed earlier were offered at lunch to students as à la carte selections in the cafeteria (not necessarily from vending machines).

Student data. Student data included self-reported grade, gender, racial/ethnic background, and SES (as indicated by parental education). Students were not asked directly about their beverage consumption. For racial/ethnic background, students were asked "How do you describe yourself?", with students coded as white, black, Hispanic, or other background. (Other racial/ethnic groups provided too few cases to yield reliable estimates.) Parent education (a proxy for SES), an average of father's and mother's educational attainment (with one missing data case permitted), was coded as follows: 1=completed grade school or less, 2=some high school, 3=completed high school, 4=some college, 5=completed college, 6=graduate or professional school after college. Grade refers to the grade in which the student was enrolled. Data for 10th and 12th graders were combined to increase the sample size of high schools available for analyses.

Data Analysis

One major analytic objective was to determine how different the beverage environment was for students (1) in middle schools versus high schools, (2) from different racial/ethnic groups, and (3) of different socioeconomic levels (indicated by level of parental education). Therefore, separate estimates of percents and median values were made for these subgroups at the middle and high school levels. In calculating the overall national averages for students at each grade level, the data from each school administrator were weighted by the (weighted) number of students that were surveyed in that school as part of the national MTF sample of students in the relevant grade. This assures that large schools are weighted more heavily than small schools, because they serve a larger number of students. Separate estimates were made at the middle school and high school levels for subgroups based on race/ethnicity and SES. In the calculation of a value for a subgroup, for example, the proportion of black students in schools that have a beverage contract, each school administrator's answer was weighted according to the (weighted) number of black students who were surveyed in that school as part of the national MTF sample. Thus, schools that serve a larger number and proportion of black students would weigh in more heavily in the overall national estimate for blacks than other schools.

Chi-square and Wilcoxon rank-sum test statistics were used to determine whether the percents and medians vary accord-

Table 1. Food and beverage contracts in grade 8 and in grades 10 and 12 combined: 2004–2005

	8th	10th & 12th	Sig. 8th vs 10th & 12th comparison
Approx N Schools	126	219	
Approx N Students	13,367	24,176	
A. Soft drink contracts			
Percentage of students in schools or districts that have a contract with a soft drink bottler	67.0	83.0	**
Percentage of students by source of contract:			
School only	22.8	36.1	*
District only	27.7	25.3	
Both, school & district	16.5	21.6	
B. Overall beverages and food revenues			
Percentage of students in schools or districts that receive a specified % of the soft drink receipts	57.1	74.2	**
Percentage of students in schools or districts that receive incentives once total soft drink receipts exceed a specified amount	24.5	31.3	
Median revenue schools get from soft drink sales per year (\$)	500.0	6000.0	***
Median revenue schools get per student from soft drink sales per year (\$)	0.70	6.48	**
Percentage of students in schools that receive revenue from foods and/or beverages sold in:			
Vending machines	75.7	95.4	***
School/student store	24.6	33.0	
Snack bars/carts	18.2	24.5	
À la carte sales in cafeteria	32.9	33.9	
Percentage of students in school districts that receive revenue from foods and/or beverages sold in the following locations: ^a			
Vending machines	41.5	42.9	
School/student store	3.7	7.9	
Snack bars/carts	11.5	16.2	
À la carte sales in cafeteria	49.2	54.4	
C. Advertising/promotion in schools			
Percent of students in schools that allow the soft drink bottler to advertise in the school building, school grounds, or school buses	7.3	21.0	***
Percent of students in schools that advertise or promote meals from fast-food restaurants or soft drinks with:			
Posters or other materials on display in the school	2.2	7.4	*
Ads on textbook covers or school food service menus	5.0	3.8	
Coupons for free or reduced-price products	11.1	17.1	
Sponsorship of school events	14.9	23.4	
D. Availability of beverages			
Percent of students in schools that offer the following beverages in vending machines throughout the day: ^b			
Diet soft drinks ^c	6.1	21.8	***
Bottled water	17.7	47.1	***
1% or skim milk	2.7	12.3	**
100% fruit or vegetable juice	5.5	25.1	***
Regular soft drinks ^d	9.5	22.9	**
Whole or 2% milk, or flavored milk	4.4	15.8	**
Percent of students in schools that offer the following beverages à la carte in the cafeteria at lunch:			
Diet soft drinks ^c	8.0	23.7	***
1% or skim milk	71.9	79.3	
100% fruit or vegetable juice	68.6	78.2	**
Regular soft drinks ^d	48.1	59.4	
Whole or 2% milk, or flavored milk	78.3	82.8	
E. Attempts to promote healthier habits			
Mean score on serious/real effort the school has made to promote healthy eating and drinking habits among students ^e	3.1	2.9	
Mean score on serious/real effort the school district has made to promote healthy eating and drinking habits among students ^e	3.2	2.9	**

(continued on next page)

Table 1. (continued)

	8th	10th & 12th	Sig. 8th vs 10th & 12th comparison
Percentage of students in schools or districts that have significant activities underway to promote healthier eating and drinking practices among students	48.5	46.3	

Note: Between-grade differences are indicated with asterisks in the column “Sig. 8th vs 10th & 12th comparison.”

^aData are based on 2005 data only because this question differs considerably from the one asked in 2004.

^bThe number of occasions that items can be available per day ranges from none to four times (all day).

^cIncludes Diet Coca-Cola, Diet Pepsi-Cola, or Diet Dr. Pepper (among others).

^dIncludes Coca-Cola, Pepsi-Cola, or Dr. Pepper (among others), sports drinks that are not 100% juice.

^e1=Not at all, 2=To a little extent, 3=To some extent, 4=To a great extent, 5=To a very great extent.

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

ing to the students’ grade levels (middle versus high) and racial/ethnic backgrounds (white versus black, white versus Hispanic, black versus Hispanic). Multiple regression analysis was used to test the linear association between each of the dependent variables and the five-category measure of parents’ education. All analyses included weighted data and took into account design effects in calculating variance estimates using Stata version 8.0.

