



Food Surveys Research Group
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Late Evening Food and Beverage Consumption by Adolescents in the U.S.

What We Eat in America, NHANES 2013-2016

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Highlights

- ▶ Nearly two in three (63%) adolescents consumed a food or beverage other than plain water in the late evening. Prevalence was higher among older than among younger adolescents.
- ▶ Late evening consumption was more common among non-Hispanic Blacks than among non-Hispanic Whites.
- ▶ More than one in four (27%) adolescents obtained 30% or more of their total daily energy from late evening consumption.
- ▶ Adolescents who consumed late evening foods/beverages had higher total daily intakes of energy, most energy-providing nutrients, vitamins C and E, calcium, magnesium, and potassium than those who did not.
- ▶ Among consumers, late evening foods/beverages contributed 28% of total daily energy and 21 to 30% of all nutrients examined.
- ▶ In the late evening, the most commonly consumed type of food was “snacks and sweets” and the most commonly consumed beverage was water.

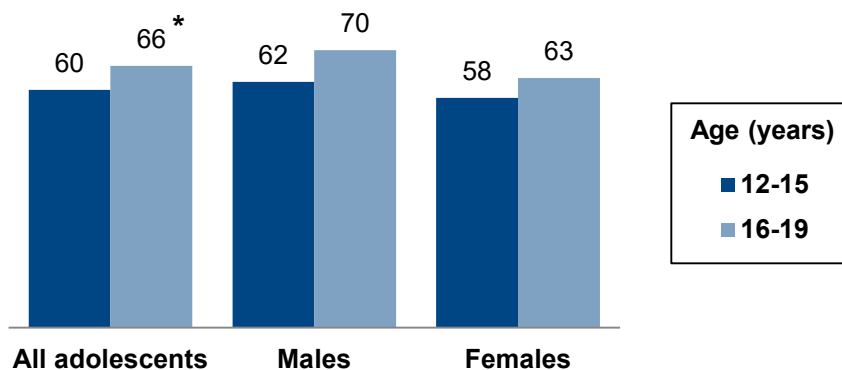
The adolescent obesity rate in the United States has nearly doubled over the past 3 decades. Currently, 20.6% of adolescents are affected by obesity (1). The primary cause of obesity is consuming more energy than one expends. For that reason, researchers seek to identify factors that are related to higher energy intakes. A recent German study found that, among adolescents, eating late in the day was associated with a higher total daily energy intake (2). However, information about consumption during this time of day by U.S. youth is lacking. This data brief characterizes food/beverage consumption by individuals age 12 to 19 years in the U.S. population during the late evening (from 8:00 pm through 11:59 pm; see “Definitions” on page 9) and identifies associations with energy and nutrient intake. This analysis is based on one day of dietary intake data from What We Eat in America (WWEIA), National Health and Nutrition Examination Survey (NHANES) 2013-2016.

Who consumed foods/beverages in the late evening?

On any given day, 63% of adolescents overall consumed one or more foods or beverages other than plain water in the late evening (*data not shown*). Among all adolescents, the percentage was higher for those age 16-19 years than for those 12-15 years (*figure 1*).

Prevalence of late evening consumption did not differ by sex, income, day of the week (i.e., on weekdays versus weekend days), or weight status.

Figure 1. Prevalence (%) of late evening consumption among adolescents age 12-19 years, by sex and age: United States, 2013-2016



*Significantly different from 12- to 15-year-olds ($p < 0.01$).
SOURCE: WWEIA, NHANES 2013-2016.



