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Factors Associated with Sugar-Sweetened Beverage Intake among United States High School Students[1]

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Abstract

This cross-sectional study examined associations of demographic characteristics, weight status, availability of school vending machines, and behavioral factors with sugar-sweetened beverage (SSB) intake, both overall and by type of SSB, among a nationally representative sample of high school students. The 2010 National Youth Physical Activity and Nutrition Study data for 11,209 students (grades 9–12) were used. SSB intake was based on intake of 4 nondiet beverages [soda, other (i.e., fruit-flavored drinks, sweetened coffee/tea drinks, or flavored milk), sports drinks, and energy drinks]. Nationwide, 64.9% of high school students drank SSB ≥1 time/d, 35.6% drank SSB ≥2 times/d, and 22.2% drank SSB ≥3 times/d. The most commonly consumed SSB was regular soda. Factors associated with a greater odds for high SSB intake (≥3 times/d) were male gender [OR = 1.66 (95% CI = 1.41,1.95); $P < 0.05$], being non-Hispanic black [OR = 1.87 (95% CI = 1.52, 2.29); $P < 0.05$], eating at fast-food restaurants 1–2 d/wk or eating there ≥3 d/wk [OR = 1.25 (95% CI = 1.05, 1.50); $P < 0.05$ and OR = 2.94 (95% CI = 2.31, 3.75); $P < 0.05$, respectively] and watching television >2 h/d [OR = 1.70 (95% CI = 1.44, 2.01); $P < 0.05$]. Non-Hispanic other/multiracial [OR = 0.67 (95% CI = 0.47, 0.95); $P < 0.05$] and being physically active ≥60 min/d on <5 d/wk were associated with a lower odds for high SSB intake [OR = 0.85 (95% CI = 0.76, 0.95); $P < 0.05$]. Weight status was not associated with SSB intake. Differences in predictors by type of SSB were small. Our findings of significant associations of high SSB intake with frequent fast-food restaurant use and sedentary behaviors may be used to tailor intervention efforts to reduce SSB intake among high-risk populations.

Introduction

Sugar-sweetened beverages (SSB) include soft drinks, fruit-flavored drinks (not 100% juice), tea and coffee drinks, sweetened milk, sports drinks, energy drinks, and any other beverages with added sugar (1,2). SSB are the largest source of added sugar and an important contributor of energy in the diet of US youth (3). The highest consumers of SSB

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are adolescents. Based on NHANES, the average energy intake from SSB was 273 kcal/d for boys and 171 kcal/d for girls in 2005–2008 among adolescents aged 12–19 y. On any given day, 70% of boys and 60% of girls aged 2–19 y drank SSB (4). Furthermore, consumption of SSB has been associated with obesity (5–8), dental caries or primary tooth extractions (9,10), type 2 diabetes (11,12), dyslipidemia (13), hypertension (14), disruptive behaviors and poor mental health (15,16), and displacement of nutrient-rich foods (17,18).

In previous studies, investigators have explored the association of SSB with demographic characteristics and dietary and behavioral factors among youth (19–23). A cross-sectional study found that less healthful dietary practices and sedentary behaviors were associated with high consumption of SSB among 15,283 middle and high school students in Texas (21). Although in 1999–2004 only 3% of SSB energy among adolescents aged 12–19 y came from sports drinks (24), the 2010 School Health Profiles show across states more schools allow purchases of sports drinks than soda (medians 51 vs. 30%, respectively) (25).

Several studies have investigated associations between SSB (mostly regular soda and fruit-flavored drinks) and various dietary or behavioral correlates among youth; however, these studies were not based on a nationally representative sample of US youth (19–21). Two additional studies were based on nationally representative samples, but one examined only regular soda (22) and the other did not include behavioral correlates (23). Furthermore, limited information exists on the consumption of and factors associated with sports drinks and energy drinks among US adolescents. Thus, the purpose of our study was to examine in a large, nationally representative sample of students in grades 9–12 the association of demographic characteristics, weight status, availability of beverage vending machines in schools, and behavioral factors with SSB intake, both overall and by type of SSB (regular soda, other SSB, sports drinks, and energy drinks).