Results

Because of the considerable amount of information reported in the following tables, and because of their parallel structure, the results in each table are divided into the same five sections: (A) Soft drink contracts, (B) Overall beverages and food revenues, (C) Advertising/promotion in schools, (D) Availability of beverages, and (E) Attempts to improve school environment.

Differences Between Grade Levels

Soft drink contracts. Table 1, Section A shows that the proportion of students in schools or districts that have a contract with a soft drink bottler is significantly higher in high schools (83%) than middle schools (67%) ($p < 0.01$). High schools also are somewhat more likely to have a contract directly between the school and the bottler (36% of the students are in such schools) than are middle schools (23%) ($p < 0.05$), probably reflecting their larger size on average.

Overall beverage and food revenues. About three quarters of all high school students (74%) attend schools that receive revenues under a pouring rights contract, significantly higher than the proportion of middle school students (57%) (Table 1B). Between one quarter and one third of students attend schools and/or districts that receive incentives once total soft drink receipts exceed a specified amount, with no significant difference by school level. There is a large and significant difference in the median revenue schools get from soft drink sales per year, with high schools receiving a median revenue annually of \$6000 and middle schools \$500 ($p < 0.001$) (Table 1B). The

corresponding interquartile ranges (data not shown in the table) for high schools is \$14,000 (from \$1000 at the 25th percentile to \$15,000 at the 75th percentile) and for middle schools it is \$4500 (from \$0 to \$4500, respectively). (The round numbers result because principals tend to answer this question in round numbers and a median value is reported here, not a mean.) On a per-student basis, a considerable difference exists (\$6.48 median in high schools versus \$0.70 median in middle schools) ($p < 0.01$).

Exclusive pouring rights contracts are not the only means by which schools might receive revenue from beverage sales; they may also receive revenues from the foods sold in vending machines. The great majority of secondary school students are in schools that receive revenues from foods *or* beverages sold in vending machines, 76% of those in middle school and 95% of those in high school ($p < 0.001$). Many fewer students, about one third, are in middle schools or high schools that receive revenues from à la carte sales in the cafeteria, less from the school/student store (25% and

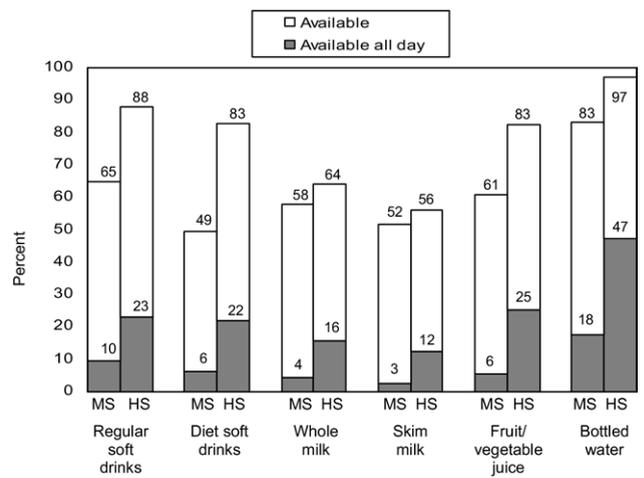


Figure 1. Percent of students who attend schools with different types of beverages available in vending machines at any time, and throughout the day, by grade level.

Note: Percentages are rounded off.

HS, high school; MS, middle school.

Table 2. Percentage of students exposed to various beverages by time of day these beverages are made available to students in schools: 2004–2005

Beverage availability	Regular soft drinks	Diet soft drinks	Whole milk	Skim milk	Fruit and/or vegetable juice	Bottled water
Percentage of students in schools that offer various beverages in vending machines						
8th	64.9	49.4	57.7	51.7	60.8	83.0
10th & 12th	87.9***	82.9***	64.0	56.2	82.6***	97.2***
Percentage of students in schools that offer these beverages in vending machines at these times:						
Before classes begin in the morning						
8th	25.3	18.0	30.7	24.1	28.2	40.8
10th & 12th	59.6***	56.8***	42.3	36.4	61.2***	79.1***
During school hours when meals are not being served						
8th	15.7	10.4	6.7	4.1	9.5	25.8
10th & 12th	42.4***	40.9***	21.7***	16.5**	38.3***	63.6***
During school lunch periods						
8th	30.8	16.4	55.7	50.0	54.3	64.5
10th & 12th	47.9**	45.6***	61.1	54.7	69.7**	82.5**
After school						
8th	55.2	45.1	15.3	9.3	19.8	57.3
10th & 12th	76.4***	72.6***	23.8*	18.4**	47.7***	77.4***

Asterisks indicate significant differences by grade level: * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

33%, respectively), or snack bars/carts (18% and 25%), with none of these differences between middle and high schools being significant (Table 1B). The school district may also share in the revenues; about half of secondary school students are in districts that make money on à la carte sales in the cafeteria (49% and 54%) and somewhat fewer (42% and 43%) are in districts that make money from vending machines. Thus, the primary between-grade differences are whether vending machine revenues go to the school and how large those revenues are.

Advertising/promotion in schools. A significantly higher percentage of high school students (21%) than middle school students (7%) attend schools that allow the soft drink bottler to advertise in the school building, school grounds, or school buses, although even the great majority of high schools do not allow such advertising (Table 1C). Of course, a soft drink vending machine is itself usually a highly visible ad.

School administrators were asked whether soft drinks or meals from fast-food restaurants are advertised or promoted by several means. The majority of students are not exposed to most of them. Sponsorship of school events is the most common (23% of high school students and 15% of middle school students; difference not significant) (Table 1C). Advertising through other means (coupons, posters, or ads on textbook covers) reaches only a small minority of students.