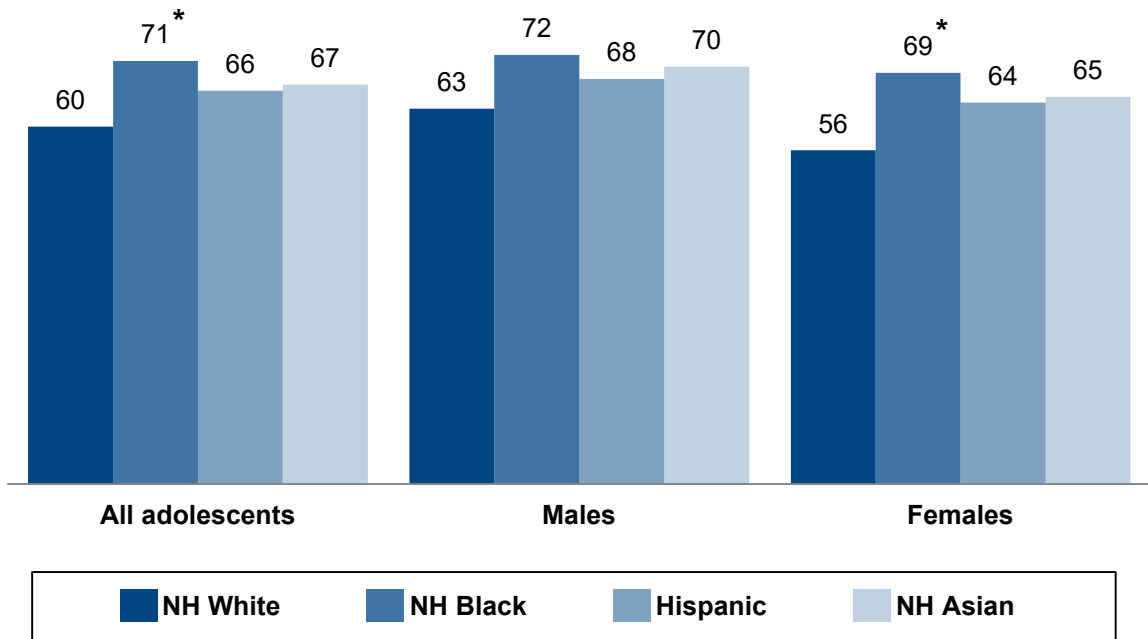
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Did the prevalence of late evening food/beverage consumption differ by race/ethnicity?

Among all adolescents and among females, the prevalence of late evening consumption was higher for non-Hispanic (NH) Blacks than for NH Whites (*figure 2*). No differences in prevalence of late evening consumption by race/ethnicity were seen among males.

Figure 2. Prevalence (%) of late evening consumption among adolescents age 12-19 years, by sex and race/ethnicity¹: United States, 2013-2016



¹Excludes individuals who were multi-racial or of a racial group other than those listed; see "Data source" on page 9.

*Significantly different from NH White adolescents ($p < 0.01$).

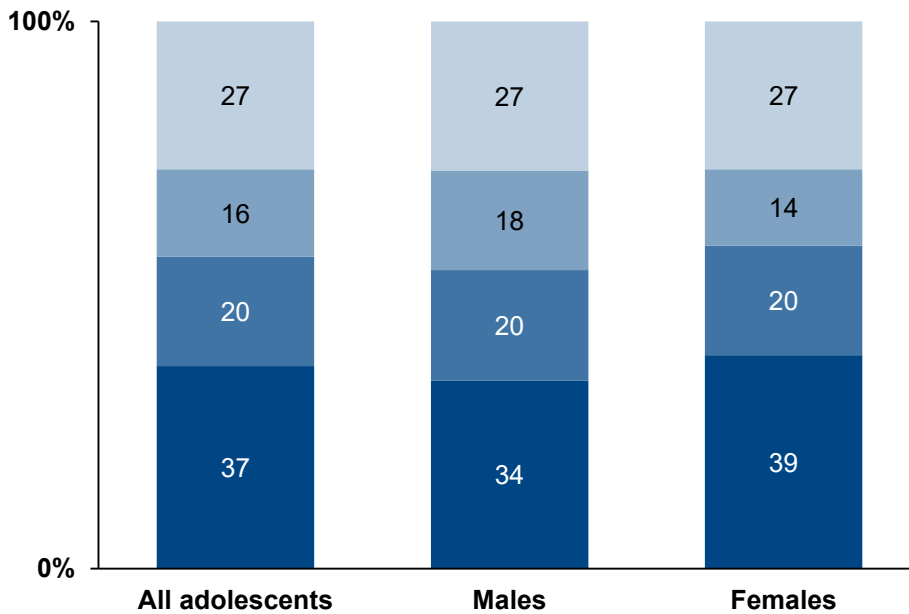
SOURCE: WWEIA, NHANES 2013-2016.

What percentage of total daily energy was consumed in the late evening?

Late evening consumption accounted for 18% of total daily energy intake among adolescents overall (*data not shown*).

Distributions of individuals classified into categories of energy intake are shown in figure 3 for all adolescents and by sex. Being considered a late evening consumer or non-consumer was based on whether the individual ate or drank anything besides plain water during the late evening period.

