

Correlates of Sugar-Sweetened Beverages Purchased for Children at Fast-Food Restaurants

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Objectives. To determine consumer and fast-food purchase characteristics associated with the purchase of a sugar-sweetened beverage, as well as calories and grams of sugar, for children at a fast-food restaurant.

Methods. We completed cross-sectional analyses of fast-food restaurant receipts and point-of-purchase surveys (n = 483) collected during 2013 and 2014 in New York City and Newark and Jersey City, New Jersey.

Results. Caregivers purchased beverages for half of all children in our sample. Approximately 60% of these beverages were sugar-sweetened beverages. Fast-food meals with sugar-sweetened beverages had, on average, 179 more calories than meals with non-sugar-sweetened beverages. Being an adolescent or male, having a caregiver with a high school degree or less, having a caregiver who saw the posted calorie information, ordering a combination meal, and eating the meal in the restaurant were associated with ordering a sugar-sweetened beverage. Purchases that included a combination meal or were consumed in the restaurant included more beverage grams of sugar and calories.

Conclusions. Characteristics of fast-food purchases appear to have the largest and most important association to beverage calories for children at fast-food restaurants. Targeting fast-food restaurants, particularly combination meals, may improve childhood obesity rates. (*Am J Public Health.* 2016;106:2038–2041. doi:10.2105/AJPH.2016.303427)

Childhood obesity is a serious public health problem in the United States, with 17% of children aged 19 years and younger classified as obese (body mass index at or greater than the 95th percentile) in 2011 to 2012.¹ Increased caloric intake is a main contributor to the recent growth in obesity.² In 2009 to 2010, children consumed an average of 155 calories from sugar-sweetened beverages each day.³ In New York City, approximately 42% of children in 2013 drank a sugar-sweetened beverage in the past week, a number that has declined since 2007.⁴ Sugar-sweetened beverages contribute calories and added sugars but no nutritional value. Sugar-sweetened beverage consumption increases caloric intake that is not offset by consuming fewer calories from other sources.⁵ The most recent Dietary Guidelines for Americans recommend that children limit their consumption of added sugars to 10% of total

calories, yet national estimates show that children consume more than these recommended levels.⁶

We contribute to the literature on exposure of children to sugar-sweetened beverages by using fast-food receipt and point-of-purchase survey data. The objective nature of receipt data improves on the limitations known to exist with dietary recall data⁷ and allows us to control for meal characteristics not available in other survey data. We examined consumer and fast-food purchase characteristics associated with the purchase of beverages and sugar-sweetened

beverages for children at fast-food restaurants.

METHODS

The data used for this study were collected as part of a project evaluating the since-overturned amendment to New York City's health code that limited the size of certain fountain beverages. We surveyed lunch and dinner customers in New York City and Newark and Jersey City, New Jersey, at the 5 most common fast-food restaurant chains in New York City. Details on data collection methods are available elsewhere.⁸ We included food and beverages on fast-food receipts in our analytic sample if the accompanying adult respondents indicated purchasing any item on the receipt for a child and the child was present at the time of the interview. We obtained nutritional information for all receipt food items from the restaurant chains' Web sites. We defined sugar-sweetened beverages as any beverages with added sugar, including soft drinks, sweetened tea, and flavored milks. Because the food industry estimates that ice displaces 40% of the volume of a beverage cup, we multiplied the nutritional content of fountain beverages without ice by 1.67.⁹ We doubled the nutrition information for refilled beverages.

We used multivariable logistic regressions to calculate the predicted probabilities for purchases of a sugar-sweetened beverage for a child. In addition, we estimated linear regression models to identify correlates of total

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TABLE 1—Sample Characteristics, Predicted Probabilities for Purchase of a Sugar-Sweetened Beverage, and Adjusted Mean Grams of Sugar and Calories for Child Beverages at Fast-Food Restaurants: New York, NY, and Newark and Jersey City, NJ, 2013–2014

Sample Characteristics, %	Purchased SSB, Predicted % (95% CI)	Beverage Mean Sugar, g (95% CI)	Beverage Mean Calories, kcal (95% CI)
Entire sample	33	21	85
Child characteristics			
Age, y			
≤ 11	85.5	32** (31, 33)	20 (19, 21)
≥ 12	14.5	39** (35, 44)	26 (21, 32)
Gender			
Male	45.5	38** (35, 42)	22 (20, 25)
Female	54.5	29** (26, 32)	19 (18, 21)
Caregiver characteristics			
Employment status			
Not employed	42.9	32 (28, 37)	21 (17, 25)
Employed	57.1	34 (30, 37)	21 (18, 24)
Race/ethnicity			
Non-Hispanic White	5.8	37 (28, 47)	15 (10, 20)
Non-Hispanic Asian or American Indian	3.9	36 (19, 53)	23 (13, 32)
Non-Hispanic African American	38.9	36 (31, 40)	23 (20, 26)
Hispanic	51.3	31 (28, 34)	19 (17, 22)
Highest level of education			
> high school	43.5	27** (25, 29)	18 (15, 21)
≤ high school degree	56.5	38** (36, 40)	23 (21, 25)
Did you see any calorie information in the restaurant?			
Did not see calorie labels	61.5	31** (30, 32)	20* (19, 21)
Did see calorie labels	38.5	36** (34, 38)	22* (20, 24)
Purchase characteristics			
Mealtime			
Dinner (4:30 PM to 7:30 PM)	49.7	34* (33, 34)	19 (18, 21)
Lunch (11:30 AM to 2:30 PM)	50.3	32* (32, 33)	22 (20, 24)
Combination meal purchased?			
No	58.4	23** (20, 26)	13** (10, 15)
Yes	41.6	47** (42, 52)	32** (29, 36)
Did you order eat in or to go?			
Eat in	46.8	40** (37, 43)	23* (21, 25)
To go	53.2	27** (24, 29)	19* (17, 20)

Note. CI = confidence interval; SSB = sugar-sweetened beverage. A logistic model was used for the purchased sugar-sweetened beverage outcome. Predicted probabilities are reported in that column. Ordinary least squares was used for the beverage calories and sugar outcome. Regression adjusted means are reported in their respective columns. Additional controls include the restaurant chain and the number of times the respondent went to a fast-food restaurant in the past week. SEs were clustered at the restaurant chain level. The sample size was $n = 483$.