Availability of beverages. The great majority of secondary school students attend schools that have soft drinks

sold in vending machines—65% of middle school students and 88% of high school students ($p < 0.001$) (Figure 1). However, relatively few schools have completely unrestricted access throughout the day to regular soft drinks in vending machines—only 10% of middle school students and 23% of high school students ($p < 0.01$) are in schools that do (Table 1D). The corresponding numbers for diet soft drinks are similar (6% and 22%, respectively), likely because both classes of soft drink are located in the same vending machines. Bottled water, on the other hand, is accessible throughout the day through vending machines to only 18% of middle school students but to about half of high school students (47%) ($p < 0.001$). All of the beverage classes are significantly less available throughout the day to middle school students compared to high school students, including 1% or skim milk (3% vs 12%, respectively), whole or 2% milk or flavored milk (4% vs 16%), and 100% fruit or vegetable juice (6% vs 25%).

As shown in Table 1D, at lunchtime, when many students make beverage choices, the majority of secondary school students have access to soft drinks in the à la carte offerings in the cafeteria (48% in middle school and 59% in high school), as well as to whole or 2% milk or flavored milk (78% and 83%). Of the various beverages, the lowest availability measured was for diet soft drinks, with middle schools having significantly less access (8% and 24%, $p < 0.001$). Modestly higher percentages are observed in high schools for all these classes of beverages, although only fruit and vegetable juices and diet soft drinks reach statistical

significance. (No question was included on the availability of bottled water in the cafeteria.)

Table 2 shows the percentages of students who are in schools offering beverages through vending machines, and more detail on when during the day the different beverages are available. About two thirds (65%) of middle school students attend schools that have vending machines that dispense regular soft drinks versus 88% of high school students ($p < 0.001$). Significant proportions attend schools that dispense diet soft drinks (49% and 83%, $p < 0.001$). Bottled water is the most widely available beverage from vending machines (83% vs 97% of students have access, $p < 0.001$) and 100% fruit or vegetable juice is also widely available (61% vs 83%, $p < 0.001$). Whole milk (58% vs 64%) and skim milk (52% vs 56%) are slightly less available (differences by grade not significant). All beverages have lower reported availability in middle schools than in high schools.

Only a minority of students have access to each of these beverages during school hours when meals are not being served (with the one exception of bottled water in high schools, to which nearly two thirds (64%) of students have access) (Table 2). Among high school students, 42% have access to soft drinks in vending machines during this time, and 41% to diet soft drinks, versus only 16% and 10% of middle school students, respectively. During the school day, when meals are not being served, is the period of lowest availability for soft drinks, bottled water, and fruit and vegetable juices. The period of greatest accessibility to soft drinks (55% and 76%) and diet soft drinks (45% and 73%) is after school, again with significantly higher proportions of high school students having access to all beverages. Figure 1 depicts the percentage of students who attend schools with the various beverages available in vending machines at least some time and throughout the day, by grade level.

Attempts to promote healthier habits. Administrators were asked to judge the extent to which the school, and separately the district, had made a serious/real effort to promote healthy eating and drinking habits among students. The average answer for both the school and the district is “to some extent”—the midpoint on the scale (Table 1E). Middle school principals gave a higher rating than high school principals ($p < 0.01$ for the district). About half (49% and 46%) of students are in schools or districts that have significant activities currently underway “to promote healthier eating and drinking practices among students.”

Racial/Ethnic Differences

Table 3 presents the findings separately for students in the four racial/ethnic subgroups distinguished in this study: whites, blacks, Hispanics, and other racial/ethnic

groups. (Pair-wise comparisons of differences did not include the Other category.)

Soft drink contracts. There is no significant difference by race/ethnicity in the percent of youth whose schools or districts have a contract with a soft drink bottler at either the middle school or high school levels (Table 3A).

Overall beverage and food revenues. There are no significant racial/ethnic differences in the percentage of students who are in schools or districts that receive incentives once total soft drink receipts exceed a specified amount (threshold incentives) (Table 3B). However, the estimated median revenue to the school differs considerably among the three groups. Middle schools in which black students are enrolled have a median revenue from soft drink sales estimated at zero, whereas schools in which Hispanics are enrolled have \$200 and for whites \$1000 (Table 3B). (The black-white difference is significant.) Estimated median revenue on a per-student basis is significantly higher for whites than blacks in both middle and high schools. High schools attended by Hispanic students actually show the highest per-student revenue, but the differences are not significant.

Lower proportions of Hispanic students are in schools and school districts that receive revenues on sales of foods and beverages sold à la carte in the cafeteria. The differences are significant at the district level in both middle schools and high schools and at the school level in high schools. However, Hispanics in high school are significantly more likely than whites to be in school districts that receive revenues from food and beverages sold from snack bars or carts (30% vs. 12%) (Table 3B).

Advertising/promotion in schools. Only a few significant differences exist between racial/ethnic groups for advertising and/or promoting beverages and foods in school, and none are of great importance (Table 3C).

Availability of beverages. Black and Hispanic students generally do not seem to be more likely than whites to be in schools that give access to regular soft drinks sold in vending machines at some time during the day (the only significant difference was the white-black difference among middle school students, showing black students having less availability) (Table 3D). However, Hispanic students appear to have greater access throughout the day to these beverages sold in vending machines, and the black-Hispanic difference reaches significance in middle school, where some 18% of Hispanic students have such access compared to 9% for whites and 6% for blacks (Table 3D). In high school the comparable rates are 32%, 23%, and 16%, all nonsignificant differences.

