

U.S. Households' Children's Drink Purchases:  
2006–2017 Trends and Associations With  
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**Introduction:** Sugar-sweetened beverages contribute a large proportion of added sugar in young children's diets; yet, companies market sugar-sweetened children's drinks extensively to children and parents. This study examines the changes in children's drink purchases by U.S. households with young children and the associations with marketing practices.

**Methods:** Longitudinal Nielsen U.S. household panel data provided monthly volume purchases by children's drink category (sugar-sweetened fruit drinks and flavored water and unsweetened juices) among households with young children (aged 1–5 years) from 2006 to 2017. Differences by household race/ethnicity and income were assessed. The 2-part models examined the associations between household purchases and marketing (including price and brand TV advertising) for each category, controlling for sociodemographics. Data were collected and analyzed in 2019–2020.

**Results:** Households' volume purchases of children's fruit drinks and unsweetened juices declined from 2006 to 2017, whereas flavored water purchases increased. Non-Hispanic Black households purchased significantly more fruit drinks (351.23 fluid ounces/month, 95% CI=342.63, 359.82) than non-Hispanic White (204.43 fluid ounces/month, 95% CI=201.81, 207.05) and Hispanic (222.63 fluid ounces/month, 95% CI=217.11, 228.15) households. Low-income households purchased more fruit drinks and fewer unsweetened juices than higher-income households ( $p<0.001$ ). TV brand advertising was positively associated with purchases across all categories, and this relationship was stronger for low-income households ( $p<0.05$ ).

**Conclusions:** Despite expert recommendations that young children do not consume Sugar-sweetened beverages, households with young children purchase more sweetened fruit drinks than unsweetened juices. Extensive TV advertising for children's drink brands may exacerbate the racial and income disparities in sugar-sweetened beverage purchases. Public health initiatives to address sugar-sweetened beverage consumption by young children and restrictions on marketing sugar-sweetened beverages to children are necessary.

*Am J Prev Med 2021;000(000):1–9. © 2021 American Journal of Preventive Medicine. Published by Elsevier Inc. All rights reserved.*

## INTRODUCTION

Sugar-sweetened beverage (SSB) consumption in early childhood (from birth to age 5 years) contributes to increased risk for diet-related diseases, including obesity, dental caries, and type 2 diabetes.<sup>1</sup> SSBs are the largest source of added sugar in young children's diets in the U.S.<sup>2,3</sup>; approximately 30% of young toddlers (aged 12–23.9 months) consume SSBs

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0749-3797/\$36.00

<https://doi.org/10.1016/j.amepre.2021.06.013>

on any given day, increasing to 45% of preschoolers (aged 24–47.9 months).<sup>4,5</sup> Fruit drinks are the most commonly consumed type of SSBs by children aged <6 years,<sup>3</sup> and 34% of young children (aged 12–47.9 months) consume fruit drinks on a given day.<sup>5</sup> Furthermore, young non-Hispanic Black and Mexican American children (aged 2–5 years) consume more fruit drinks and total SSBs than non-Hispanic White and other Hispanic children.<sup>6</sup>

Although health and nutrition experts counsel against serving fruit drinks or other SSBs to children aged <6 years,<sup>3</sup> U.S. sales of SSBs marketed specifically for children to consume (children's drinks) totaled \$1.3 billion in 2018. Sweetened children's drinks include fruit drinks (fruit-flavored drinks with added sugar and/or non-nutritive sweeteners) and flavored waters (labeled as water beverages and containing added sugar and/or non-nutritive sweeteners).<sup>7</sup> These drinks contain significant amounts of total sugar (median of 16 grams in children's fruit drinks) and little to no juice (median of 5%).<sup>7</sup> By contrast, sales of unsweetened children's juices, including 100% juice and juice/water blends (diluted juice without added sweeteners), totaled \$839 million, representing only 38% of all children's drink sales.

Furthermore, companies continue to extensively market children's fruit drinks and flavored waters to children and parents. In 2018, annual U.S. advertising expenditures for these categories totaled \$21 million. Young children (aged 2–5 years) viewed twice as many TV advertisements for sweetened children's drinks as for children's unsweetened juices.<sup>7</sup> Moreover, some fruit drink brands disproportionately target advertising to Spanish-speaking households and/or Black children.<sup>7</sup> Research has documented an association between TV advertising for children's cereals and cereal purchases in households with children.<sup>8</sup> However, studies have not examined the relationship between the marketing of children's drinks and household purchases.