Methods

Sample and survey administration

For this cross-sectional analysis, we obtained data from the 2010 NYPANS (26), a one-time, school-based study conducted by CDC. This study used a survey to collect information on physical activity, dietary practices, and behavioral determinants related to nutrition and physical activity. The study also included directly measured height and weight data completed by trained personnel using a standard protocol. The survey used a 3-stage cluster sample design to produce a nationally representative sample of students in grades 9–12 who attend public and private high schools in the 50 states and the District of Columbia (26). Student participation in the study was anonymous and voluntary, and local parental permission procedures were followed. NYPANS was approved by the study contractor's (ICF Macro) institutional review board. Students completed a self-administered questionnaire in their classrooms during a regular class period in the spring of 2010. The school response rate was 82%, the student response rate was 88%, and the overall response rate was 73%. NYPANS included data from 11,429 students (26). For this analysis, we excluded 400 students with missing data on ≥1 question about SSB (regular soda, other SSB, sports drinks, and energy drinks), resulting in a final analytic sample of 11,029 students. In addition, unknown values or missing data regarding explanatory variables

ranged from 0.4 to 12% (weight status) and were excluded from analyses when the variable was used. For the final multivariable logistic regression model, we included data on 9149 students who had complete information on all variables studied. Comparing students who were included in the final logistic regression model and those who were not in the final logistic regression model, we found no differences in age, sex, race/ethnicity, and weight status.

SSB intake

The main outcome measure was SSB intake. This was based on the following semiquantitative frequency questions. Respondents were asked how many times during the past 7 d they drank a can, bottle, or glass of the following beverages: soda or pop such as Coke, Pepsi, or Sprite (not counting diet soda or diet pop); a SSB such as lemonade, sweetened tea or coffee drinks, flavored milk, Snapple, or Sunny Delight (not counting soda or pop, sports drinks, energy drinks, or 100% fruit juice), referred to in this article as "other SSB"; sports drinks such as Gatorade or PowerAde (not counting low-calorie sports drinks such as Propel or G2); and energy drinks, such as Red Bull or Jolt (not counting diet energy drinks or sports drinks such as Gatorade or PowerAde). For each question, the response options were as follows: I did not drink (beverage) during the past 7 d, 1–3 times during the past 7 d, 4–6 times during the past 7 d, 1 time/d, 2 times/d, 3 times/d, and ≥4 times/d. To calculate total SSB intake, the frequency of consumption of regular soda, other SSB, sports drinks, and energy drinks was summed. Similar to a method used in CDC's Youth Risk Behavior Survey (27), weekly intake was converted to daily intake. For example, 1–3 times during the past 7 d was converted to 0.29 time/d (2 divided by 7), and 4–6 times during the past 7 d was converted to 0.71 time/d (5 divided by 7). Additionally, ≥4 times/d was converted to 4 times/d. Cutpoints for beverages were chosen based on the data distributions and previous reports (4,23,28). The cutpoint of 1 time/d was chosen to provide daily intake of beverages (23,28). To define high-SSB consumers, the cutpoint of 3 times/d was based on estimated 90th percentile of energy intake from SSB on any given day, which was ~450 kcal [three 12-oz (355 mL) cans of soda] among Americans (4). For χ^2 tests, we created three mutually exclusive total sugar intake categories: <1 time/d, 1 to <3 times/d, and ≥3 times/d based on the data distribution. For logistic regression analysis, total SSB intake was dichotomized into <3 times/d vs. ≥3 times/d. Second, for each beverage type, we dichotomized response categories into <1 time/d vs. ≥1 time/d (daily consumption).

Demographic characteristics, weight status, availability of school beverage vending machines, and behavioral variables

We created mutually exclusive response categories for each covariate. Demographic variables included were age (≤15, 16, and ≥17 y), sex, and race/ethnicity (non-Hispanic white, non-Hispanic black, Hispanic, and non-Hispanic other/multiracial). BMI was calculated from measured weight and height and was categorized into underweight/normal weight (<85th percentile for BMI by age and sex), overweight (≥85th to <95th percentile), and obese (≥95th percentile) based on sex- and age-specific reference data from the 2000 growth charts (29). For availability of beverage vending machines in their school, students were asked about whether their school has a vending machine that students can use to purchase soda, sports drinks, or fruit drinks that are not 100% juice. Response options were

yes, no, or not sure. After excluding students who answered “not sure” for the availability of vending machine question, results remained the same as when we included students with either response; thus, to increase sample sizes, we categorized students as “yes” or “no/not sure” for this analysis. For behavior variables, eating a meal or snack from a fast-food restaurant during the past 7 d was categorized as 0, 1–2, or ≥3 d/wk; being physically active at least 60 min/d during the past 7 d was categorized as <5 or ≥5 d/wk; and watching television on an average school day was categorized as ≤2 or >2 h/d.