Attempts to promote healthier habits. Finally, there were no significant differences between the studied

Table 3. School food and beverage contracts by student race/ethnicity: 2004–2005

	Student race/ethnicity				Sig. racial/ ethnic comparison
	White	Black	Hispanic	Other	
Approx N total	25,895	4,113	3,280	4,254	
Approx N 8th	9,002	1,202	1,276	1,887	
Approx N 10th & 12th	16,894	2,911	2,004	2,368	
A. Soft drink contracts					
Percentage of students in schools or districts that have a contract with a soft drink bottler					
8th	69.6	56.9	66.0	61.9	
10th & 12th	82.3	82.2	88.0	84.6	
Percentage of students by source of contract:					
School only					
8th	25.4	21.8	19.4	13.8	WH,BH
10th & 12th	38.3	37.2	19.8	32.5	WH,BH
District only					
8th	26.4	23.7	34.2	31.8	WH
10th & 12th	23.5	26.5	34.9	29.0	WH
Both, school & district					
8th	17.9	11.4	12.4	16.3	
10th & 12th	20.5	18.5	33.3	23.2	WH,BH
B. Overall beverages and food revenues					
Percentage of students in schools or districts that receive a specified % of the soft drink receipts					
8th	59.4	45.4	59.6	51.8	
10th & 12th	73.1	75.6	78.8	76.8	
Percentage of students in schools or districts that receive incentives once total soft drink receipts exceed a specified amount					
8th	25.3	24.8	23.4	21.1	
10th & 12th	31.5	31.3	30.4	30.3	
Median revenue schools get from soft drink sales per year (\$)					
8th	1000.0	0	200.0	200.0	WB
10th & 12th	6000.0	5000.0	10000.0	7500.0	
Median revenue schools get per student from soft drink sales per year (\$)					
8th	1.54	0.00	0.26	0.26	WB
10th & 12th	6.73	4.81	7.01	6.19	WB
Percentage of students in schools that receive revenue from foods and/or beverages sold in:					
Vending machines					
8th	78.8	70.3	72.6	65.8	
10th & 12th	94.7	98.0	96.3	96.9	
School/student store					
8th	24.1	28.0	34.2	18.9	
10th & 12th	31.9	26.5	36.3	46.3	
Snack bars/carts					
8th	18.3	18.3	18.5	17.2	
10th & 12th	22.3	29.1	29.3	29.9	
À la carte sales in cafeteria					
8th	36.1	32.5	28.5	21.3	
10th & 12th	36.7	30.3	21.4	28.0	WH
Percentage of students in school districts that receive revenue from foods and/or beverages sold in the following locations: ^a					
Vending machines					
8th	44.7	32.5	32.4	39.5	
10th & 12th	43.2	37.8	46.1	43.3	
School/student store					
8th	3.5	4.3	4.3	4.1	
10th & 12th	8.7	6.8	4.7	6.0	

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Table 3. (continued)

	Student race/ethnicity				Sig. racial/ ethnic comparison
	White	Black	Hispanic	Other	
Snack bars/carts					
8th	10.0	7.7	8.5	23.3	
10th & 12th	12.1	18.6	30.1	31.1	WH
À la carte sales in cafeteria					
8th	50.2	63.4	28.3	46.0	WH
10th & 12th	57.1	46.1	42.5	53.1	WH,BH
C. Advertising/promotion in schools					
Percentage of students in schools that allow the soft drink bottler to advertise in the school building, school grounds, or school buses					
8th	7.8	6.0	2.7	9.1	WH,BH
10th & 12th	21.5	20.4	24.1	15.7	
Percentage of students in schools that advertise or promote meals from fast-food restaurants or soft drinks with:					
Posters or other materials on display in the school					
8th	2.2	2.8	2.1	1.7	
10th & 12th	7.4	8.2	7.1	7.1	
Ads on textbook covers or school food service menus					
8th	3.8	5.5	9.2	7.7	WH
10th & 12th	3.5	3.9	5.8	3.5	
Coupons for free or reduced-price products					
8th	10.5	11.9	17.8	9.2	
10th & 12th	17.8	20.6	10.6	13.1	BH
Sponsorship of school events					
8th	15.6	13.1	15.2	12.3	
10th & 12th	25.0	24.3	17.5	15.8	
D. Availability of beverages					
Percentage of students in schools that offer the following beverages in vending machines at any time in the day: ^b					
Diet soft drinks ^c					
8th	54.1	45.9	29.9	42.3	WH
10th & 12th	85.9	72.9	76.4	78.7	WB
Bottled water					
8th	86.0	74.6	80.3	75.7	
10th & 12th	97.5	94.4	98.2	97.4	
1% or skim milk					
8th	54.2	55.5	45.7	41.4	
10th & 12th	57.2	52.3	50.7	57.9	
100% fruit or vegetable juice					
8th	62.3	59.6	61.8	53.7	
10th & 12th	82.9	82.9	76.9	85.4	
Regular soft drinks ^d					
8th	69.5	46.9	56.9	60.2	WB
10th & 12th	89.7	82.2	83.7	84.9	
Whole or 2% milk, or flavored milk					
8th	59.5	50.7	59.9	51.7	
10th & 12th	65.2	62.4	55.6	64.8	
Percentage of students in schools that offer the following beverages in vending machines throughout the day: ^b					
Diet soft drinks ^c					
8th	5.8	3.9	10.5	5.9	
10th & 12th	21.4	15.6	31.9	22.9	
Bottled water					
8th	16.3	17.5	32.2	14.5	
10th & 12th	48.3	39.4	48.3	46.4	
1% or skim milk					
8th	2.8	3.9	2.2	1.3	WH
10th & 12th	14.0	6.8	8.1	10.1	

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Table 3. School food and beverage contracts by student race/ethnicity: 2004–2005 (*continued*)