Availability of SSBs and other characteristics of the home environment are also associated with school-age children's beverage consumption.<sup>9</sup> The home environment may be even more influential for younger children because parents are the primary provider of SSBs to children aged <6 years.<sup>10</sup> From 2002 to 2014, SSB purchases by households at all levels of consumption declined significantly,<sup>11</sup> although disparities persisted. Low income and non-Hispanic Black households purchased more SSBs than higher income and non-Hispanic White and Hispanic households. However, previous studies have not examined the availability of children's SSBs or unsweetened juices in households with children aged <6 years.

Therefore, additional research is needed to examine whether purchases of sweetened children's drinks by

households with young children have declined and whether marketing and purchases of these drinks are related. This study assesses the trends (2006–2017) in children's drink purchases among U.S. households with young children by category, including sweetened fruit drinks and flavored water and unsweetened juices (100% juice and juice/water blends) for comparison. It also examines the differences in purchases by household income and race/ethnicity. Statistical models investigate the relationship between household purchases of children's drinks by category and marketing of those drinks, controlling for sociodemographic characteristics.

## METHODS

### Study Sample

Nielsen consumer panel data provided purchases of children's drink products by households with young children (aged 1–5 years) for 2006–2017. The Nielsen consumer panel includes 40,000–60,000 nationally representative households who agree to participate for 1 year. Panelists scan every item purchased on all shopping trips (including online shopping) and record detailed information, including store location, retailer type, and date of purchase. Data also include Universal Product Code–level information for all food and beverage items purchased in each shopping trip over a 1-year period, including product brand, package type, package size, quantity purchased, the price paid, and whether it was purchased on deal (i.e., with a coupon or on deal, as defined by the participant). The data set also provides some demographic information for each household in the year, including ZIP code, household size, presence of children by age, head-of-household demographic information (income, education, race [White, Black, Asian, and Other], and Hispanic/non-Hispanic ethnicity), and demographic information for each household member (including age). The pooled cross-sectional data for 2006–2017 totaled 23,857 U.S. households with young children (aged 1–5 years) in the household who made  $\geq 1$  purchase of children's fruit drink, flavored water, or unsweetened juices in any year.

### Measures

The dependent variables included household purchase data for the 23 most popular children's drink brands, identified in a previous study, with  $\geq \$10$  million in national-product sales in 2018 and marketed as drinks for young children to consume. Using product information in the Nielsen consumer panel data, household purchases of all drinks within these 23 brands were grouped into 3 categories (fruit drinks, flavored water, or unsweetened juices) according to the criteria used in previous research.<sup>7</sup> Some brands, such as Capri Sun and Apple & Eve, offered products in >1 category (Appendix Table 1, available online). From 2006 to 2017, sample households made 285,210 children's drink purchases (of any size), including fruit drinks ( $n=146,872$ ), flavored water ( $n=18,790$ ), and unsweetened juices ( $n=119,548$ ). The quantity purchased (fluid ounces) and spending (U.S. dollars) were identified for each household and aggregated by beverage category and month.

Independent variables included marketing measures (average unit price, percentage of items purchased on deal, and TV

advertising goodwill) and household sociodemographic characteristics. Average unit price (\$/fluid ounce) was calculated for each household, category, and month by dividing the dollars spent (after discounts) by quantity, deflated using gross domestic product deflators.<sup>12</sup> The percentage of items purchased on deal (i.e., purchased with a coupon or on deal as reported by the participant) for each Universal Product Code was calculated for each household and shopping trip. TV advertising goodwill provides a measure of the cumulative lagged effect of advertising spending on future purchases. To assess TV advertising spending, this study used Nielsen national monthly TV advertising expenditures (including national and local TV) in 2006–2017 for the examined brands. Some brands advertised products in >1 category (e.g., Capri Sun original [fruit drink], Capri Sun Roarin' Waters [flavored water], Capri Sun Refreshers [juice/water blend], Capri Sun 100% juice). Brand-level TV advertising expenditures account for spillover effects of advertising on all products offered by the brand.<sup>13</sup> As in previous studies of advertising effects,<sup>13,14</sup> TV advertising goodwill was calculated as a log transformation of TV advertising expenditures depreciated monthly from  $t - 11$  months to  $t$  months. For each household and month, advertising goodwill for each brand purchased was calculated and aggregated by category.