Figure 3. Percentages of adolescents age 12-19 years in specified categories of total daily energy intake from late evening foods/beverages, by sex: United States, 2013-2016



Category of total daily energy intake provided by late evening foods/beverages:

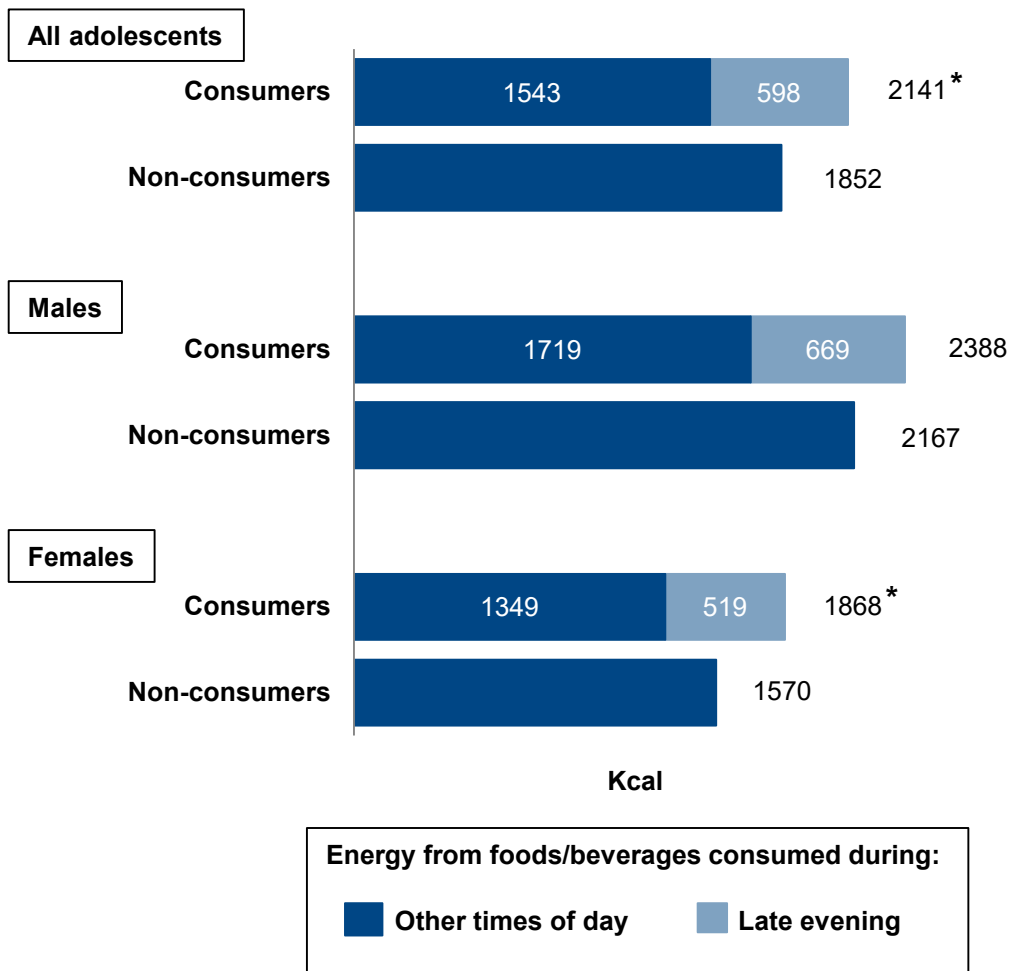
Non-consumers
 <15%
 15-30%
 30%

SOURCE: WWEIA, NHANES 2013-2016.

Was total daily energy intake higher for late evening consumers than for non-consumers?

Among all adolescents, mean total daily energy intake was nearly 300 kcal higher for consumers of late evening foods/beverages than for non-consumers (*figure 4*). The pattern was similar among females. Among males, energy intake did not differ by late evening consumption status.

Figure 4. Energy intake (kcal¹) by late evening consumption status among adolescents age 12-19 years, by sex: United States, 2013-2016



¹kcal, kilocalories

*Total daily energy intake was significantly higher for adolescent consumers than for non-consumers ($p < 0.01$).

SOURCE: WWEIA, NHANES 2013-2016.