	Student race/ethnicity				Sig. racial/ ethnic comparison
	White	Black	Hispanic	Other	
100% fruit or vegetable juice					
8th	5.5	4.3	9.7	3.7	
10th & 12th	24.3	24.2	31.2	26.6	
Regular soft drinks ^d					
8th	8.5	6.2	17.6	10.7	BH
10th & 12th	22.9	15.8	32.1	23.6	
Whole or 2% milk, or flavored milk					
8th	4.5	1.4	8.1	2.9	BH
10th & 12th	16.5	12.2	16.2	14.9	
Percentage of students in schools that offer the following beverages à la carte in the cafeteria at lunch:					
Diet soft drinks ^c					
8th	7.9	14.2	3.3	7.6	WH,BH
10th & 12th	23.2	18.3	26.5	32.0	
1% or skim milk					
8th	71.5	80.1	72.3	68.5	
10th & 12th	80.1	67.4	82.5	85.2	
100% fruit or vegetable juice					
8th	66.4	81.1	76.5	66.3	WB
10th & 12th	78.5	72.2	75.7	84.7	
Regular soft drinks ^d					
8th	49.0	38.1	49.4	49.8	
10th & 12th	59.0	54.1	63.4	64.6	
Whole or 2% milk, or flavored milk					
8th	77.3	80.2	83.3	78.4	
10th & 12th	83.3	86.3	71.3	84.2	
E. Attempts to promote healthier habits					
Mean score on serious/real effort the school has made to promote healthy eating and drinking habits among students ^c					
8th	3.0	3.1	3.2	3.1	
10th & 12th	2.9	3.0	2.8	3.1	
Mean score on serious/real effort the school district has made to promote healthy eating and drinking habits among students ^c					
8th	3.2	3.2	3.2	3.2	
10th & 12th	2.9	3.0	2.9	3.1	
Percentage of students in schools or districts that have significant activities underway to promote healthier eating and drinking practices among students					
Total	45.8	46.6	50.2	53.0	
8th	47.9	44.7	54.2	50.1	
10th & 12th	44.7	47.4	47.7	55.4	

Note: Between-race/ethnicity differences are indicated in the column “Sig. Racial/Ethnic Comparison” where WB=White–Black, WH=White–Hispanic, and BH=Black–Hispanic.

^aData are based on 2005 data only because this question differs considerably from the one asked in 2004.

^bThe number of occasions that items can be available per day ranges from none to four times (all day).

^cIncludes Diet Coca-Cola, Diet Pepsi-Cola, or Diet Dr. Pepper (among others).

^dIncludes Coca-Cola, Pepsi-Cola, or Dr. Pepper (among others), sports drinks that are not 100% juice.

^e1=Not at all, 2=To a little extent, 3=To some extent, 4=To a great extent, 5=To a very great extent.

racial/ethnic groups on the effort that schools or school districts have made to promote healthy eating and drinking habits among students. Nor are there significant differences in the percent of students in schools or districts that “currently have significant activities underway to promote healthier eating and drinking practices among students” (Table 3E).

Overall, the situation is quite similar for the three racial/ethnic groups under study. About equal propor-

tions are in schools that have pouring rights contracts, that receive revenues from those contracts, or that have incentives for achieving certain thresholds in sales. One difference is that the median revenues, and per-student revenues, that middle schools receive from soft drink sales differ significantly: White students attend schools with higher revenues than schools attended by black students. A similar significant difference occurs for per-student revenue in high schools.

Socioeconomic Differences

Soft drink contracts. Differences as a function of SES are detailed in Table 4, where differences across a five-category scale based on parental education are tested for a linear association that is significantly different from zero. No significant linear association is found between student SES and the percent of students in schools or districts that have a contract with a soft drink bottler, although the very top stratum has the lowest rate in both middle and high schools (Table 4A). At the high school level, a significant negative association exists between SES and the proportion of students in schools where both the school and the district are party to the soft drink contract ($p < 0.01$).

Overall beverage and food revenues. There was only one significant association in relation to beverage and food revenues: A positive association exists between SES and the percent of students in middle schools that receive revenues from foods and/or beverages sold in à la carte sales in the cafeteria ($p < 0.05$) (Table 4B). A similar relationship exists at the high school level that falls just short of significance ($p < 0.06$).

Advertising/promotion in schools. The percent of students in schools that allow the soft drink bottler to advertise in the school building, school grounds, or school buses is inversely related to SES, with the largest differences existing in high schools ($p < 0.001$), where 29% of students in the lowest stratum are exposed to such advertising versus 13% of students in the highest stratum (Table 4C). The most prevalent forms of advertising and promotion in the schools of soft drinks, or meals from fast-food restaurants, are sponsorship of school events and the distribution of coupons for free or reduced-price products (Table 4C). Sponsorship of school events occurs with greater frequency in schools attended by low-SES students ($p < 0.05$); and when data for all schools are combined (tabular data not shown), a significant negative association with SES is observed ($p < 0.01$).

Availability of beverages. Among both middle and high school students, higher SES is generally associated with greater access to a number of beverages in vending machines. Student SES is positively associated with being in schools that give greater access to 1% or skim milk (among middle schools, $p = 0.08$) and 100% fruit or vegetable juice, but also with whole or 2% milk or flavored milk (Table 4D). Higher SES was inversely associated with access to diet soft drinks among middle but not high school students (Table 4D). On the other hand, having access throughout the day from vending machines to regular soft drinks does not vary systematically as a function of SES. Access to soft drinks throughout the school day is relatively uncommon for students in all SES strata, and not systematically related to SES. In fact, that is

generally true for all of the beverage classes covered, with the single exception that skim milk availability correlates positively, although weakly, with SES.

More social class differences are found in the à la carte beverage offerings in the cafeteria at lunch. Taking all grades combined (data not shown), there is a positive association between the SES of the students and the proportion who have access at lunch to regular soft drinks ($p < 0.01$), diet soft drinks ($p < 0.01$), and 100% fruit and/or vegetable juices ($p < 0.05$). In all SES strata, the majority of students have access to each of the beverage classes covered, with the single exception of diet soft drinks; those in higher-SES schools tended to have more access to all beverages, both those relatively high in calories or fat and those low.

Attempts to promote healthier habits. A positive linear association ($p < 0.05$) exists between SES and the mean score given by the middle school principals on the extent to which the school district has made a serious/real effort to promote healthy eating and drinking habits among students (Table 4E). This suggests that middle school students in more privileged districts have received somewhat more attention. (No such association exists at the high school level.) The other related question, on whether the school or district has "significant activities underway to promote healthier eating and drinking practices among students," shows a similar linear association that is significant for middle schools ($p < 0.01$) (Table 4E). Again, high schools do not show such an association.