Household sociodemographic characteristics included head-of-household race/ethnicity (non-Hispanic White, non-Hispanic Black, non-Hispanic Asian, Hispanic, non-Hispanic Other), number of household members (aged 1–12 years, 13–18 years, and >18 years), and household income. As in previous studies, income groups were classified as low income (<130% of the federal poverty level), moderate income (130% < income ≤185% of federal poverty level), and higher income (>185% of federal poverty level).<sup>15–17</sup>

### Statistical Analysis

For each drink category, unadjusted means of monthly volume purchases were calculated across income and race/ethnicity groups, and  $t$ -tests assessed the mean differences between groups. To examine the relationship between household purchases and marketing of drink brands, separate 2-part models were estimated for purchases of fruit drinks, flavored water, and unsweetened juices. The dependent variable in each equation was the monthly volume purchased by a given household for each category. Independent variables included average unit price; percentage of items purchased on deal; and TV advertising goodwill (marketing measures) and household income group, race/ethnicity, and the number of household members by age range (sociodemographic characteristics). An interaction term of TV advertising goodwill and household income also tested for potential heterogeneity in the relationship between advertising and purchases by income.

For each drink category, a logit model first predicted a probability for households to purchase that category of children's drinks. Then, a linear regression was used to estimate the purchased monthly amount conditional on any purchase in the first part. These 2-part models were used to account for households with 0 purchases of some product categories in a given month (ranging from 38% for fruit drinks to 92% for flavored waters) and nonlinearity in the data (Technical Appendix, available online, provides details).<sup>18</sup> Data were collected in 2019 and analyzed in 2020 using Stata MP, version 15.

## RESULTS

Table 1 shows the sample descriptive characteristics, with percentages weighted using Nielsen's projection factors. Households averaged 4.3 members, including 1.3 children aged <6 years. The average age of older children (6–18 years) was 9.7 years. Approximately 64% of heads of households were non-Hispanic White; 19% of households were categorized as low income, and 67% were categorized as higher income.

Weighted monthly household volume purchases across all categories decreased on average by 22% (–2% every year) from 334 fluid ounces in 2006 to 261 fluid ounces in 2017 (Figure 1 A). Unsweetened juice purchases decreased by 12% (90–79 fluid ounces), whereas flavored water purchases increased by 68% (5–8 fluid ounces). Fruit drink purchases also decreased by 27% (239–174 fluid ounces), but the total purchase amount remained higher than that of other drink categories. During this period, the average inflation-adjusted price of drinks increased in all categories (Figure 1 B),<sup>14</sup> including fruit drinks (42%; from \$0.02/fluid ounce in 2006 to \$0.03/fluid ounce in 2017), unsweetened juices (102%; from \$0.03/fluid ounce to \$0.07/fluid ounce), and flavored water (259%; from \$0.02/fluid ounce to \$0.09/fluid ounce). The total monthly TV advertising spending decreased by 32%, from \$9.5 million in 2006 to \$6.5 million in 2017, but trends differed by category.

