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Trends in the Nutritional Content of Television Food Advertisements Seen by Children in the United States

Analyses by Age, Food Categories, and Companies

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Objective: To examine trends in children's exposure to food-related advertising on television by age, product category, and company.

Design: Nutritional content analysis using television ratings data for 2003, 2005, 2007, and 2009 for children.

Setting: Annual age-specific television ratings data captured children's exposure to broadcast network, cable network, syndicated, and spot television food advertising from all (except Spanish-language) programming.

Participants: Children aged 2 to 5 and 6 to 11 years.

Main Exposure: Television ratings.

Main Outcome Measures: Children's exposure to food-related advertising on television with nutritional assessments for food and beverage products for grams of saturated fat, sugar, and fiber and milligrams of sodium.

Results: Children aged 2 to 5 and 6 to 11 years saw, respectively, on average, 10.9 and 12.7 food-related television advertisements daily in 2009, down 17.8% and 6.9% from 2003. Exposure to food and beverage products high in saturated fat, sugar, or sodium fell 37.9% and 27.7% but fast-food advertising exposure increased by 21.1% and 30.8% among 2- to 5- and 6- to 11-year-olds, respectively, between 2003 and 2009. In 2009, 86% of ads seen by children were for products high in saturated fat, sugar, or sodium, down from 94% in 2003.

Conclusions: Exposure to unhealthy food and beverage product advertisements has fallen, whereas exposure to fast-food ads increased from 2003 to 2009. By 2009, there was not a substantial improvement in the nutritional content of food and beverage advertisements that continued to be advertised and viewed on television by US children.

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IN 2007 TO 2008, 10.4% AND 19.6% of children aged 2 to 5 and 6 to 11 years, respectively, were obese.[1] Children's diets were poorer than recommended and high intakes of sugar, fat, saturated fat, sodium, and fast food were associated with increased obesity and other health consequences.[2-9] Children averaged 3.5 hours of television watching daily in 2009, and 23% of households with televisions had a set in a child's bedroom.[10] Television remained the most common form of media used by children.[11] Television also remained the primary advertising channel for food and beverage companies, who spent an estimated $745 million dollars in this medium, of which more than 50% was directed to children younger than 12 years.[12]

Research shows that the majority of food ads seen by children were for unhealthful products.[13-17] For example, a study using television ratings data found that 97.8% of advertisements seen by children aged 2 to 11 years were for products high in fat, sugar, or sodium.[17] Another study that used television ratings data found that cereal companies mostly marketed their least nutritious cereals to children, and none of the brands marketed to US children met nutritional standards set for advertising to UK children.[14] A recent examination of the nutritional content of food ads during children's programming found that 72.5% were for high-calorie, low-nutrient products; 26.6% were for high-fat or high-sugar products; and just 0.9% were for low-calorie, nutrient-rich products.[18] Further, several studies showed that children's exposure to fast-food advertising has recently increased.[19,20] The public health community and government agencies have empha-

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Table 1. Children's Exposure to Food-Related Television Advertisements and Nutrition Indicators of Food and Beverage Products by Age, Product Category, and Year[a]

	All Children Aged 2-5 y					All Children Aged 6-11 y				
	2003	2005	2007	2009	% of Change 2003-2009	2003	2005	2007	2009	% of Change 2003-2009
Total No. food-related ads/d	13.3	12.1	11.5	10.9	−17.8	13.7	13.5	13.1	12.7	−6.9
Total No. food and beverage ads/d	10.1	8.7	7.9	6.8	−32.5	10.1	9.7	8.9	7.9	−21.7
High saturated fat	3.1	2.9	2.1	1.6	−47.1	3.1	3.1	2.3	1.9	−38.3
High sugar	7.3	5.8	5.0	4.2	−42.2	7.2	6.4	5.8	4.9	−32.1
High sodium	4.3	3.8	3.6	3.0	−30.0	4.2	4.1	4.0	3.5	−15.8
High saturated fat, sugar, or sodium	9.5	7.7	7.0	5.9	−37.9	9.5	8.5	8.0	6.9	−27.7
Beverages	1.5	1.3	1.0	0.9	−43.0	1.7	1.6	1.2	1.0	−40.9
High saturated fat	0.1	0.1	0.1	0.0	−75.0	0.1	0.1	0.1	0.0	−75.0
High sugar	1.3	0.9	0.8	0.5	−58.6	1.5	1.1	0.9	0.7	−55.5
High sodium	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0
High saturated fat, sugar, or sodium	1.4	0.9	0.8	0.6	−59.7	1.6	1.1	0.9	0.7	−57.2
Cereal	2.6	2.4	2.0	1.8	−30.4	2.3	2.6	2.3	2.1	−11.5
High saturated fat	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
High sugar	2.4	2.2	1.8	1.6	−34.9	2.1	2.3	2.1	1.8	−16.8
High sodium	2.4	2.1	1.8	1.6	−34.2	2.2	2.3	2.1	1.8	−16.1
High saturated fat, sugar, or sodium	2.5	2.4	1.9	1.7	−32.9	2.3	2.5	2.2	2.0	−14.8
Snacks	1.3	1.1	1.0	0.7	−43.5	1.3	1.2	1.2	0.9	−32.0
High saturated fat	0.5	0.3	0.3	0.2	−68.6	0.5	0.3	0.3	0.2	−64.7
High sugar	0.8	0.6	0.5	0.4	−56.6	0.8	0.7	0.6	0.4	−45.5
High sodium	0.5	0.5	0.5	0.4	−28.6	0.5	0.6	0.6	0.4	−19.6
High saturated fat, sugar, or sodium	1.3	1.1	1.0	0.7	−44.2	1.3	1.2	1.1	0.8	−33.3
Sweets	2.3	1.7	1.3	1.0	−55.1	2.3	2.0	1.6	1.3	−44.0
High saturated fat	1.2	0.6	0.6	0.5	−55.6	1.2	0.7	0.7	0.6	−45.8
High sugar	2.0	1.4	1.0	0.8	−60.5	2.0	1.6	1.3	1.0	−51.0
High sodium	0.2	0.2	0.1	0.1	−63.2	0.2	0.2	0.1	0.1	−52.6
High saturated fat, sugar, or sodium	2.1	1.5	1.2	0.9	−57.2	2.1	1.8	1.4	1.1	−46.4
Other	2.5	2.2	2.5	2.4	−2.0	2.5	2.3	2.7	2.7	+8.1
High saturated fat	1.2	0.8	1.0	0.9	−23.5	1.2	0.9	1.1	1.0	−13.4
High sugar	0.9	0.7	0.9	0.9	+2.2	0.9	0.7	0.9	1.0	+15.3
High sodium	1.3	1.0	1.2	1.1	−20.1	1.4	1.1	1.3	1.2	−10.1
High saturated fat, sugar, or sodium	2.2	1.8	2.1	2.1	−8.5	2.2	1.9	2.3	2.3	+1.3
Total No. of restaurant ads/d	3.2	3.3	3.6	4.1	+28.8	3.5	3.9	4.2	4.8	+35.3
Fast-food restaurants	2.3	2.3	2.4	2.8	+21.1	2.6	2.7	3.0	3.4	+30.8
Full-service restaurants	0.9	1.0	1.2	1.3	+48.9	0.9	1.1	1.3	1.4	+49.5