Statistical analysis

We used χ^2 tests to examine the unadjusted association of SSB intake with previously described characteristics and used $P < 0.05$ for significance. Multivariable logistic regression models were used to estimate adjusted OR and 95% CI for variables associated with drinking any SSB ≥3 times/d as well as daily consumption of each beverage ≥1 time/d. We repeated the above analyses to examine associations for each of the four beverage types. Age, sex, race/ethnicity, weight status, school beverage vending machines, fast-food restaurants, physical activity, and television viewing were included in one logistic regression model for each beverage type. Sample weights were applied to all analyses to adjust for nonresponse. All statistical analyses were performed using SAS software version 9.2 (SAS Institute) and incorporating appropriate procedures to account for the complex sample design.

Results

Nearly two-thirds of respondents were non-Hispanic white with relatively even distributions in age and sex (Table 1). Although bivariate analyses are included in the results, we have limited results to discuss multivariable analyses. The most commonly consumed SSB was regular soda (Fig. 1). Mean total SSB intake was 2 times/d, with a mean of 0.7 times/d for regular soda, 0.6 times/d for other SSB, 0.5 times/d for sports drinks, and 0.2 times/d for energy drinks (data not shown). Nationally, 64.9% of students drank a can, bottle, or glass of any SSB ≥1 time/d, 35.6% drank any SSB ≥2 times/d, and 22.2% drank any SSB ≥3 times/d. Results of multivariable logistic regression modeling of SSB ≥3 times/d compared to <3 times/d showed that being male, non-Hispanic black (vs. non-Hispanic white), eating at fast-food restaurants ≥1 d/wk (vs. 0 d/wk), and watching television >2 h/d (vs. ≤2 h/d) were significantly associated with a greater odds of drinking any SSB ≥3 times/d, whereas non-Hispanic other/multiracial (vs. non-Hispanic white) and being physically active at least 60 min/d on <5 d during the previous week (vs. ≥5 d/wk) were significantly associated with reduced odds of drinking any SSB ≥3 times/d. Weight status was not significantly associated with SSB intake (Table 1).

For our stratified analyses by beverage type (Table 2), ~24% of students reported drinking a can, bottle, or glass of regular soda ≥1 time/d. Results of multivariable logistic regression modeling of regular soda ≥1 time/d vs. <1 time/d showed that being male, eating at fast-food restaurants ≥1 d/wk (vs. 0 d/wk), being physically active at least 60 min/d on <5 d during the previous week (vs. ≥5 d/wk), and watching television >2 h/d (vs. ≤2 h/d) were significantly associated with greater odds of drinking regular soda ≥1 time/d, whereas non-Hispanic

other/multiracial (vs. non-Hispanic white) was significantly associated with a reduced odds of drinking regular soda ≥1 time/d.

For our strata on other SSB (Table 2), we found that ~17% of students reported drinking a can, bottle, or glass of other SSB ≥1 time/d. Results of multivariable logistic regression modeling of other SSB ≥1 time/d compared with <1 time/d showed the following variables to be significantly associated with greater odds of drinking other SSB ≥1 time/d: non-Hispanic black (vs. non-Hispanic white), eating at fast-food restaurants ≥3 d/wk (vs. 0 d/wk), and watching television >2 h/d (vs. ≤2 h/d).

Our analysis of sports drinks showed that 16% of students reported drinking them at least once daily (Table 3). Results of multivariable logistic regression modeling of drinking sports drinks ≥1 time/d compared with <1 time/d showed that being male, non-Hispanic black, or Hispanic (vs. non-Hispanic white) and eating at fast-food restaurants ≥1 d/wk (vs. 0 d/wk) were significantly associated with greater odds of drinking sports drinks ≥1 time/d, whereas being physically active at least 60 min/d on <5 d during the previous week (vs. ≥5 d/wk) was significantly associated with reduced odds of drinking sports drinks ≥1 time/d.

For energy drinks (Table 3), only ~5% of students reported drinking a can, bottle, or glass of energy drinks ≥1 time/d. Using multivariable logistic regression modeling of drinking energy drinks ≥1 time/d compared <1 time/d, we found that being male, non-Hispanic black, or Hispanic (vs. non-Hispanic white), eating at fast-food restaurants ≥3 d/wk (vs. 0 d/wk), and watching television >2 h/d (vs. ≤2 h/d) were significantly associated with greater odds of drinking energy drinks ≥1 time/d, whereas having beverage vending machines in the school was significantly associated with reduced odds of drinking energy drinks ≥1 time/d.