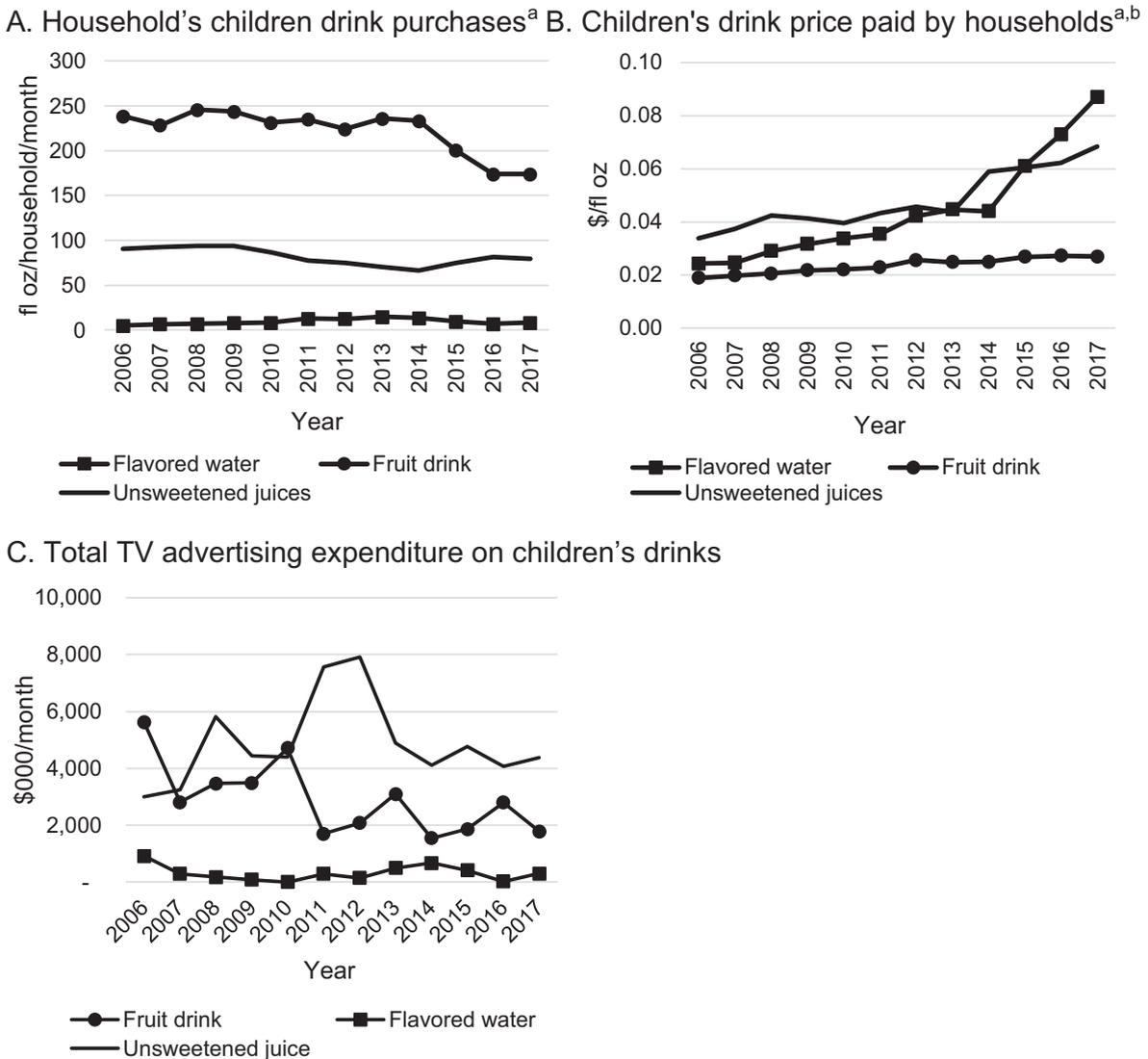
**Table 1.** Sample Household Characteristics

Characteristics	Frequency (%) <sup>a</sup>
Households with children aged 1–5 years	23,857
Race/ethnicity	
Non-Hispanic White	17,282 (64.1)
Non-Hispanic Black	2,298 (10.8)
Hispanic	2,683 (18.4)
Non-Hispanic Asian	1,003 (4.0)
Non-Hispanic Other	591 (2.7)
Household income <sup>b</sup>	
Low (≤130% of federal poverty level)	3,643 (18.8)
Middle (130% < income ≤ 185% of federal poverty level)	3,698 (14.8)
Higher (>185% of federal poverty level)	16,516 (66.5)
Characteristics	Mean (SD)
Number of household members <sup>a</sup>	4.4 (1.3)
Ages 1–5 years	1.3 (0.5)
Ages 6–12 years	0.7 (0.8)
Ages 13–18 years	0.2 (0.5)
Age >18 years	2.2 (0.7)

Note: Data were from the 2006–2017 Nielsen consumer panel data.

<sup>a</sup>Statistics were weighted using Nielsen projection factors to ensure national representativeness.

<sup>b</sup>The federal poverty level was calculated using the HHS poverty guidelines for each year.<sup>16</sup>



**Figure 1.** Trends in children's drink purchases by households with young children and TV advertising expenditures.

Note: Data were from the 2006–2017 Nielsen consumer panel data.

<sup>a</sup>Statistics were weighted using Nielsen projection factors to ensure national representativeness.

<sup>b</sup>Prices were deflated using GDP deflators.

GDP, gross domestic product; fl oz, fluid ounce.

Advertising on children's fruit drinks and flavored water decreased by 68%, whereas unsweetened juice advertising increased by 47% (Figure 1 C). The percentage of items purchased on deal decreased for all categories, including for fruit drinks (34% in 2006–17% in 2017), flavored water (44%–17%), and unsweetened juices (31%–21%).