[a] Copyright The Nielsen Company 2009. Percentage of change calculations were based on 2 decimal points.

sized the need to address unhealthful food advertising seen by children.[11,12,21] Evidence showed that food advertising increases purchase requests and consumption[11] and found a positive association with weight outcomes.[22,23]

In the United States, in 2006, the Council of Better Business Bureaus launched the Children's Food and Beverage Advertising Initiative (CFBAI).[24] To date, the CFBAI includes 17 companies; 4 (Cadbury, the Coca-Cola Company, the Hershey Company, and Mars Inc) pledged not to engage in any advertising of food or beverage products on programming primarily directed to children younger than 12 years and the remainder pledged to engage in 100% "better-for-you" advertising defined by each company.[25] Previous work that assessed the nutritional content of children's exposure to food and beverage ads used pre-CFBAI data[17] and recent post-CFBAI analyses were limited to specific products such as cereal[14] or fast food[20] or specific programming.[18]

This study provides a trend analysis of total food-related (food, beverage, and restaurant) advertising exposure among children and a nutritional analysis of all food and beverage product ads seen by children before and after CFBAI implementation. Nutrient content was assessed for saturated fat, sugar, sodium, and fiber. Analyses were undertaken for children aged 2 to 5 and 6 to 11 years by product category and parent company to assess how the CFBAI has changed the nutritional landscape of food advertising seen by children.

METHODS

Exposure was assessed using television ratings data from Nielsen Media Research[26] for all food-related television advertisements in 2003, 2005, 2007, and 2009. Ratings were assessed separately for children aged 2 to 5 and 6 to 11 years. Annual age-specific targeted rating points captured exposure to broadcast network, cable network, syndicated, and spot television advertising from all programming (except Spanish-language programming). In 2003, 2005, 2007, and 2009, 4436 (1604), 4928 (1665), 5392 (1834), 6602 (1804) food-related brands (food and beverage brands only) fell into 163 (159), 168 (164), 175 (171), and 182 (178) food-related product (food and beverage product only) categories, respectively.[17,19] The food-related product categories were then categorized into 7 broad categories:

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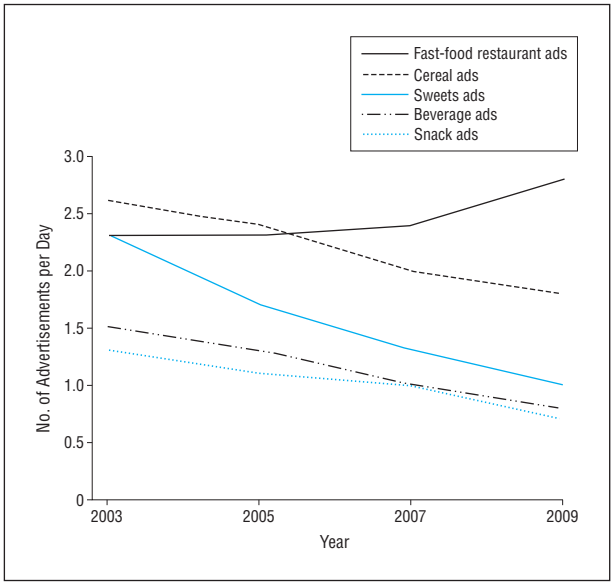

Figure 1. Exposure to food-related advertisements for selected categories for children aged 2 to 5 years by year.