Discussion

We found that about two-thirds (65%) of high school students nationwide drank some type of SSB at least once or more each day and about 22% drank them ≥3 times/d. Drinking a glass (8 oz or 237 mL), can (12 oz or 355 mL), or bottle (20 oz or 591 mL) of regular soda 3 times/d could provide 270–690 kcal of extra energy/d (30). Our findings also indicate that although regular soda remained the most frequently consumed SSB among adolescents, other SSB and sports drinks also had a high frequency of consumption as well. This finding is somewhat different from the 1999–2004 NHANES data, which showed that sweetened soda contributed ~67% of all energy from SSB, followed by fruit drinks (~23%), other SSB (~7%), and sports drinks (~3%) among adolescents (24).

Furthermore, we found that being male, being non-Hispanic black, frequent use of fast-food restaurants, and prolonged television viewing were significantly associated with greater odds for drinking any SSB ≥3 times/d, compared to both non-SSB drinkers and fairly frequent SSB drinkers. Our results concur with previous studies, which showed that adolescent boys were more likely than adolescent girls to consume SSB (4,21,24,31,32). Similar to our survey results, previous research reported that non-Hispanic blacks had high SSB intake compared with non-Hispanic whites (4,31,32). SSB are marketed more frequently to blacks relative to whites, which may result in their higher levels of consumption (33).

Similar to our results, previous studies among youth reported that frequent fast-food restaurant users were more likely to drink SSB (32,34). Although most SSB intake still occurs at home, fast-food restaurants remain an important source of all SSB energy (13% of all SSB energy in 2003–2004) among US youth (24), in part because Americans are eating out more often at restaurants and fast-food restaurants (35).

The inverse association between physical activity and total SSB intake found in the present study might be driven by sports drinks intake. A previous study reported an inverse relationship between days of vigorous physical activity and regular soda intake in both boys and girls but a positive association between vigorous physical activity and “flavored and sports beverages” in boys (21). That same study reported that hours spent watching television increased with consumption of any SSB and regular soda but not with flavored and sports beverages (21). This is consistent with our national findings.

In the present study, measured weight status was not significantly associated with SSB intake overall or by beverage type. It is possible that overweight and obese adolescents might underreport their SSB intake or reduce their SSB intake as a strategy for losing weight. These concepts are supported by other studies, which found that overweight and obese adolescents were more likely to underreport their energy intake (36) and students who were trying to lose weight were less likely to drink SSB (22,37).

Despite the high availability of beverage vending machines that sell SSB in schools, the presence of beverage vending machines was not significantly associated with consumption of SSB in the present study. One study reported that access to vending machines in schools declined between 2006 and 2008 (38), which may be in part be a result of some schools turning off vending machines during school hours or having vending machines containing nonsweetened beverages.

The major strengths of our study are that it is based on a large, nationally representative sample with a relatively high response rate and had measured weight and height. However, our study is subject to at least 3 limitations. First, NYPANS data are self-reported with the exception of height and weight data, and although the extent of underreporting or overreporting of beverage consumption cannot be determined, results did differ from those using 24-h recall methods (24). Based on other studies, which showed beverage intake was similar between FFQ and 24-h recall or food records (39,40), SSB intake in our study might provide valid and reliable measurements of habitual intake of SSB. Second, these associations are cross-sectional; thus, we cannot provide the directionality of these associations. Third, these data apply only to adolescents who attend school and, therefore, are not representative of all persons in this age group. However, in 2008, only ~5% of youth between ages 16 and 18 y nationwide had not completed high school and were not enrolled in a high school program (41).

In conclusion, this analysis indicates that nearly one in four high school students reported drinking SSB at least 3 times/d. Furthermore, factors significantly associated with elevated odds for high SSB intake overall were being male and non-Hispanic black, frequent use of fast-food restaurants, and prolonged television viewing. Considering possible adverse health

consequences of high SSB intake, efforts to decrease SSB intake among adolescents are critical, because this is the highest SSB-consuming population group. One strategy is to limit access to SSB in schools through policy and environmental changes. Another strategy is to encourage schools to ensure free drinking water access. However, additional strategies are needed to decrease SSB intake among adolescents, because our findings suggest that they might be consuming as much as 3/4 cups of sugar/d from their SSB intake. Our identification of characteristics of high SSB consumers can be used for the development of initiatives to assist in decreasing SSB intake and potential adverse consequences.