To summarize the findings regarding SES, there are a number of relevant dimensions on which there do not seem to be important differences, but there also are a number of systematic differences that may be contributing to differentials in overweight. Lower-SES students are more likely to be exposed to the advertising and promotion of soft drinks and fast-food restaurants, less likely to have skim milk available throughout the school day, and less likely to have diet soft drinks or 100% fruit and vegetable juices available in the cafeteria (although they are also less likely to have regular soft drinks available in the cafeteria). On some variables, it can be seen that the very highest SES group seems to be different from the others: They have the least advertising allowed in the school and it appears that more effort is going into improving meal offerings in schools attended by these more privileged students, at least in the middle schools.

Discussion

The study findings clearly highlight the beverage and food industry's extensive reach into the nation's schools, at least up to the point of the industry's 2006 agreement with the Alliance for a Healthier Generation to improve beverage offerings in the schools. Consistent with findings

Table 4. Food and beverage contracts by student socioeconomic status (SES): 2004–2005

	Student SES					b	Sig. linear association
	1 (Low)	2	3	4	5 (High)		
Approx N total	2,760	8,449	9,840	10,544	5,950		
Approx N 8th	1,005	3,046	3,262	3,813	2,241		
Approx N 10th & 12th	1,755	5,403	6,577	6,732	3,709		
A. Soft drink contracts							
Percentage of students in schools or districts that have a contract with a soft drink bottler							
8th	68.6	69.2	69.4	69.1	56.4	–2.60	
10th & 12th	84.2	84.4	83.3	82.7	80.3	–1.05	
Percentage of students by source of contract:							
School only							
8th	23.6	24.5	23.0	22.5	20.5	–0.98	
10th & 12th	28.6	36.7	36.6	35.0	39.8	1.32	
District only							
8th	29.1	25.6	29.3	29.3	24.7	–0.18	
10th & 12th	26.3	23.2	24.6	27.8	24.5	0.56	
Both, school & district							
8th	15.9	19.1	17.1	17.3	11.2	–1.44	
10th & 12th	29.3	24.6	22.1	19.9	15.9	–2.93	**
B. Overall beverages and food revenues							
Percentage of students in schools or districts that receive a specified % of the soft drink receipts							
8th	59.0	59.8	60.5	58.3	45.5	–3.12	
10th & 12th	76.1	75.0	74.0	74.4	72.4	–0.69	
Percentage of students in schools or districts that receive incentives once total soft drink receipts exceed a specified amount							
8th	22.1	22.2	25.6	27.3	22.3	0.68	
10th & 12th	28.7	32.1	31.1	33.3	28.0	–0.21	
Median revenue schools get from soft drink sales per year (\$)							
8th	500	1000	1000	600	—	–330.7	
10th & 12th	6500	5750	6000	6500	5000	89.0	
Median revenue schools get per student from soft drink sales per year (\$)							
8th	0.77	1.54	1.18	0.77	—	–0.33	
10th & 12th	5.56	6.67	6.67	6.73	5.25	–0.14	
Percentage of students in schools that receive revenue from foods and/or beverages sold in:							
Vending machines							
8th	72.6	76.4	77.7	76.5	71.6	–0.57	
10th & 12th	95.7	95.1	95.2	95.6	95.9	–0.16	
School/student store							
8th	32.1	26.0	26.4	23.5	18.7	–2.61	
10th & 12th	31.5	29.4	32.4	34.3	37.6	2.06	
Snack bars/carts							
8th	15.5	18.3	18.4	20.0	16.0	0.10	
10th & 12th	25.6	22.4	24.2	24.5	27.1	0.83	
À la carte sales in cafeteria							
8th	26.9	25.4	31.8	37.8	39.9	4.44	*
10th & 12th	27.6	31.6	34.1	36.3	35.2	1.84	
Percentage of students in school districts that receive revenue from foods and/or beverages sold in the following locations: ^a							
Vending machines							
8th	34.9	43.0	38.9	42.0	44.6	1.32	
10th & 12th	36.1	40.7	42.2	46.8	42.3	1.72	
School/student store							
8th	5.2	5.2	3.6	2.7	3.2	–0.70	
10th & 12th	6.4	8.2	9.1	8.5	5.3	–0.44	

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Table 4. (continued)

	Student SES					b	Sig. linear association
	1 (Low)	2	3	4	5 (High)		
Snack bars/carts							
8th	15.7	12.9	10.5	11.8	9.1	-1.18	
10th & 12th	17.7	13.3	16.3	16.4	18.8	1.04	
À la carte sales in cafeteria							
8th	45.8	47.2	47.0	49.0	55.5	2.25	
10th & 12th	47.3	56.2	57.2	54.3	50.5	-0.66	
C. Advertising/promotion in schools							
Percentage of students in schools that allow the soft drink bottler to advertise in the school building, school grounds, or school buses							
8th	8.1	9.8	8.4	6.2	4.2	-1.43	*
10th & 12th	28.6	26.6	22.4	17.7	12.8	-4.26	***
Percentage of students in schools that advertise or promote meals from fast-food restaurants or soft drinks with:							
Posters or other materials on display in the school							
8th	3.5	2.3	2.7	2.0	0.9	-0.48	
10th & 12th	6.1	7.1	7.2	8.4	7.1	0.32	
Ads on textbook covers or school food service menus							
8th	5.8	4.9	5.0	5.1	4.6	-0.13	
10th & 12th	4.8	4.7	4.4	3.3	1.7	-0.83	*
Coupons for free or reduced-price products							
8th	16.3	12.7	11.8	10.0	7.7	-1.82	
10th & 12th	17.1	19.7	18.4	15.8	13.2	-1.58	
Sponsorship of school events							
8th	22.5	19.0	16.1	11.6	9.8	-3.33	*
10th & 12th	25.9	26.2	23.5	22.1	20.3	-1.70	
D. Availability of beverages							
Percentage of students in schools that offer the following beverages in vending machines at any time in the day: ^b							
Diet soft drinks ^c							
8th	47.3	56.0	53.1	46.9	39.8	-0.04	*
10th & 12th	75.2	83.2	84.5	85.1	79.0	0.01	
Bottled water							
8th	76.3	81.1	82.9	83.8	87.1	0.02	
10th & 12th	95.1	96.5	97.1	97.8	98.2	0.01	
1% or skim milk							
8th	40.9	48.1	51.7	54.9	56.0	0.03	
10th & 12th	51.5	51.1	54.5	58.3	64.8	0.04	*
100% fruit or vegetable juice							
8th	51.8	57.7	59.6	63.2	66.7	0.03	*
10th & 12th	77.4	80.0	81.5	84.3	87.6	0.03	**
Regular soft drinks ^d							
8th	63.2	67.4	66.7	62.6	63.8	-0.01	
10th & 12th	81.0	87.4	89.1	89.2	87.1	0.01	
Whole or 2% milk, or flavored milk							
8th	48.1	53.4	56.5	59.5	66.4	0.04	*
10th & 12th	58.4	59.8	63.4	66.5	69.4	0.03	**
Percentage of students in schools that offer the following beverages in vending machines throughout the day: ^b							
Diet soft drinks ^c							
8th	9.9	5.8	6.2	5.8	5.3	-0.60	
10th & 12th	23.7	18.1	20.7	24.4	23.1	1.25	
Bottled water							
8th	21.1	15.9	18.1	18.7	16.2	-0.21	
10th & 12th	45.8	44.6	46.5	48.0	50.8	1.57	