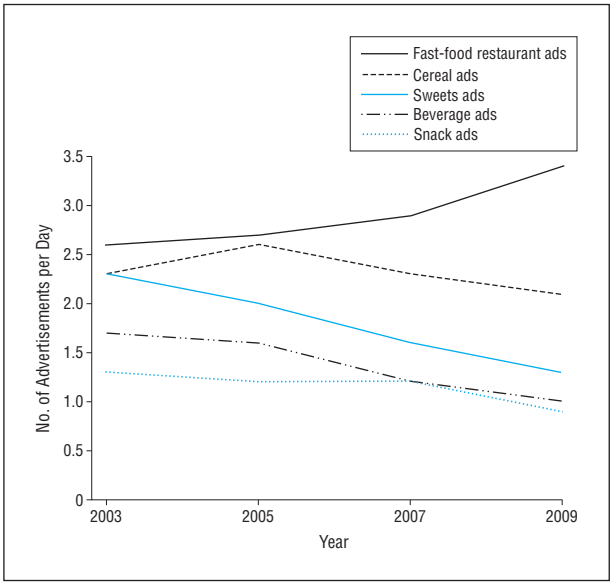

Figure 2. Exposure to food-related advertisements for selected categories for children aged 6 to 11 years by year.

cereals, sweets, snacks, beverages, other food products, fast-food restaurants, and full-service restaurants. The most commonly advertised items in the "other" category included yogurt, frozen and prepared entrees, and ready-to-eat soups. Analyses assessed trends in exposure to food-related advertisements for each category. Saturated fat, sugar, sodium, and fiber content were assessed for the 5 product-specific categories. Nutritional content of restaurant ads was not assessed given that many ads did not market a specific product, sources for nutritional information on restaurants are limited, and nutritional content of fast-food restaurants was recently assessed in another study.[20]

Information on grams of saturated fat, sugar, and fiber and milligrams of sodium and information on total energy calories (kilocalories) used in the computation of nutritional indicators were determined in order from the following: (1) the Nutrient Data System for Research; (2) US Department of Agriculture (USDA) Nutrient Database; (3) nutrition facts panels on the product's label; and, (4) manufacturer's Web site. Nutritional information on 53.6%, 3.2%, 4.5%, and 32.6% of the products, respectively, was gathered using these methods. Nutritional information was unavailable for 6.1% of advertised products because they were either nonspecific (4.5%) (ie, Dairy Association or general food company advertisement) or the information was not contained in the earlier-mentioned sources (1.6%). Using these data, for each age group and by food category, we assessed exposure to food product advertising in terms of mean percentage of kilocalories from saturated fat and sugar and mean milligrams of sodium and grams of fiber per 50-g serving.

Nutrient content of products was classified as high in saturated fat or sodium using National Academy of Sciences standards for foods sold in schools.[27] A food was "high saturated fat" if it contained more than 10% of total calories from saturated fat (nuts, nut butter, and seeds exempted). Products containing more than 200 mg of sodium per 50-g serving were classified as "high sodium." High-sugar products were defined based on recommendations in the National Academy of Sciences dietary reference intakes report[28] that no more than 25% of total calories come from added sugars; thus, we classified products as "high sugar" if more than 25% of kilocalories came from sugar (whole fruits, 100% juice, and plain white milk exempted). The nutrient content data for each advertised product were weighted by age- and year-specific television ratings to provide actual exposure measures to the nutritional content of the food and beverage product advertisements.

RESULTS

In 2009, children aged 2 to 5 and 6 to 11 years saw, on average, 10.9 and 12.7 food-related ads per day, respectively (**Table 1**). There was a consistent downward trend in exposure, with a 17.8% and 6.9% drop, respectively, between 2003 and 2009. The largest percentage of reduction was for sweets ads, which fell by 55.1% and 44.0% among children aged 2 to 5 and 6 to 11 years, respectively. Exposure to beverage ads fell more than 40% among both age groups, as did exposure to snack product ads among younger children. Overall, exposure to food and beverage product advertising fell 32.5% and 21.7% among 2- to 5- and 6- to 11-year-olds, respectively. Between 2003 and 2009, exposure to fast-food advertising increased among 2- to 5- and 6- to 11-year-olds by 21.1% and 30.8%, respectively, with more than half of this increase between 2007 and 2009. By 2009, children aged 2 to 5 and 6 to 11 years saw, respectively, 2.8 and 3.4 fast-food ads, on average, daily (**Figure 1** and **Figure 2**).

Table 1 also shows changes in the number of ads for products high in saturated fat, sugar, and sodium (SAFSUSO) or high in any of these, reflecting changes in exposure, the mix of items advertised, and the nutritional content of advertised products. Exposure fell more for high- vs low-sugar and saturated fat items across all food categories. Exposure to the number of food ads seen, on average, each day that were high in SAFSUSO fell by 37.9% and 27.7% among 2- to 5- and 6- to 11-year-olds, respectively, between 2003 and 2009.