Did total daily intakes of nutrients differ by late evening consumption status?

Among all adolescents and among females, intakes of most of the energy-providing nutrients examined were higher for late evening consumers than for non-consumers, as shown in table 1. Among males, the only energy-providing nutrient that differed between consumers and non-consumers was saturated fat.

Relative to non-consumers, late evening consumers had higher intakes of vitamin C (all adolescents), vitamin E (all, females), calcium (all, males), and magnesium and potassium (all, females).

Table 1. Mean daily intake of selected nutrients by late evening consumption status among adolescents age 12-19 years, by sex: United States, 2013-2016

Nutrient	All adolescents		Males		Females	
	C	NC	C	NC	C	NC
Energy-providing nutrients:						
Protein (g)	79	72	92	86	65*	59
Carbohydrate (g)	272*	237	298	276	243*	201
Added sugars (tsp eq)	20*	17	22	20	18*	14
Dietary fiber (g)	15.1	14.1	16.3	16.0	13.7	12.4
Total fat (g)	84*	71	93	82	73*	61
Saturated fat (g)	28.6*	24.1	32.3*	27.8	24.5*	20.8
Vitamins:						
Vitamin A (mcg RAE)	603	539	684	585	513	497
Vitamin C (mg)	72.2*	59.5	76.0	64.1	68.1	55.4
Vitamin D (mcg)	5.1	4.6	6.2	5.2	3.9	4.0
Vitamin E (mg α-TE)	8.6*	6.8	9.5	7.8	7.6*	6.0
Folate (mcg DFE)	558	521	625	580	485	467
Minerals:						
Calcium (mg)	1052*	924	1217*	1044	871	817
Iron (mg)	15.2	14.3	17.3	16.7	12.9	12.2
Magnesium (mg)	262*	234	294	271	227*	202
Potassium (mg)	2322*	2076	2618	2385	1995*	1798
Sodium (mg)	3506	3188	3961	3703	3004	2727

Abbreviations: C, consumer; NC, non-consumer; g, grams; tsp eq, teaspoon equivalents; mcg, micrograms; RAE, retinol activity equivalents; mg, milligrams; α-TE, alpha-tocopherol equivalents; DFE, dietary folate equivalents.

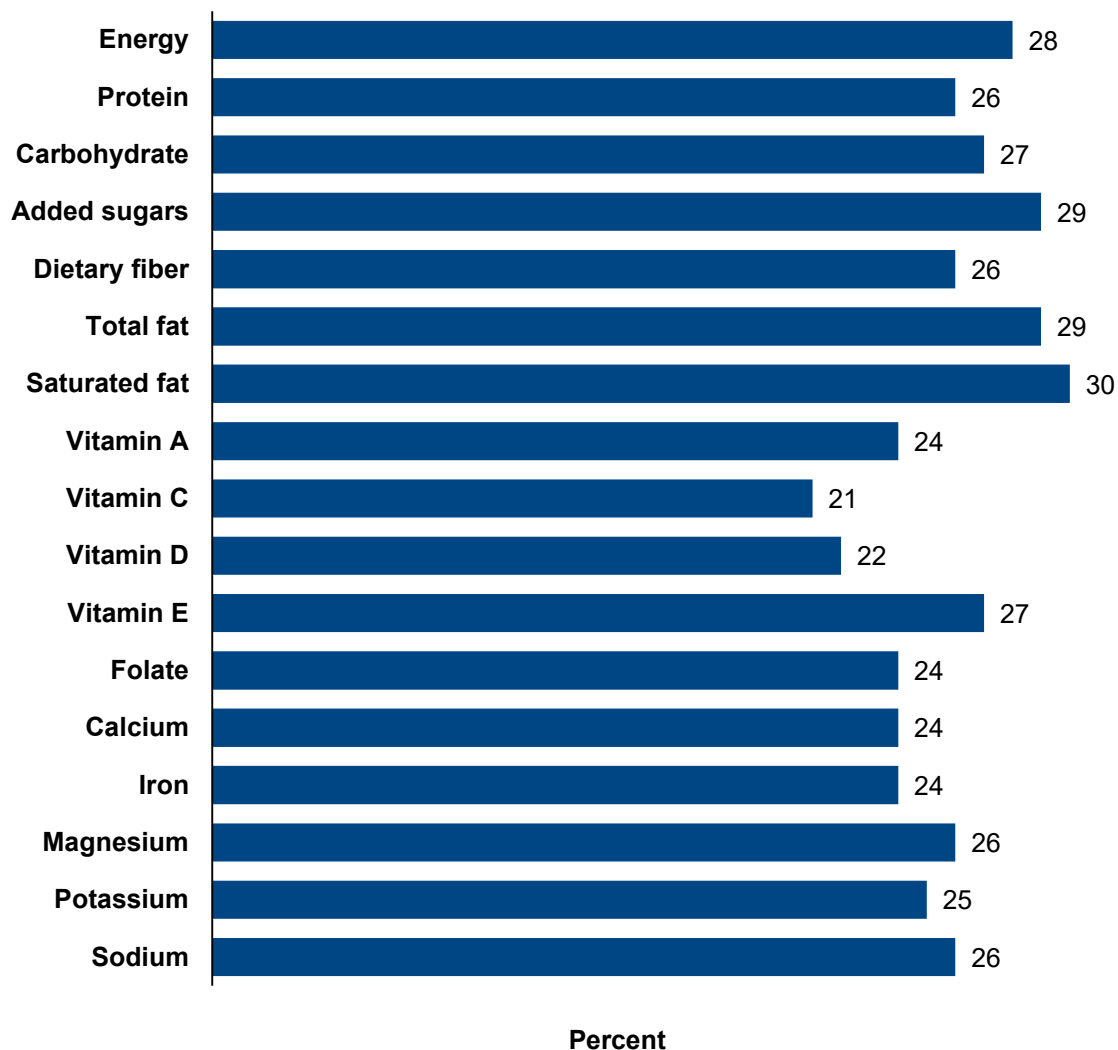
*Intake was significantly higher for adolescent consumers than for non-consumers ($p < 0.01$).