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S.P. analyzed data and wrote the manuscript; H.M.B., B.S., N.B., and T.O. provided critical editorial comments to the manuscript; and S.P. had primary responsibility for final content. All authors read and approved the final manuscript.

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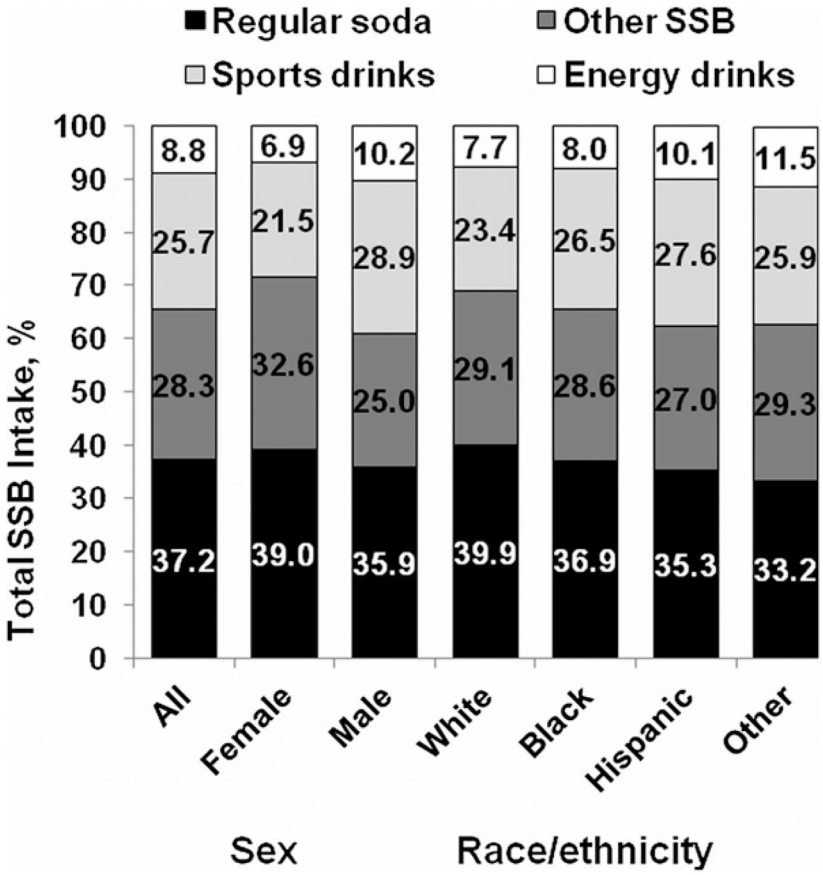

FIGURE 1.

The relative contribution of various beverages to the total number of times SSB were consumed for all respondents (n = 11,029) according to sex (n = 10,976) and race/ethnicity (n = 10,817) among US high school students who reported consuming any SSB during the past 7 d (NYPANS, 2010). NYPANS, National Youth Physical Activity and Nutrition Study; SSB, sugar-sweetened beverage.

TABLE 1

Bivariate and multivariable analyses of characteristics of study participants and their association with total SSB intake during the past 7 d among US high school students (NYPANS, 2010)[1,2]