Table 2 shows the differences in unadjusted volume purchases across household demographic characteristics. In 2006–2017, households with young children (aged 1–5 years) purchased on average 224.29 fluid ounces/month (95% CI=222.01, 226.56) of fruit drinks, 82.82 fluid ounces/month (95% CI=82.06, 83.58) of

unsweetened juices, and 9.22 fluid ounces/month (95% CI=8.96, 9.49) of flavored water. Low-income households purchased more fruit drinks than middle- and higher-income households but less flavored water and unsweetened juice. Households with non-Hispanic Black heads of households purchased significantly more fruit drinks and fewer unsweetened juices than households with a non-Hispanic White head of household, whereas Asian households purchased fewer fruit drinks and more unsweetened juices.

Table 3 reports the estimation results of the 2-part models by category. After controlling for other covariates, the 3 marketing variables (average unit price,

**Table 2.** Monthly Volume Purchases (fl oz/household) by Household Characteristics

Characteristics	Fruit drinks	Flavored water	Unsweetened juices
Total	224.29 (222.01, 226.56) <sup>a</sup>	9.22 (8.96, 9.49)	82.82 (82.06, 83.58)
Household income <sup>b</sup>			
Low	302.68 (295.80, 309.57)	6.28 (5.85, 6.71)	70.10 (68.60, 71.60)
Middle	<b>266.83</b> <b>(260.54, 273.13)**</b>	<b>7.35</b> <b>(6.81, 7.88)*</b>	<b>77.03</b> <b>(75.13, 78.93)**</b>
Higher	<b>189.19</b> <b>(186.88, 191.50)**</b>	<b>10.61</b> <b>(10.25, 10.97)**</b>	<b>88.24</b> <b>(87.26, 89.22)**</b>
Race/ethnicity			
Non-Hispanic White	204.43 (201.81, 207.05)	10.08 (9.77, 10.38)	82.03 (81.16, 82.90)
Non-Hispanic Black	<b>351.23</b> <b>(342.63, 359.82)**</b>	<b>6.19</b> <b>(5.56, 6.83)**</b>	<b>77.06</b> <b>(74.74, 79.38)**</b>
Hispanic	<b>222.63</b> <b>(217.11, 228.15)**</b>	<b>8.69</b> <b>(7.92, 9.47)*</b>	<b>85.71</b> <b>(83.62, 87.81)*</b>
Non-Hispanic Asian	<b>140.53</b> <b>(132.91, 148.16)**</b>	<b>6.87</b> <b>(5.56, 8.19)**</b>	<b>95.30</b> <b>(91.32, 99.28)**</b>
Non-Hispanic Other	<b>226.57</b> <b>(212.78, 240.36)*</b>	9.22 (7.38, 11.05)	<b>93.20</b> <b>(87.23, 99.17)**</b>

Note: Boldface indicates statistical significance (\* $p < 0.01$ ; \*\* $p < 0.001$ ).

These statistically significant differences were compared with low-income and non-Hispanic White households. Data were from the 2006–2017 Nielsen consumer panel data. All statistics were weighted using Nielsen projection factors to ensure national representativeness. For each drink category, unadjusted means of monthly volume purchases were calculated across income and race/ethnicity groups. Then, *t*-test was used to test the mean difference between groups.

<sup>a</sup>Values in parentheses are the 95% CIs.

<sup>b</sup>Low-income households ( $\leq 130\%$  of federal poverty level), middle-income households ( $130\% < \text{income} \leq 185\%$  of federal poverty level), and higher-income households ( $> 185\%$  of federal poverty level).

fl oz, fluid ounce.

proportion of children's drink products purchased on deal, and TV advertising goodwill) were significant in all models under the condition of any purchase. Purchase price negatively correlated with purchase volume ( $p < 0.001$ ), and the proportion of items purchased on deal was associated with higher purchase volume of all categories ( $p < 0.01$ ). Fruit drink purchases were more sensitive to price changes than the other 2 drink categories. There were also significant differences by household income in relationships between drink purchases and TV advertising. Specifically, low-income households appeared to be more sensitive to advertising across all the 3 categories ( $\beta = 19.13, 11.28, \text{ and } 5.48$ , respectively,  $p < 0.001$ ), increasing purchases at a greater rate than middle- and higher-income families at the same level of TV advertising ( $p < 0.05$ ). The numbers of older children (aged 6–12 and 13–18 years) in the household were also associated with volume purchases ( $p < 0.001$  and  $p < 0.05$ ).