SOURCE: WWEIA, NHANES 2013-2016.

How much did late evening foods and beverages contribute to total daily intakes of energy and nutrients?

Among adolescent late evening consumers, foods and beverages consumed during this time of day accounted for 28% of total daily energy intake (*figure 5*). Late evening consumption's contributions to intakes of most nutrients were comparable to its energy contribution. The percentage contribution of late evening consumption to overall intake of energy and nutrients did not vary by sex.

Figure 5. Contributions by late evening consumption to total daily intakes of energy and selected nutrients among adolescents age 12-19 years, consumers only: United States, 2013-2016



SOURCE: WWEIA, NHANES 2013-2016.

What foods did late evening consumers commonly eat?

The vast majority of adolescents who were late evening consumers ate at least one food between 8:00 pm and 11:59 pm (*table 2*). The most commonly consumed WWEIA Food Category was “snacks and sweets.” Mixed dishes was the WWEIA Food Category that contributed the largest mean amount of energy to intakes of late evening consumers who ate them.

Table 2. Foods most frequently consumed in the late evening: Percentage of late evening consumers eating and mean energy contribution per consumer among adolescents age 12-19 years: United States, 2013-2016

WWEIA Food Category	Late evening consumers who ate a food from that category (%)	Mean energy contribution per consumer among those who ate a food from that category (kcal) ¹
All foods	89	564
Snacks and sweets	44	335
Sweet bakery products	15	331
Savory snacks	14	257
Other desserts	11	325
Candy	9	205
Mixed dishes	36	600
Sandwiches	11	528
Grain-based mixed dishes	7	431
Pizza	7	759
Protein foods	14	365
Poultry	7	399
Vegetables	13	200
White potatoes	8	245
Vegetables excluding potatoes	7	99
Grains	13	307
Breads, rolls, tortillas	5	220
Ready-to-eat cereal	4	332
Fruits	9	94
Cheese and yogurt	3	160

¹kcal, kilocalories

SOURCE: WWEIA, NHANES 2013-2016.

What beverages did late evening consumers commonly drink?

Nearly three out of four late evening consumers drank a beverage during that time period (*table 3*). Water was the WWEIA Food Category most common among adolescent late-evening consumers, followed by sweetened beverages. Percentages of adolescent consumers who drank beverages in the other categories presented below during the late evening period were much smaller.