Table 2 and **Table 3** present nutritional content information over time by product category. In 2009, 86% of food and beverage ads seen by children were high in SAFSUSO, down from about 94% in 2003. While the mean percentage of calories from sugar fell in nearly all prod-

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Table 2. Nutritional Content of Food and Beverage Product Advertisements Viewed by Children by Age, Product Category, and Year[a]

	Mean % of kcal From Saturated Fat					Mean % of kcal From Sugar				
	2003	2005	2007	2009	% of Change 2003-2009	2003	2005	2007	2009	% of Change 2003-2009
Children aged 2-5 y										
All foods	7.3	6.1	6.9	6.8	−6.6	43.4	40.9	37.3	36.7	−15.4
Beverages	1.4	1.5	1.9	1.1	−20.7	84.3	69.1	69.9	70.9	−15.9
Cereal	2.4	2.4	3.0	2.0	−17.0	39.0	36.9	36.8	34.1	−12.5
Snacks	7.0	5.9	7.8	6.3	−10.1	35.2	29.4	26.0	28.2	−20.0
Sweets	11.8	8.9	9.9	13.1	+10.9	48.1	54.0	46.0	43.3	−10.0
Other	11.4	11.0	10.0	9.9	−12.8	24.8	22.8	23.8	26.1	+5.5
Children aged 6-11 y										
All foods	7.4	6.1	6.8	6.9	−5.6	44.1	41.5	38.1	36.7	−16.7
Beverages	1.2	1.3	1.4	1.0	−12.9	84.8	69.7	72.9	71.3	−15.8
Cereal	2.4	2.4	3.1	2.0	−18.0	38.6	37.1	36.9	34.0	−12.1
Snacks	7.3	5.9	7.9	6.3	−14.5	33.6	28.5	25.9	27.7	−17.6
Sweets	11.6	8.7	9.4	12.6	+8.5	48.2	54.1	46.7	43.4	−9.9
Other	11.6	11.3	10.2	10.4	−10.4	24.1	22.2	23.4	25.0	+4.1

	Mean mg of Sodium per 50-g Serving					Mean g of Fiber per 50-g Serving				
	2003	2005	2007	2009	% of Change 2003-2009	2003	2005	2007	2009	% of Change 2003-2009
Children aged 2-5 y										
All foods	193.8	222.3	194.4	222.1	+14.6	0.8	0.8	1.0	1.4	+61.9
Beverages	11.3	21.5	54.4	13.8	+22.2	0.0	0.1	0.1	0.1	+175.0
Cereal	294.3	301.9	296.9	282.2	−4.1	1.6	1.8	2.2	2.9	+79.4
Snacks	248.3	255.8	251.2	255.2	+2.8	0.8	0.8	1.1	1.9	+132.5
Sweets	91.7	78.2	76.0	89.6	−2.3	0.7	0.6	0.9	0.8	+8.6
Other	266.1	362.5	215.5	298.9	+12.3	0.7	0.5	0.6	0.8	+18.3
Children aged 6-11 y										
All foods	190.6	209.0	193.9	222.3	+16.6	0.8	0.8	1.0	1.3	+61.0
Beverages	10.9	21.0	54.2	13.3	+21.7	0.0	0.1	0.1	0.1	+266.7
Cereal	293.3	299.1	298.6	281.6	−4.0	1.7	1.8	2.2	2.9	+75.2
Snacks	254.9	260.8	253.1	257.8	+1.1	0.9	0.8	1.1	1.9	+124.4
Sweets	90.3	77.7	73.2	88.8	−1.6	0.7	0.6	0.8	0.7	+7.2
Other	280.3	332.0	219.4	311.5	+11.1	0.7	0.5	0.6	0.7	−1.4

[a] Copyright The Nielsen Company 2009. Percentage of change calculations were based on 2 decimal points.

uct categories, it remained high, making up more than a third, on average, of calories in food product ads seen by children. There was some reduction in the sugar content of cereal ads; in 2009, 34% of total calories were from sugar. As a result, 86% of children's cereal ad exposure in 2009 was for high-sugar cereals. Despite the continued prevalence of high-sugar cereal ads, there were increases in the fiber content in cereal ads seen by children, which almost doubled from a mean of 1.6 g (ages 2-5 years) and 1.7 g (ages 6-11 years) per 50-g serving in 2003 to 2.9 g per 50-g serving for both age groups in 2009.

Sweets ads generally remained high in sugar (approximately 77% in 2009, down from 88% in 2003). For all product categories but sweets, the mean percentage of calories from saturated fat fell. In particular, exposure to high–saturated fat snack product ads fell from 38.6% to 21.3% and from 39.6% to 20.6% among 2- to 5- and 6- to 11-year-olds, respectively, between 2003 and 2009. The greatest reduction in exposure to high-sugar ads also was for snack products. In 2003, 63.4% and 60.4% of snack product ads seen by children aged 2 to 5 and 6 to 11 years were for high-sugar products, respectively; by 2009, just under half of snack products were high sugar. As with cereal, there was an increase in the fiber content of snack product ads seen, with fiber content more than doubling between 2003 and 2009 from 0.8 g to 1.9 g per 50-g serving for 2- to 5-year-olds and 0.9 g to 1.9 g per 50-g serving for 6- to 11-year-olds. However, children were increasingly exposed to ads for higher-sodium products, with food products having, on average, more than 200 mg of sodium per 50-g serving by 2009. This was driven primarily by an increase in sodium among snack product ads seen; the proportion of high-sodium snack products increased between 2003 and 2009 from 37.2% to 46.8% and 39.7% to 47.1% among 2- to 5- and 6- to 11-year-olds, respectively. Thus, although fewer snack product ads were high in saturated fat and sugar, as a result of the increased sodium, 97% of snack ads seen by children in 2009 were high in SAFSUSO.