			Bivariate analysis Total SSB intake			Multivariable logistic regression analysis	
Characteristics	**All**		**<1 time/d**	**1 to <3 times/d**	**≥3 times/d**	**Total SSB intake ≥3 times/d[3]**	
	n		Weighted %[4] ± SE			Adjusted OR	95% CI
Total sample	11,029	100	35.1 ± 1.3	42.7 ± 1.0	22.2 ± 1.4		
Age, *y*	10,956						
≤15		35.5 ± 0.7	36.3 ± 1.8	42.5 ± 1.5	21.3 ± 1.4	Reference	
16		26.3 ± 0.5	35.1 ± 1.6	42.0 ± 1.8	22.9 ± 1.5	1.05	0.85, 1.29
≥17		38.2 ± 0.7	34.1 ± 1.6	43.1 ± 1.1	22.7 ± 1.9	0.95	0.79, 1.15
Sex	10,976						
Female		49.6 ± 0.8	42.9 ± 1.7*	39.0 ± 1.0*	18.1 ± 1.4*	Reference	
Male		50.4 ± 0.8	27.4 ± 1.1*	46.2 ± 1.3*	26.4 ± 1.7*	1.66	1.41, 1.95
Race/ethnicity	10,817						
White, non-Hispanic		58.4 ± 3.1	36.5 ± 1.8*	43.9 ± 1.5*	19.6 ± 1.7*	Reference	
Black, non-Hispanic		14.5 ± 1.7	25.7 ± 1.6*	37.3 ± 1.4*	37.0 ± 1.5*	1.87	1.52, 2.29
Hispanic or Latino		18.6 ± 2.2	35.3 ± 1.3*	43.1 ± 1.4*	21.7 ± 1.4*	1.03	0.82, 1.29
Other/multi-racial, non-Hispanic		8.5 ± 0.8	40.7 ± 2.7*	42.8 ± 3.1*	16.4 ± 2.4*	0.67	0.47, 0.95
Weight status[5]	9692						
Underweight/normal weight		63.2 ± 1.2	35.2 ± 1.5	42.5 ± 1.1	22.3 ± 1.6	Reference	
Overweight		17.8 ± 0.5	34.6 ± 1.9	43.1 ± 2.2	22.3 ± 2.1	1.04	0.82, 1.32
Obese		19.0 ± 0.9	35.8 ± 1.7	42.3 ± 1.6	21.9 ± 2.0	1.04	0.84, 1.30
Beverage vending machine that dispenses SSB in school[6]	10,647						
Yes		71.8 ± 2.3	35.1 ± 1.3	43.4 ± 1.4	21.5 ± 1.6	0.94	0.76, 1.17
No/not sure		28.2 ± 2.3	35.1 ± 2.0	41.3 ± 1.2	23.6 ± 1.6	Reference	
Eat at fast-food restaurants	10,699						
0 d/wk		25.2 ± 1.6	53.8 ± 2.1*	32.7 ± 1.7*	13.5 ± 1.3*	Reference	
1–2 d/wk		44.0 ± 1.2	35.8 ± 1.3*	46.2 ± 1.3*	18.0 ± 1.4*	1.25	1.05, 1.50

Characteristics		All	Bivariate analysis Total SSB intake			Multivariable logistic regression analysis	
			<1 time/d	1 to <3 times/d	≥3 times/d	Total SSB intake ≥3 times/d[3]	
≥3 d/wk		30.8 ± 1.3	18.7 ± 1.0*	46.3 ± 1.6*	35.0 ± 2.2*	2.94	2.31, 3.75
Physically active ≥60 min/d during previous 7 d	10,919						
<5 d/wk		52.1 ± 1.1	38.8 ± 1.4*	40.6 ± 1.1*	20.6 ± 1.5*	0.85	0.76, 0.95
≥5 d/wk		47.9 ± 1.1	31.0 ± 1.4*	44.9 ± 1.2*	24.1 ± 1.5*	Reference	
Television watching on average school day	10,984						
≤2 h/d		72.0 ± 1.3	37.2 ± 1.7*	44.0 ± 1.2*	18.7 ± 1.5*	Reference	
>2 h/d		28.0 ± 1.3	29.8 ± 1.3*	39.2 ± 1.2*	31.0 ± 1.4*	1.7	1.44, 2.01

[1] NYPANS, National Youth Physical Activity and Nutrition Study; SSB, sugar-sweetened beverages.

* χ^2 tests were used for each variable to examine differences across categories, $P < 0.05$.

[2] Total SSB includes regular soda, fruit-flavored drinks, flavored milk, sweetened tea or coffee drinks, sports drinks, and energy drinks.

[3] The multivariable logistic regression model included a sample of 9149 students without missing data. Reference category included students who drank <3 times/d.

[4] Because of rounding, weighted percentages may not add up to 100%.

[5] Measured weight and height were used to calculate BMI. Underweight/normal weight was defined as BMI <85th percentile; overweight was defined as BMI ≥85th to <95th percentile; and obese was defined as BMI ≥95th percentile, based on reference data.

[6] Beverage vending machine that dispenses soda or pop, sports drinks, or fruit-flavored drinks that are not 100% juice, such as Coke, Gatorade, or Sunny Delight.