Appendix Table 2 (available online) reports the estimated volume purchases across the distribution of the marketing factors (price, purchases on deal, and TV advertising). For all categories, volume purchases were the highest at the bottom quartile of the price distribution, reflecting a typical price–demand negative

relationship. By contrast, volume purchases at the bottom quartile of the proportion purchased on deal were the lowest, suggesting higher purchases for items on sale. Finally, estimated volume purchases were proportional to TV advertising for all household income groups and drink categories.

## DISCUSSION

The volume of sweetened children's fruit drinks purchased by households with young children (aged 1–5 years) decreased from 2006 to 2017, but fruit drink purchases were approximately 3 times higher than purchases of unsweetened juices. These findings are consistent with beverage industry data showing a 2.3% decline in the volume of fruit beverages (fruit drinks and unsweetened juices) sold from 2008 to 2018<sup>19</sup> and declines in total SSB purchases by all households from 2002–2003 to 2013–2014.<sup>11</sup> However, this study is the first to examine trends in purchases of fruit drinks and juices by category and to specifically examine children's drink purchases by households with young children. It is also the first to show that purchases of sweetened children's flavored water have increased significantly.

**Table 3.** The 2-Part Model Estimation Results

Independent variables	Fruit drinks	Flavored water	Unsweetened juices
<b>Part I</b>			
Constant	<b>-0.25*</b> (-0.46, -0.03) <sup>a</sup>	<b>-6.74***</b> (-7.39, -6.09)	<b>1.16***</b> (0.95, 1.38)
Household income <sup>b</sup> (ref=low)			
Middle	<b>-0.08*</b> (-0.15, -0.01)	0.06 (-0.04, 0.16)	0.06 (0, 0.13)
Higher	<b>-0.32***</b> (-0.38, -0.25)	<b>0.27***</b> (0.18, 0.37)	<b>0.19***</b> (0.12, 0.26)
Race/ethnicity (ref=non-Hispanic White)			
Non-Hispanic Black	<b>0.87***</b> (0.77, 0.97)	<b>-0.50***</b> (-0.64, -0.37)	<b>-0.46***</b> (-0.56, -0.36)
Hispanic	0.08 (-0.01, 0.17)	<b>-0.30***</b> (-0.42, -0.18)	0.02 (-0.07, 0.11)
Non-Hispanic Asian	<b>-0.47***</b> (-0.61, -0.33)	<b>-0.53***</b> (-0.73, -0.33)	<b>0.44***</b> (0.29, 0.59)
Non-Hispanic Other	0.01 (-0.14, 0.17)	<b>-0.60***</b> (-0.83, -0.37)	<b>0.18*</b> (0.03, 0.34)
Number of household members			
Ages 1-5 years	<b>0.05*</b> (0.01, 0.09)	<b>0.11***</b> (0.05, 0.16)	<b>0.06**</b> (0.02, 0.1)
Ages 6-12 years	<b>0.45***</b> (0.42, 0.48)	<b>0.28***</b> (0.24, 0.32)	<b>-0.36***</b> (-0.39, -0.34)
Ages 13-18 years	<b>0.40***</b> (0.36, 0.44)	<b>-0.10**</b> (-0.16, -0.04)	<b>-0.32***</b> (-0.36, -0.28)
Age >18 years	<b>0.23***</b> (0.2, 0.27)	<b>-0.10***</b> (-0.15, -0.05)	<b>-0.21***</b> (-0.25, -0.18)
<b>Part II</b>			
Constant	<b>341.19***</b> (306.33, 376.04)	<b>98.33**</b> (32.98, 163.67)	<b>145.42***</b> (132.28, 158.55)
Price	<b>-6,290.87***</b> (-6,407.78, -6,173.95)	<b>-118.64***</b> (-163.22, -74.06)	<b>-409.44***</b> (-427.33, -391.56)
Proportion purchased on deal <sup>c</sup>	<b>8.88<sup>e</sup></b> (3.04, 14.71)	<b>20.49***</b> (16.73, 24.24)	<b>9.97***</b> (7.87, 12.07)
TV ad goodwill	<b>19.13***</b> (18.16, 20.1)	<b>11.28***</b> (10.23, 12.34)	<b>5.48***</b> (4.94, 6.02)
Household income <sup>b</sup> (ref=low)			
Middle	<b>-12.62*</b> (-25.21, -0.02)	0.02 (-9.99, 10.03)	<b>9.13***</b> (4.58, 13.68)
Higher	<b>-27.48**</b> (-38.24, -16.72)	<b>9.80*</b> (1.74, 17.86)	<b>14.40***</b> (10.64, 18.17)
TV advertising goodwill X income (ref=low)			
Middle	<b>-2.13**</b> (-3.47, -0.79)	<b>-1.52*</b> (-2.94, -0.1)	<b>-0.77*</b> (-1.47, -0.06)
Higher	<b>-4.93***</b> (-6.01, -3.85)	-0.48 (-1.62, 0.65)	<b>-0.57*</b> (-1.13, 0)
Race/ethnicity (ref=non-Hispanic White)			
Non-Hispanic Black	<b>98.86***</b> (88.21, 109.52)	4.50 (-1.72, 10.72)	<b>14.51***</b> (10.74, 18.28)
Hispanic	3.52 (-7.04, 14.09)	4.63 (-0.94, 10.2)	<b>8.99***</b> (5.58, 12.41)
Non-Hispanic Asian	<b>-40.91***</b> (-59.34, -22.48)	-1.68 (-11.98, 8.63)	<b>12.28***</b> (7.01, 17.55)
Non-Hispanic Other	<b>29.07**</b> (8.62, 49.52)	11.32 (-0.49, 23.14)	<b>13.25***</b> (6.41, 20.09)
Number of household members			
Ages 1-5 years	<b>27.88***</b> (22.26, 33.49)	<b>9.22***</b> (5.76, 12.68)	<b>22.17***</b> (20.29, 24.05)