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Table 4. Food and beverage contracts by student socioeconomic status (SES): 2004–2005 (*continued*)

	Student SES					b	Sig. linear association
	1 (Low)	2	3	4	5 (High)		
1% or skim milk							
8th	2.2	1.6	2.7	3.4	3.0	0.43	
10th & 12th	8.9	9.7	11.3	13.6	17.4	2.20	
100% fruit or vegetable juice							
8th	8.0	4.9	5.6	5.6	4.8	-0.31	
10th & 12th	26.5	21.9	24.2	25.3	30.3	1.57	
Regular soft drinks ^d							
8th	14.4	9.4	9.8	9.1	7.7	-0.10	
10th & 12th	24.2	19.0	21.8	25.6	24.9	1.50	
Whole or 2% milk, or flavored milk							
8th	3.9	3.5	4.3	5.4	4.2	0.38	
10th & 12th	14.6	13.4	15.5	16.9	18.5	1.35	
Percentage of students in schools that offer the following beverages à la carte in the cafeteria at lunch:							
Diet soft drinks ^c							
8th	6.5	7.5	8.4	8.9	7.1	0.22	
10th & 12th	19.4	17.4	22.1	27.2	31.5	3.40	**
1% or skim milk							
8th	69.8	72.7	69.4	71.4	76.3	1.03	
10th & 12th	79.0	77.5	78.5	79.7	82.7	1.19	
100% fruit or vegetable juice							
8th	68.0	65.6	66.3	68.2	76.9	2.43	
10th & 12th	73.3	75.5	78.5	79.2	81.7	1.97	
Regular soft drinks ^d							
8th	46.9	44.6	45.5	48.1	57.4	2.86	
10th & 12th	55.4	54.3	59.0	62.0	64.1	2.86	*
Whole or 2% milk, or flavored milk							
8th	77.8	78.7	76.9	77.1	82.0	0.62	
10th & 12th	79.1	82.4	83.1	83.5	83.1	0.68	
E. Attempts to promote healthier habits							
Mean score on serious/real effort the school has made to promote healthy eating and drinking habits among students ^c							
8th	3.1	3.0	3.0	3.1	3.2	0.03	
10th & 12th	2.9	2.9	2.9	2.9	3.0	0.03	
Mean score on serious/real effort the school district has made to promote healthy eating and drinking habits among students ^c							
8th	3.1	3.1	3.2	3.2	3.4	0.07	*
10th & 12th	2.9	2.9	2.9	3.0	3.0	0.02	
Percentage of students in schools or districts that have significant activities underway to promote healthier eating and drinking practices among students							
8th	42.8	41.6	44.5	50.6	62.7	5.49	**
10th & 12th	49.7	44.5	44.2	46.7	50.1	0.88	

Note: The column labeled “b” refers to the unstandardized regression coefficient obtained from the OLS regression analyses that were utilized to determine if a linear association exists between SES and each of the dependent variables (items in rows). Significance of regression coefficients is indicated with asterisks in the column “Sig. linear association.” “-” indicates the estimated coefficient is essentially zero.

^aData are based on 2005 data only because this question differs considerably from the one asked in 2004.

^bThe number of occasions that items can be available per day ranges from none to four times (all day).

^cIncludes Diet Coca-Cola, Diet Pepsi-Cola, or Diet Dr. Pepper (among others).

^dIncludes Coca-Cola, Pepsi-Cola, or Dr. Pepper (among others), sports drinks that are not 100% juice.

^e1=Not at all, 2=To a little extent, 3=To some extent, 4=To a great extent, 5=To a very great extent.

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

from previous studies,²⁸ a large proportion of all secondary school students in grades 8, 10, and 12 have access to soft drinks at school. In 2004 and 2005, nearly two thirds or more had attended schools that had regular soft drinks available in vending machines (65% of middle schools

students and 88% of high schools students); two thirds or more (67% of middle school students and 83% of high school students) were in schools and/or school districts that had pouring rights contracts with soft drink bottlers; the majority (57% and 74%) were in schools and/or

school districts that received a specified percent of the soft drink receipts; and between one quarter and one third (25% and 31%) were in schools or districts that received threshold incentives obviously intended to encourage sales beyond what the fixed percentage cut accomplishes. Half or more (48% and 59%) had access to soft drinks in the cafeteria at lunch. A higher percentage of high school than middle school students were exposed to each of these conditions; clearly the high schools are where the greatest student consumption of soft drinks is occurring, and where student access through vending machines has been the greatest.