TABLE 2

Bivariate and multivariable analyses of characteristics associated with the consumption of regular soda and other SSB during the past 7 d among US high school students (NYPANS, 2010)[1,2]

		Regular soda ≥1 time/d			Other SSB ≥1 time/d		
		Bivariate analysis	Multivariable logistic regression analysis[3]		Bivariate analysis	Multivariable logistic regression analysis[3]	
Characteristics	***n***	**Weighted % ± SE[4]**	**Adjusted OR**	**95% CI**	**Weighted %± SE[4]**	**Adjusted OR**	**95% CI**
Total sample	11,029	24.3 ± 1.2	—	—	16.9 ± 0.8	—	—
Age	10,956						
≤15 y		23.6 ± 1.3	Reference		15.7 ± 0.8	Reference	
16 y		23.1 ± 1.3	0.92	0.77, 1.10	17.9 ± 1.2	1.17	0.93, 1.47
≥17 y		25.8 ± 1.9	0.99	0.79, 1.23	17.2 ± 1.1	1.03	0.86, 1.24
Sex	10,976						
Female		20.2 ± 1.4*	Reference		16.2 ± 1.0	Reference	
Male		28.4 ± 1.3*	1.57	1.36, 1.83	17.6 ± 0.8	1.13	0.98, 1.30
Race/ethnicity	10,817						
White, non-Hispanic		23.9 ± 1.5*	Reference		15.4 ± 1.2*	Reference	
Black, non-Hispanic		32.0 ± 1.8*	1.11	0.90, 1.40	24.6 ± 1.3*	1.63	1.24, 2.14
Hispanic or Latino		22.8 ± 1.9*	0.82	0.61, 1.10	15.9 ± 0.9*	1.00	0.78, 1.27
Other/multiracial, non-Hispanic		16.7 ± 2.4*	0.58	0.41, 0.82	16.2 ± 1.7*	1.03	0.73, 1.44
Weight status[5]	9692						
Underweight/normal weight		24.7 ± 1.3	Reference		17.1 ± 0.9	Reference	
Overweight		23.2 ± 1.9	0.95	0.79, 1.14	16.7 ± 1.3	0.97	0.77, 1.22
Obese		23.4 ± 2.3	0.95	0.78, 1.15	16.4 ± 1.7	0.97	0.77, 1.21
Beverage vending machine that dispenses SSB in school[6]	10,647						
Yes		23.3 ± 1.3	0.91	0.75, 1.11	16.5 ± 1.0	0.96	0.82, 1.12
No/not sure		26.2 ± 1.9	Reference		17.7 ± 0.8	Reference	
Eat at fast-food restaurants	10,699						
0 d/wk		14.1 ± 1.3*	Reference		13.7 ± 0.9*	Reference	

		Regular soda ≥1 time/d			Other SSB ≥1 time/d		
		Bivariate analysis	Multivariable logistic regression analysis[3]		Bivariate analysis	Multivariable logistic regression analysis[3]	
Characteristics	***n***	**Weighted % ± SE[4]**	**Adjusted OR**	**95% CI**	**Weighted %± SE[4]**	**Adjusted OR**	**95% CI**
1–2 d/wk		20.5 ± 1.3*	1.46	1.16, 1.84	15.6 ± 1.0*	1.06	0.87, 1.30
≥3 d/wk		37.5 ± 1.6*	3.35	2.61, 4.30	21.2 ± 1.4*	1.43	1.13, 1.80
Physically active ≥60 min/d during previous 7 d	10,919						
<5 d/wk		25.2 ± 1.4	1.23	1.05, 1.44	17.2 ± 0.9	1.04	0.91, 1.19
≥5 d/wk		23.3 ± 1.3	Reference		16.5 ± 1.0	Reference	
Television watching on average school day	10,984						
≤2 h/d		21.2 ± 1.3*	Reference		15.4 ± 0.8*	Reference	
>2 h/d		32.2 ± 1.2*	1.72	1.50, 1.96	20.5 ± 1.3*	1.24	1.01, 1.51

[1] NYPANS, National Youth Physical Activity and Nutrition Study; SSB, sugar-sweetened beverages.

[*] χ^2 tests were used for each variable to examine differences across categories, $P < 0.05$.

[2] Other SSB includes fruit-flavored drinks, flavored milk, and sweetened tea or coffee drinks.

[3] The multivariable logistic regression model for each SSB included a sample of 9149 students without missing data.

[4] Because of rounding, weighted percentages may not add up to 100%.

[5] Measured weight and height were used to calculate BMI. Underweight/normal weight was defined as BMI <85th percentile; overweight was defined as BMI ≥85th to <95th percentile; and obesity was defined as BMI ≥95th percentile, based on reference data.

[6] Beverage vending machine that dispenses soda or pop, sports drinks, or fruit-flavored drinks that are not 100% juice, such as Coke, Gatorade, or Sunny Delight.