* $P < .05$; ** $P < .01$, indicating differences among groups within each variable.

number of child beverage calories and grams of sugar. All regression models controlled for child characteristics, including age and gender; caregiver characteristics, including employment status, self-reported race/ethnicity, frequency of fast-food visits in the past week, and highest level of education; and fast-food

meal characteristics, including mealtime, location of restaurant (state), restaurant chain, and indicators for round of data collection and whether meal was taken to go or eaten in and whether it was a combination meal. Regression SEs were clustered at the restaurant chain level.

RESULTS

Our sample included 483 children and adolescents, 160 of whom had a sugar-sweetened beverage (33%). Approximately half of the beverages were soda (49%), 38% were juice, 5% were flavored milk, 2% were unflavored milk, 1% were water, and 5%

were other beverages (such as lemonade, sweet tea, hot chocolate). Table 1 includes descriptive statistics for characteristics of the children, their caregivers, and the individual purchases. Approximately 86% of our sample was aged 11 years or younger. Our sample had more females (55%) than males (45%). Fewer than half of our sample (42%) purchased a combination meal, of which 74% were kids' meals. Meals ordered for children contained an average 628 calories (SD = 358). However, meals that included a sugar-sweetened beverage averaged 722 calories (SD = 356) compared with 543 calories (SD = 254) for meals that included a non-sugar-sweetened beverage.

Table 1 also includes results from a logistic regression model in which the outcome variable was the purchase of a sugar-sweetened beverage and ordinary least squares regression with amount of calories and sugar for children's beverages. Adolescents (39%) and males (38%) were more likely to purchase a sugar-sweetened beverage. Children with parents with a high school degree or less (38%), who made their purchase during dinner hours (34%), who had a combination meal (47%), who had a caregiver who saw the posted calorie information (36%), and who ate their meal in the restaurant (40%) were more likely to purchase a sugar-sweetened beverage.

Neither the child's age category nor the gender characteristics were correlated to the number of grams of sugar or calories in the beverage. Three caregiver characteristics were significant: (1) beverage purchases by caregivers with a high school degree or less contained an average of 21 additional calories, (2) caregivers who saw calorie labels purchased drinks with 10 additional calories and 2 additional grams of sugar, and (3) African American caregivers purchased beverages with 15 additional calories compared with Hispanic caregivers.

Characteristics of the purchase were correlated with beverage grams of sugar and calories. Having a combination meal was associated with 82 additional beverage calories and 19 additional beverage grams of sugar. We also found that the setting of the meal mattered. Those who made their purchase to go bought beverages with 4 fewer grams of

sugar and 14 fewer calories than those who ate in the restaurant.

DISCUSSION

Our results indicate that children who have a sugar-sweetened beverage with their fast-food meal have more beverage calories and more beverage grams of sugar. Our results suggest that race/ethnicity is correlated with the number of sugar-sweetened beverage calories purchased (with African Americans purchasing more than Hispanics) but not with the probability of making a purchase or the grams of sugar purchased. We found that fast-food meals with sugar-sweetened beverages had, on average, 179 more calories compared with meals with non-sugar-sweetened beverages. This difference in calories is important because it likely exceeds the national dietary guidelines of added sugar for children with a single meal in the day (120–180 calories). As a result, our findings suggest that one avenue for improving childhood obesity rates is to target fast-food restaurants.

This study had several limitations. First, we adjusted the beverage calories and grams of sugar for the 2% of children who refilled their beverage (4% of children with a beverage) based on the assumptions that refilled beverages were refilled only once, only after the first portion was consumed entirely, and that the beverage was completely refilled. To our knowledge, no standard refill adjustment exists. As a result, we may have misestimated the beverage calories and ounces for this small subgroup. Second, we only observed the size of the beverage purchased but not how much of each drink was actually consumed. Third, our sample did not include drive-through customers, which may make up a significant portion of fast-food restaurant traffic in some locations, particularly New Jersey. Finally, our results may not generalize to other fast-casual dining, other sit-down or full-service restaurants, or, more generally, all children. We do not know the response rate for our survey, but previous studies have indicated that the participation rate is as high as 60%.¹⁰

Because we found a strong correlation between having ordered a combination meal and consuming a sugar-sweetened beverage, a possible effective policy option for reducing sugar-sweetened beverage consumption would be to decouple sugar-sweetened beverages from combination meals.¹¹ Such an ordinance recently passed in Stockton, California. The goal was to remove sugar-sweetened beverages from being the default beverage for kids' meals. It is well established that most combination meals are, on average, less healthy.¹² Our findings indicate that decoupling sugar-sweetened beverages from combination meals, a practice that several chains have already started, could reduce the number of beverage calories and grams of sugar purchased and consumed.¹¹ **AJPH**

CONTRIBUTORS

J. Cantor and A. Breck conceptualized the study and contributed to the analysis, interpretation of the results, and writing of the article. B. Elbel conceptualized the study, design, and analysis plan and contributed to the interpretation of the results and the writing of the article.

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HUMAN PARTICIPANT PROTECTION

The study received approval from the Institutional Review Board of New York University School of Medicine.

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