Across all product categories, the largest improvements were for beverages, where 65.5% and 66.9% of beverage ads seen by 2- to 5- and 6- to 11-year-olds were high in SAFSUSO in 2009, down from 93.2% in 2003. Among advertised beverages, two-thirds of the calories

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Table 3. Nutritional Indicators of Food and Beverage Product Advertisements Viewed by Children by Age, Product Category, and Year[a]

	% of High Saturated Fat				% of High Sugar			
	2003	2005	2007	2009	2003	2005	2007	2009
Children aged 2-5 y								
All foods	30.4	32.8	26.3	23.9	72.4	66.0	63.6	62.0
Beverages	8.0	6.8	11.7	3.5	85.7	66.1	74.4	62.7
Cereal	0.0	0.0	0.5	0.4	92.6	89.4	91.6	86.5
Snacks	38.6	23.2	29.1	21.3	63.4	54.0	49.0	48.5
Sweets	51.4	36.2	44.5	50.7	88.3	82.3	77.9	77.9
Other	47.9	38.8	41.1	37.5	36.0	32.9	35.4	38.0
Children aged 6-11 y								
All foods	30.5	32.3	25.7	24.0	71.4	66.2	64.5	61.8
Beverages	6.9	5.5	8.6	3.3	85.6	68.3	76.0	64.1
Cereal	0.0	0.0	0.5	0.4	91.6	89.9	92.1	85.8
Snacks	39.6	23.4	29.0	20.6	60.4	52.6	49.1	47.8
Sweets	50.7	35.2	42.8	49.1	88.1	82.5	77.9	77.4
Other	48.1	39.4	42.3	38.4	34.3	31.5	34.5	36.6

	% of High Sodium				% of High Saturated Fat, Sugar, or Sodium			
	2003	2005	2007	2009	2003	2005	2007	2009
Children aged 2-5 y								
All foods	42.9	43.0	45.1	44.4	93.9	88.3	88.7	86.3
Beverages	0.0	3.1	2.2	0.0	93.2	69.4	77.5	65.5
Cereal	93.3	87.8	90.2	88.2	98.1	97.2	96.9	94.3
Snacks	37.2	44.0	52.5	46.8	98.4	97.7	97.4	97.4
Sweets	8.5	11.4	5.6	6.9	91.6	90.7	86.6	87.6
Other	54.0	44.4	46.9	44.1	90.0	83.1	84.6	84.2
Children aged 6-11 y								
All foods	41.4	42.0	45.2	44.4	93.6	88.2	89.3	86.5
Beverages	0.0	3.1	2.2	0.0	93.2	71.5	79.1	66.9
Cereal	92.9	87.3	90.5	87.6	97.8	97.1	97.1	93.9
Snacks	39.7	44.9	52.3	47.1	98.0	97.3	97.8	97.2
Sweets	8.1	11.5	5.3	7.0	90.9	90.1	85.5	87.0
Other	56.0	45.3	48.8	46.6	90.6	83.5	85.9	85.0

[a] Copyright The Nielsen Company 2009.

came from sugar, and more than 60% of beverage ads were for high-sugar drinks in 2009, down from about 85% in 2003. By beverage type, as shown in **Table 4**, the largest reduction in exposure was to regular soft drink ads (–67.9% and –67.6%, respectively, for ages 2-5 and 6-11 years); however, exposure to regular soft drink ads flattened for 2- to 5-year-olds and increased for 6- to 11-year-olds between 2007 and 2009. For both age groups, fruit drink ad exposure trended downward from 2003 to 2007 but then doubled between 2007 and 2009, although overall exposure was lower in 2009 than it was in 2003. Additionally, children have recently been exposed to high-sugar bottled water ads. Exposure to low-sugar beverage ads increased by 63.2% and 52.2% among 2- to 5- and 6- to 11-year-olds. Exposure to diet soft drink ads increased substantially between 2003 and 2007 but exposure has fallen since 2007, resulting in no change among children aged 2 to 5 years and a 33.3% increase among children aged 6 to 11 years between 2003 and 2009.

Results tabulated by parent companies and membership in the CFBAI (based on participation as of 2009) are shown in **Table 5** and **Figure 3**. The results show that there was a higher reduction in the number of ads from CFBAI vs non-CFBAI companies seen by 2- to 5-year-olds (–37.5% vs –1.4%) and 6- to 11-year-olds (–25.1% vs –2.6%). However, in terms of nutritional content, there were greater percentages of improvement for products from non-CFBAI companies. Between 2003 and 2009, the proportion of CFBAI vs non-CFBAI company ads that were high in SAFSUSO fell by 6.2% vs 15.3%, respectively, among 2- to 5-year-olds and 5.8% vs 15.2% among 6- to 11-year-olds. With regard to changes in the number of fast-food ads seen by 2- to 5-year-olds, the increase in exposure from the 2 CFBAI fast-food companies was 4.2% compared with a 39.8% increase in exposure to non-CFBAI fast-food ads. However, among 6- to 11-year-olds, the increase in exposure to CFBAI fast-food ads was 28.0%, almost as high as the non-CFBAI increase of 33.1%.