Table 3. Beverages most frequently consumed in the late evening: Percentage of late evening consumers drinking and mean energy contribution per consumer among adolescents 12-19 years: United States, 2013-2016

WWEIA Food Category	Late evening consumers who drank a beverage from that category (%)	Mean energy contribution per consumer among those who drank a beverage from that category (kcal) ¹
All beverages ²	70	125
Water ³	30	1
Plain water	30	0
Tap water	18	0
Bottled water	11	0
Sweetened beverages	27	160
Soft drinks	17	165
Fruit drinks	7	120
Sport and energy drinks	3	156
Milk and dairy ⁴	13	236
Milk	8	179
Tea	5	92
100% juice	4	146
Diet beverages	3	8
Coffee	1	218

¹kcal, kilocalories.

²Includes non-alcoholic beverages only.

³In this analysis, those who consumed only plain water in the late evening were classified as non-consumers (see “Definitions” on page 9). For that reason, the percentages of all adolescents consuming water and its subgroups in the late evening are higher than those for late-evening consumers, which are shown here.

⁴Excludes cheese and yogurt, which are included in table 2 on page 7.

SOURCE: WWEIA, NHANES 2013-2016.

Definitions

Consumer/non-consumer: In general, anyone who had any late evening consumption (*see definition below*) was considered a “consumer,” whereas anyone who did not was considered a “non-consumer.” The single exception was that individuals who drank only plain water during the late evening were considered non-consumers. In all, 1,661 adolescents were classified as late evening consumers (856 males and 805 females), and 831 were classified as non-consumers (399 males and 432 females). Classification as a consumer or non-consumer for this analysis has no implications as to habitual intake. People classified as non-consumers may eat foods and/or drink beverages in the late evening on some days, even though they did not on the intake day. Likewise, those classified as consumers do not necessarily eat foods and/or drink beverages in the late evening every day.

Kilocalories: Scientific unit used in reporting the energy content of food; shortened to “calories” in casual usage in the U.S.

Late evening consumption: Food and/or beverage intake that commenced between 8:00 pm and 11:59 pm on the intake day.

Weekdays/weekends: Dietary intakes were collected across all days of the week. Previous examination of national survey data has shown that dietary intakes on Monday through Thursday are similar to each other and that intakes on Friday are more similar to those on Saturday and Sunday (5). For that reason, in this analysis Monday through Thursday were considered weekdays and Friday through Sunday were considered weekend days.

Weight status: Weight and height were measured on the same day as the dietary interview. Body mass index (BMI), an indicator of weight status, was calculated as weight in kilograms divided by the square of height in meters and then assessed against age- and sex-specific percentiles in the 2000 Centers for Disease Control and Prevention growth charts (3). Weight status categories used in this analysis were BMI <85th percentile (includes normal/healthy weight and underweight), BMI ≥85th percentile and <95th percentile (overweight), and BMI ≥95th percentile (obese; 4).

WWEIA Food Categories: Available at www.ars.usda.gov/Services/docs.htm?docid=23429 is a full list of the WWEIA Food Categories, a scheme for classifying each food and beverage reported in WWEIA, NHANES into one of approximately 150 mutually exclusive categories. In contrast to the WWEIA Food Categories’ item-by-item classification, this analysis classified as a group any foods or beverages that were represented in the dietary data by two or more items linked as having been consumed together. In such cases, all of the linked items were classified together into the most appropriate WWEIA Food Category. For example, a tomato sandwich represented in the dietary data as bread, tomato, lettuce, and spread would be assigned to the “sandwiches” group, along with the sandwiches that were not represented by multiple items, i.e., the “single-code sandwiches” that make up the WWEIA Food Category “mixed dishes - sandwiches (single code).” Similarly, if sugar was consumed with tea, it was assigned to the tea group in this analysis.

Data source

Estimates in this data brief are based on one day of data from WWEIA, NHANES 2013-2016 (6). Day 1 dietary data were collected in person using the 5-step USDA Automated Multiple-Pass Method for the 24-hour recall. A total of 2,492 individuals age 12-19 years (1,255 males and 1,237 females) provided complete and reliable dietary intake data. Only in the race-specific analysis (see page 2), individuals who were multi-racial or of a racial group other than those listed (141 adolescents, of whom 91 were late evening consumers) were excluded. Sample weights were applied in all analyses to produce nationally representative estimates. Intakes of energy and nutrients were calculated using the 2013-2014 and 2015-2016 versions of USDA’s Food and Nutrient Database for Dietary Studies (7) and Food Patterns Equivalents Database (8).

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