TABLE 3

Bivariate and multivariable analyses of characteristics associated with the consumption of sports drinks and energy drinks during the past 7 d among US high school students (NYPANS, 2010)[1]

		Sports drink ≥1 time/d			Energy drink ≥1 time/d		
		Bivariate analysis	Multivariable logistic regression analysis[2]		Bivariate analysis	Multivariable logistic regression analysis[2]	
Characteristics	***n***	**Weighted % ± SE[3]**	**Adjusted OR**	**95% CI**	**Weighted % ± SE[3]**	**Adjusted OR**	**95% CI**
Total sample	11,029	16.0 ± 0.7	–	–	4.9 ± 0.4	–	–
Age	10,956						
≤15 y		16.7 ± 1.0	Reference		4.9 ± 0.5	Reference	
16 y		16.4 ± 1.4	1.01	0.81, 1.24	5.4 ± 0.7	1.20	0.80, 1.80
≥17 y		15.0 ± 0.9	0.82	0.62, 1.08	4.5 ± 0.5	0.78	0.56, 1.07
Sex	10,976						
Female		10.8 ± 0.8*	Reference		3.2 ± 0.4*	Reference	
Male		21.1 ± 0.9*	1.99	1.67, 2.37	6.6 ± 0.5*	2.17	1. 59, 2.96
Race/ethnicity	10,817						
White, non-Hispanic		13.5 ± 0.8*	Reference		3.2 ± 0.3*	Reference	
Black, non-Hispanic		25.4 ± 2.1*	2.06	1.54, 2.76	8.4 ± 0.8*	2.39	1.68, 3.41
Hispanic or Latino		17.3 ± 1.1*	1.42	1.13, 1.78	6.4 ± 0.7*	1.94	1.44, 2.61
Other/multiracial, non-Hispanic		15.0 ± 2.0*	1.05	0.78, 1.40	5.0 ± 1.4*	1.20	0.72, 1.98
Weight status[4]	9692						
Underweight/normal weight		16.0 ± 0.9	Reference		4.7 ± 0.4	Reference	
Overweight		17.9 ± 1.3	1.19	0.97, 1.45	4.5 ± 0.8	0.96	0.69, 1.35
Obese		14.6 ± 1.4	1.00	0.74, 1.34	4.9 ± 1.0	1.00	0.62, 1.61
Beverage vending machine dispenses SSB in school[5]	10,647						
Yes		15.6 ± 0.8	0.99	0.84, 1.17	4.1 ± 0.4*	0.64	0.46, 0.89
No/not sure		16.5 ± 0.8	Reference		6.7 ± 0.7*	Reference	
Eat at fast-food restaurants	10,699						
0 d/wk		10.3 ± 0.9*	Reference		3.4 ± 0.5*	Reference	

		Sports drink ≥1 time/d			Energy drink ≥1 time/d		
		Bivariate analysis	Multivariable logistic regression analysis[2]		Bivariate analysis	Multivariable logistic regression analysis[2]	
Characteristics	***n***	**Weighted % ± SE[3]**	**Adjusted OR**	**95% CI**	**Weighted % ± SE[3]**	**Adjusted OR**	**95% CI**
1–2 d/wk		14.0 ± 0.8*	1.32	1.08, 1.62	3.2 ± 0.4*	0.80	0.55, 1.16
≥3 d/wk		23.2 ± 1.2*	2.36	1.93, 2.89	8.4 ± 0.8*	1.87	1.25, 2.82
Physically active ≥ 60 min/d during previous 7 d	10,919						
<5 d/wk		11.5 ± 0.8*	0.55	0.43, 0.69	4.1 ± 0.4*	0.80	0.65, 1.00
≥5 d/wk		21.0 ± 1.2*	Reference		5.7 ± 0.4*	Reference	
Television watching on average school day	10,984						
≤2 h/d		15.5 ± 0.9*	Reference		4.2 ± 0.4*	Reference	
>2 h/d		17.3 ± 0.8*	1.04	0.87, 1.25	6.4 ± 0.5*	1.37	1.07, 1.75

[1] SSB, sugar-sweetened beverage.

* χ^2 tests were used for each variable to examine differences across categories, $P < 0.05$.

[2] The multivariable logistic regression model for each SSB included a sample of 9149 students without missing data.

[3] Because of rounding, weighted percentages may not add up to 100%.

[4] Measured weight and height were used to calculate BMI. Underweight/normal weight was defined as BMI <85th percentile; overweight was defined as BMI ≥85th to <95th percentile; and obesity was defined as BMI ≥95th percentile, based on reference data.

[5] Beverage vending machine that dispenses soda or pop, sports drinks, or fruit-flavored drinks that are not 100% juice, such as Coke, Gatorade, or Sunny Delight.