Whereas exposure to CFBAI food and beverage product ads fell by 37.5% and 25.1% for 2- to 5- and 6- to 11-year-old children, respectively, the single largest advertiser to children, General Mills, had a smaller 16.0% reduction in ads seen by children 2 to 5 years old and a 6.5% increase in ads seen by 6- to 11-year-olds. Further, among the General Mills ads that continued to be viewed, there was no improvement in the overall nutritional con-

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Table 4. Children's Exposure to Beverage Advertisements by Age, Beverage Type, and Year[a]

	2003	2005	2007	2009	% of Change 2007-2009	% of Change 2003-2009
Children aged 2-5 y						
High-sugar beverage ads	1.2	0.9	0.8	0.5	−30.7	−55.2
Regular soft drinks	0.3	0.2	0.1	0.1	0.0	−67.9
Fruit drinks	0.4	0.3	0.1	0.2	+111.1	−51.3
Bottled water, sugar added	0.0	0.0	0.1	0.1	−50.0	+500.0
Drinks, isotonic	0.1	0.1	0.1	0.1	−50.0	−61.5
Other high-sugar beverage	0.4	0.3	0.4	0.1	−62.9	−63.9
Low-sugar beverage ads	0.2	0.4	0.3	0.3	+19.2	63.2
Diet soft drinks	0.0	0.1	0.1	0.0	−40.0	0.0
Fruit juices, 100%	0.1	0.2	0.1	0.1	+10.0	+10.0
Bottled water	0.0	0.0	0.0	0.0	0.0	0.0
Milk, unflavored	0.0	0.0	0.0	0.0	+50.0	0.0
Other low-sugar beverage	0.1	0.1	0.1	0.1	+57.1	+120.0
Children aged 6-11 y						
High-sugar beverage ads	1.3	1.0	0.9	0.6	−28.4	−53.0
Regular soft drinks	0.4	0.3	0.1	0.1	+9.1	−67.6
Fruit drinks	0.4	0.3	0.1	0.2	+118.2	−42.9
Bottled water, sugar added	0.0	0.0	0.2	0.1	−53.3	+600.0
Drinks, isotonic	0.2	0.2	0.1	0.1	−53.8	−60.0
Other high-sugar beverage	0.4	0.3	0.4	0.2	−59.5	−60.5
Low-sugar beverage ads	0.2	0.5	0.3	0.4	+25.0	+52.2
Diet soft drinks	0.0	0.2	0.1	0.0	−33.3	+33.3
Fruit juices, 100%	0.1	0.2	0.1	0.1	+20.0	0.0
Bottled water	0.0	0.1	0.0	0.0	0.0	0.0
Milk, unflavored	0.0	0.0	0.0	0.0	+100.0	0.0
Other low-sugar beverage	0.1	0.1	0.1	0.1	+62.5	+160.0

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tent of advertised products, with 97.4% and 97.3% of ads for the respective age groups being for products high in SAFSUSO in 2009. Among the next largest advertisers, between 2003 and 2009, 2- to 5-year-olds saw approximately 50% fewer ads for Kellogg's and Kraft Foods Company products and 6- to 11-year-olds were exposed to 36.8% and 40.8% fewer Kellogg's and Kraft food ads, respectively. However, the vast majority (88.7%-94.9%) of ad exposures among children in 2009 from these companies were for products high in SAFSUSO. Among other CFBAI companies, there were greater than 50% reductions in children's exposure to ads from PepsiCo, Unilever, Mars, and Coca-Cola between 2003 and 2009. However, in 2009, the majority of the ads from all but 2 (Cadbury and Coca-Cola) of the CFBAI companies seen by children were for products high in SAFSUSO.

COMMENT

To our knowledge, this study provided the first comprehensive examination of children's total exposure to food-related advertising before and after implementation of the industry's self-regulatory CFBAI. The results showed that exposure to food and beverage products high in SAFSUSO fell 37.9% and 27.7% among children 2 to 5 and 6 to 11 years old, respectively. Among advertised products, the largest nutritional improvements were for beverages. Whereas fiber content increased substantially in cereals, 94% of cereal ads seen in 2009 were high in SAFSUSO. Further, although the sugar and saturated fat content fell in snacks product ads, as a result of increases in sodium most of the snack ads remained unhealthy. Increases in sodium content among the advertised products indicated that greater attention needs to be placed on commitments to reducing sodium content, consistent with recent calls for population-wide reductions in sodium intake.[9] Overall, despite reductions in advertising exposure, in 2009, 86% of the food and beverage ads seen by children were for products high in SAFSUSO, down from 94% in 2003. These study findings are consistent with other recent studies that documented the poor nutritional content of cereal ads and ads on children's programming advertised post-CFBAI.[14,18]

Reductions in exposure to food and beverage product advertising were greater among CFBAI companies compared with non-CFBAI companies. In particular, there were 50% or greater reductions in exposure to ads from Kellogg's, Kraft, Mars, PepsiCo, Unilever, and Coca-Cola. The CFBAI companies accounted for approximately 80% of children's exposure to food and beverage products. Despite the marked reductions in CFBAI exposure, the vast majority (88%) of CFBAI company ads seen in 2009 continued to be for high-SAFSUSO products. Moreover, there were substantial variations in both changes in the amount of advertising seen by children and the nutritional content of the advertised products across CFBAI companies, highlighting the lack of common standards within the CFBAI. Further, there were differences across age groups, with often limited improvement among 6- to 11-year-olds, suggesting that the pledges do not adequately address the reach of advertising to children.