(continued on next page)

**Table 3.** The 2-Part Model Estimation Results (*continued*)

Independent variables	Fruit drinks	Flavored water	Unsweetened juices
Ages 6–12 years	<b>23.88***</b> (20.21, 27.56)	<b>9.71***</b> (7.59, 11.84)	<b>8.99***</b> (7.69, 10.29)
Ages 13–18 years	<b>41.98***</b> (36.75, 47.22)	<b>4.36*</b> (1.03, 7.69)	<b>6.31***</b> (4.28, 8.34)
Age >18 years	<b>16.89***</b> (12.71, 21.08)	1.03 (–1.76, 3.81)	0.79 (–0.82, 2.41)

Note: Boldface indicates statistical significance (\* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$ ).

Data were from the 2006–2017 Nielsen consumer panel data. Estimated using group random effects and time fixed effects.

<sup>a</sup>Values in parentheses are the 95% CIs.

<sup>b</sup>Low-income households ( $\leq 130\%$  of federal poverty level), middle-income households ( $130\% < \text{income} \leq 185\%$  of federal poverty level), and higher-income households ( $> 185\%$  of federal poverty level).

<sup>c</sup>Percentage of items purchased with a coupon or on deal, as reported by the participant.

Higher purchases of children's fruit drinks by low income and Black households, after controlling for price and other factors, are consistent with the findings of previous research on racial and income differences in young children's consumption of fruit drinks<sup>5,6</sup> and with the findings of studies showing higher SSB purchases by low income and non-Hispanic Black households.<sup>11</sup> Furthermore, it appears that TV advertising of all children's drink categories may disproportionately influence purchases by low-income households. The finding that Hispanic households purchased more unsweetened juices also conforms with the findings of previous research showing that Hispanic toddlers consume more 100% juice than non-Hispanic White toddlers.<sup>5</sup> By contrast, Asian households purchased fewer fruit drinks and more unsweetened juices than non-Hispanic White households, indicating healthier drink purchases for Asian children.

These findings raise numerous public health issues. Continued disproportionately high purchases of sweetened children's drinks by non-Hispanic Black, Hispanic, and low-income households likely contribute to the health disparities affecting these communities.<sup>20</sup> Fruit drinks are less expensive than other children's drink categories and purchases appear to be especially sensitive to lower prices, which may explain their relative popularity with these households. Furthermore, extensive TV advertising for children's drink brands continued and was associated with greater household purchases of all children's drinks, offsetting the negative impact of price increases on purchases. Moreover, the findings that associations between advertising and purchases were stronger for fruit drinks and for low-income households support the need to reduce unhealthy drink advertising to children. Previous research has shown that TV advertisements for children's sweetened drinks are highly targeted to preschoolers and children (aged 2–11 years) as well as to Black and Hispanic youth.<sup>7</sup>