The estimated financial benefits to the schools seem modest relative to the health threat that the promotion of soft drinks entails. Overall, the median revenue that soft drinks generate for high schools is \$6000 per year, and for middle schools only \$500 per year. Median revenues per student per year are \$6.48 in high schools versus \$0.70 in middle schools. If the sale of soft drinks to young people is viewed as a problem from a health perspective, then it is clear that the problem is most concentrated in the nation's high schools. Not only are these students consuming large quantities of empty calories during their adolescence with the obvious consequences, they also may be establishing unhealthy habits that carry over with them well into adulthood.

The advent of exclusive pouring rights contracts was an unfortunate development, because once one soft drink company started to use this device, all of the others surely felt that they had to follow suit in order to protect market share. Not only is there a fairly substantial sales volume involved in sales through the schools, but young people are very likely developing brand preferences in their soft drink choices at this stage of their lives. While the industry previously had jointly pledged to remove soft drinks from elementary schools and to restrict access in middle schools (very likely in response to rising public concern about this issue as well as fear of possible liability suits in the future²⁹), the limits applied to high schools—where the data suggest that the problem is particularly concentrated—have been the least restrictive. Under the newer agreement with the Alliance for a Healthier Generation, the industry has committed to removing soft drinks even from high schools, which will be an important change if it is effected.

Until regular soft drinks are removed from schools, they might consider making the healthier beverages more accessible and perhaps more prominently displayed to students. Currently, only 18% of middle school students and 47% of high school students have unrestricted access to bottled water, for example. This likely would require having a separate vending machine dedicated to bottled water (and possibly other more healthy alternatives), so that when soft drink machines are locked down during parts of the day, the water could remain available. Many students do not have access to other potentially healthier

beverages, like 1% or skim milk and 100% fruit juice. These could be offered in all school cafeterias, at a minimum providing some more vigorous competition for the sugar-laden soft drinks.

One central purpose of this paper is to determine to what extent racial/ethnic minorities (specifically, black and Hispanic youth) and lower-SES groups are subject to influences in the school environment that may contribute to their differential rates of overweight and obesity. We did not find larger proportions of black or Hispanic students in schools or districts that have contracts with bottlers, or that receive a specified percent of receipts from soft drink sales, or that have threshold incentives based on sales. These seem to be highly prevalent conditions and fairly evenly distributed by race/ethnicity. The reported per-student median revenue to the school from soft drink sales was highest for Hispanic high school students, but this Hispanic-white difference did not reach statistical significance. (Black students in both high school and middle school, on the other hand, attend schools that have significantly lower per-student soft drink revenues than white students.)

With regard to socioeconomic status, however, students from lower-SES backgrounds were more likely to be in schools that allow soft drink bottlers to advertise in the school, and to sponsor school events in middle school. These differences serve to put those segments of youth already at greater risk for overweight and its accompanying adverse health effects at still greater risk. The schools that serve these at-risk segments of the population are also likely to be those that are the most seriously underfunded, so it would be understandable if these schools and districts prove to be more reluctant to give up the monetary incentives offered by commercial interests. However, those financial rewards would come at a price in terms of their students' health, and according to the findings in this study the rewards are quite modest in any case.

Limitations

Certain limitations should be kept in mind. The data are based on school principals' (or other school staff members') responses to a self-administered questionnaire, raising the possibility of errors in reporting or of social desirability bias. To minimize the latter, the investigators guaranteed the respondents that they would not be identified. To minimize response errors, the investigators attempted to have the questionnaire segments completed by the school personnel most likely to be knowledgeable about the matters covered, such as the food service manager. Also, participants who provided incomplete answers, or whose answers to related questions were inconsistent, were re-contacted by phone by research staff to clarify their answers. Finally, some of the differences examined were not

statistically significant despite what at times appeared to be large and important differences. Even a sample of 345 schools has power limitations, particularly for subgroup comparisons.

Conclusion

Soft drinks were widely available to American students in their schools in the 2004 and 2005 school years—more so in high schools than in middle schools. Pouring rights contracts exist in the majority of schools and/or districts with whatever influences they carry on the promotion of soft drink sales in the schools, but they almost certainly create an incentive for school administrators and school boards not to discourage the sale of soft drinks to students. Threshold incentives, whereby the school receives added incentives for meeting certain sales goals, above and beyond the percentage of soft drink receipts they routinely receive under the pouring rights contract, still exist in schools attended by a quarter of middle school students and nearly one third of high school students.

There are some disparities in the environmental influences that students face with regard to soft drinks—disparities that would tend to encourage those most at risk for overweight and obesity to drink more soft drinks. They include the fact that compared to schools attended by blacks and whites, schools attended by Hispanics provide more exposure to soft drink advertising. Lower-SES students also face some differential influences. The proportion of students whose schools permit the soft drink bottler to advertise in the school and to sponsor school events increases with declining SES.

Principals of the schools attended by about half of the students studied report that their schools or districts have “significant activities” underway to promote healthier eating and drinking practices among their students. This encouraging finding suggests that this is a time of “unfreezing” traditional ways of viewing the food and beverage offerings in schools, and that reform is beginning to occur. Indeed, these recently collected data may well reflect some of that change; but they also make clear that there remains a great deal of room for improving the environmental influences of schools on their students when it comes to developing healthy behaviors in beverage consumption. Perhaps the industry’s new agreement with the Alliance for a Healthier Generation will bring about the major changes outlined in the agreement, despite possible resistance from bottling companies and even school districts who may not want to give up the revenues generated under current contracts. Future surveys in this series should speak to the progress being made. Indeed, the questionnaire for the 2007 YES survey of school administrators includes a section that asks respondents if they are aware of the agreement and whether they have imple-

mented, or are planning to implement, in their school the school beverage guidelines adopted under the agreement. It is quite possible, of course, that the financial losses to both the industry and the schools will not be as large as is commonly assumed if students switch to buying beverages such as water, skim milk, and 100% fruit or vegetable juice that could be made increasingly available to them through vending machines. That would be a win-win-win situation for the students, their schools, and the industry.

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