Fast-food advertising exposure increased substantially and by 2009 it was the largest category of food-related ad-

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Table 5. Children's Exposure to Food-Related Television Advertisements and Nutritional Indicators of Food and Beverage Products by Parent Company, Age, and Year[a]

	No. of Ads/d					% of Ads High in Saturated Fat, Sugar, or Sodium				
	2003	2005	2007	2009	% of Change 2003-2009	2003	2005	2007	2009	% of Change 2003-2009
Children aged 2-5 y										
CFBAI companies										
Burger King Corp	0.4	0.4	0.4	0.4	+5.1	NA	NA	NA	NA	NA
Cadbury	0.1	0.1	0.2	0.1	+16.7	0.0	43.1	59.2	17.2	NA
The Campbell Soup Co	0.3	0.4	0.6	0.3	+3.4	88.2	69.4	82.0	70.7	–19.8
The Coca-Cola Co	0.2	0.2	0.1	0.1	–57.9	93.9	54.0	54.1	41.4	–56.0
ConAgra Foods	0.3	0.2	0.4	0.3	+3.8	63.9	63.1	79.9	63.1	–1.2
Dannon	0.2	0.1	0.2	0.2	+22.2	100.0	100.0	99.9	99.9	–0.1
General Mills	2.4	1.9	1.7	2.0	–16.0	97.2	99.3	98.2	97.4	+0.2
The Hershey Co	0.3	0.2	0.1	0.2	–34.5	81.5	89.7	70.8	100.0	+22.7
Kellogg's	1.5	1.4	1.3	0.7	–50.7	98.8	97.0	97.5	89.2	–9.8
Kraft Foods Co	1.3	0.8	0.8	0.6	–51.6	97.7	95.9	96.0	94.3	–3.5
Mars Inc	0.7	0.5	0.4	0.3	–64.3	95.5	90.1	74.0	75.1	–21.4
McDonald's Corp	0.8	0.7	0.7	0.8	+3.7	NA	NA	NA	NA	NA
Nestle	0.4	0.4	0.4	0.3	–35.7	91.0	75.3	67.3	72.3	–20.5
PepsiCo	0.6	0.7	0.5	0.2	–70.7	91.7	85.4	86.6	81.6	–11.0
Post Foods	0.4	0.3	0.3	0.2	–46.5	95.2	99.9	98.7	96.7	+1.5
Unilever	0.2	0.1	0.1	0.1	–65.0	95.1	85.0	92.7	92.2	–3.1
CFBAI companies food and beverage products subtotal	8.7	7.4	6.8	5.4	–37.5	94.0	89.7	89.9	88.2	–6.2
Non-CFBAI companies food and beverage products subtotal	1.4	1.3	1.1	1.4	–1.4	93.3	80.6	81.7	79.1	–15.3
CFBAI fast-food companies subtotal	1.2	1.1	1.1	1.3	+4.2	NA	NA	NA	NA	NA
Non-CFBAI fast-food companies subtotal	1.1	1.2	1.3	1.5	+39.8	NA	NA	NA	NA	NA
Non-CFBAI full-service restaurant subtotal	0.9	1.0	1.2	1.3	+48.9	NA	NA	NA	NA	NA
Total CFBAI companies	9.9	8.5	7.8	6.7	–32.4					
Total	13.3	12.1	11.5	10.9	–17.8	NA	NA	NA	NA	NA
Children aged 6-11 y										
CFBAI companies										
Burger King Corp	0.4	0.4	0.5	0.5	+25.0	NA	NA	NA	NA	NA
Cadbury	0.1	0.2	0.2	0.1	+42.9	0.0	41.8	61.5	24.3	NA
The Campbell Soup Co	0.3	0.4	0.6	0.3	+17.2	88.5	69.0	82.4	69.6	–21.4
The Coca-Cola Co	0.2	0.3	0.1	0.1	–54.5	94.5	55.4	55.8	44.8	–52.6
ConAgra Foods	0.2	0.3	0.4	0.3	+25.0	66.3	65.7	82.1	62.8	–5.2
Dannon	0.2	0.1	0.2	0.2	+27.8	100.0	100.0	99.9	99.9	–0.1
General Mills	2.2	2.0	1.9	2.3	+6.5	96.6	99.1	98.3	97.3	+0.7
The Hershey Co	0.3	0.3	0.1	0.2	–20.0	79.6	89.3	72.1	100.0	+25.7
Kellogg's	1.4	1.5	1.5	0.9	–36.8	98.7	97.1	97.6	88.7	–10.1
Kraft Foods Co	1.3	0.9	0.9	0.8	–40.8	97.6	96.2	96.4	94.9	–2.7
Mars Inc	0.8	0.6	0.5	0.3	–56.0	95.3	90.2	72.7	74.0	–22.3
McDonald's Corp	0.8	0.8	0.8	1.0	+29.9	NA	NA	NA	NA	NA
Nestle	0.4	0.4	0.4	0.3	–33.3	92.6	74.5	72.0	73.7	–20.5
PepsiCo	0.7	0.8	0.6	0.2	–67.7	90.8	84.5	87.5	82.4	–9.3
Post Foods	0.4	0.3	0.4	0.3	–32.6	94.7	99.9	99.0	96.9	+2.4
Unilever	0.2	0.1	0.1	0.1	–55.6	96.8	83.0	90.6	91.8	–5.2
CFBAI companies food and beverage products subtotal	8.6	8.2	7.8	6.4	–25.1	93.7	89.3	90.3	88.2	–5.8
Non-CFBAI companies food and beverage products subtotal	1.6	1.5	1.2	1.5	–2.6	93.6	82.5	82.4	79.4	–15.2
CFBAI fast-food companies subtotal	1.2	1.2	1.3	1.5	+28.0	NA	NA	NA	NA	NA
Non-CFBAI fast-food companies subtotal	1.5	1.6	1.7	1.9	+33.1	NA	NA	NA	NA	NA
Non-CFBAI full-service restaurant subtotal	0.9	1.1	1.3	1.4	+49.5	NA	NA	NA	NA	NA
Total CFBAI companies	9.7	9.4	9.1	7.9	–18.7					
Total	13.7	13.5	13.1	12.7	–6.8	NA	NA	NA	NA	NA