Industry self-regulation, primarily through the Children's Food and Beverage Advertising Initiative, presents the main option to address advertising to children in the U.S. In 2020, the initiative implemented new nutrition standards that no longer allow participating companies to advertise most drinks with added sugar directly to children aged <12 years.<sup>21</sup> However, it still allows child-directed advertising for low-calorie drinks with up to 5 grams of added sugar, including flavored water and fruit drinks with non-nutritive sweeteners, which experts do not recommend for young children.<sup>22</sup> Experts also call for numerous further actions to close the Children's Food and Beverage Advertising Initiative loopholes that continue to allow extensive marketing of SSBs to children, including the age of children and the marketing techniques covered.<sup>23</sup> Child health advocates also call for industry commitments to address disproportionately targeted marketing of sugary drinks to communities of color.<sup>7</sup> At the government level, the U.S. Food and Drug Administration could require disclosure of added sugar, non-nutritive sweeteners, and percentage of juice on package fronts to address common misperceptions among parents about the ingredients and healthfulness of children's drinks.<sup>24</sup> Taxes on drinks with added sugar that increase the price of sweetened children's drinks would also likely reduce purchases by households with young children.<sup>25,26</sup>

### Limitations

Strengths of this study include the use of longitudinal data recording actual purchases over 2006–2017 across all shopping trips, including online shopping, in a large national sample of U.S. households with young children. However, the study is subject to limitations. Although children are likely the primary consumers of children's drinks such as Kool-Aid and Capri Sun, household purchase data cannot determine who in the household consumed these drinks or how much they

consumed. It appears that children aged <12 years may not be the only household members consuming children's drinks because the number of older children (aged 13–18 years) and adults in the household were also associated with purchases. However, because all examined drinks were specifically marketed for children aged <12 years and because the presence of SSBs in a household has been shown to increase children's consumption,<sup>9</sup> it is likely that young children also consumed these drinks. Further research should assess whether young children living in households with older children are more likely to consume SSBs than those without older siblings, as has been previously shown for unhealthy diets overall.<sup>27–29</sup>

Furthermore, these analyses utilized brand-level TV advertising expenditures to account for spillover effects of advertising on all drinks offered by advertised brands, but they did not measure associations with advertising for specific products. Some highly advertised brands offered and advertised products in >1 category (e.g., Capri Sun),<sup>7</sup> but this method accounts for consumer confusion about products offered by the same brand (i.e., fruit drink versus 100% juice).<sup>30</sup> Moreover, these analyses examined the associations with only 3 marketing measures (TV advertising spending, price, and purchases on deal). TV advertising represents 90% of sweetened children's drinks advertising expenditures,<sup>7</sup> but drink companies also market to children in other ways that are not reflected in these findings, including through digital media and child-directed packaging.<sup>7</sup> In addition, Nielsen data provide only aggregated race and ethnicity information (i.e., White, Black, Asian, Other, and Hispanic), which limits analyses of households' purchasing behaviors across more distinct racial/ethnic groups. Finally, despite strong the associations between marketing practices and household purchases, these analyses cannot prove causal relationships.

## CONCLUSIONS

Despite recent reductions in sweetened children's fruit drink purchases, households with young children purchased approximately 3 times as many ounces of fruit drinks as unsweetened juices over the 12 years examined in this study. Advertising and relatively low prices contribute to sweetened fruit drink purchases by households with young children, despite expert recommendations to not serve them. Industry, public health, and policy initiatives to address the consumption of sweetened fruit drinks and flavored water by young children and restrict child-directed marketing of SSBs are necessary.

## ACKNOWLEDGMENTS

The authors are grateful to Timothy E. Moore and Joochul Lee from the UConn Statistical Consulting Services for the insightful comments on statistical analyses.

The Robert Wood Johnson Foundation had no role in the design, analysis, or writing of this article. Researchers' own analyses calculated (or derived) are based in part on data from The Nielsen Company (U.S.), LLC and marketing databases provided through the Nielsen Datasets at the Kilts Center for Marketing Data Center at The University of Chicago Booth School of Business. The conclusions drawn from the Nielsen data are those of the researchers and do not reflect the views of Nielsen. Nielsen is not responsible for, had no role in, and was not involved in analyzing and preparing the results reported in this paper.

This work was supported by a grant from the Robert Wood Johnson Foundation, Princeton, NJ.

No financial disclosures were reported by the authors of this paper.

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## SUPPLEMENTAL MATERIAL

Supplemental materials associated with this article can be found in the online version at <https://doi.org/10.1016/j.amepre.2021.06.013>.

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