Abbreviations: CFBAI, Children's Food and Beverage Advertising Initiative; NA, not assessed.
[a]Copyright The Nielsen Company 2009. Percentage of change calculations were based on 2 decimal points.

vertising exposure for children of both age groups. The increase in exposure was lower for CFBAI vs non-CFBAI member ads, although to a lesser extent among 6- to 11-year-olds. Company membership in the CFBAI accounted for a much lower proportion of fast-food product exposure compared with food and beverage product exposure, accounting for about 45% of fast-food ad exposure among children. These study findings are concerning given the recent research that demonstrated the poor nutritional content of fast-food advertising to children[20] and studies that have found significant associations between fast-food advertising and children's weight outcomes.[22,23]

In assessing the CFBAI self-regulatory pledges, we note that these apply to children's programming only, albeit

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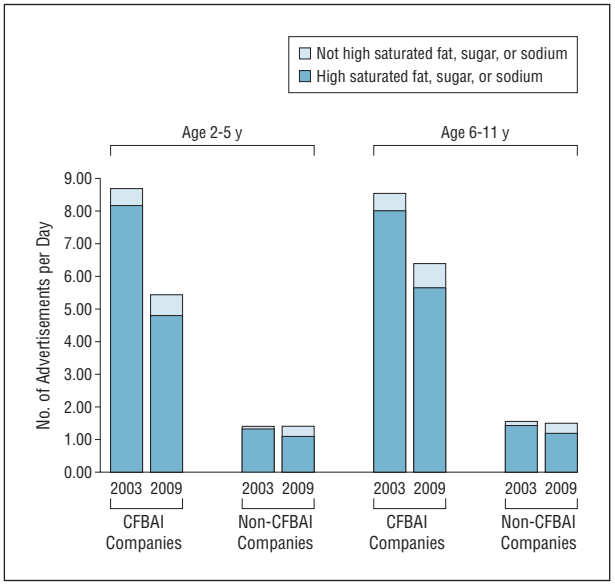

Figure 3. Exposure to food and beverage advertisements by high–saturated fat, high-sugar, or high-sodium status by Children's Food and Beverage Advertising Initiative (CFBAI) membership, age, and year.

with different definitions on what constituted such programming. In this study, we examined exposure to all advertising seen by children, not just advertising on children's programming. Thus, the study results assessed the extent to which self-regulation impacted the landscape of all food-related advertisements seen by children. Further, our nutritional standards, which drew on the nutritional recommendations from the National Academy of Sciences, were not necessarily reflected in the CFBAI individual members' self-defined nutritional standards.

In conclusion, examining children's advertising exposure using television ratings data over time on the one hand showed promising reductions in exposure to food and beverage advertisements but on the other hand showed that the vast majority of the ads that children saw in 2009 were for products high in SAFSUSO. Further, between 2003 and 2009, children were exposed to an ever-increasing number of fast-food ads. If self-regulation is to continue as the modus operandi, the results suggest that several substantive changes are needed within the CFBAI to further improve the landscape of television food advertising seen by US children. These include the need to (1) develop common nutritional standards based on governmental agency guidelines; (2) standardize and broaden the definition of what constitutes children's programming since the reach of unhealthful ads in other programming is high; and, (3) increase the membership of the CFBAI, particularly among fast-food companies to stem the growing barrage of fast-food ads seen by children.

The Council of Better Business Bureaus has reported the CFBAI member advertising practices directed at children's programming to be in compliance as per their self-defined pledges.[29] In this regard, the development and application of formal nutritional standards and definitions of child programming are critical to evaluate self-regulation. Continued monitoring of children's overall exposure and exposure on children's programming is clearly needed. If continued monitoring shows minimal further reductions in food-related advertising exposure and/or little improvement in the nutritional content of food and beverage advertisements seen by children, then formal governmental intervention may be warranted.

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