

Breakfast cereal industry pledges to self-regulate advertising to youth: Will they improve the marketing landscape?

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Abstract In 2007, the Council of Better Business Bureaus created the Children's Food and Beverage Advertising Initiative to improve the nutritional profile of products marketed to children in the United States. We provide quantitative baseline data describing (a) the amount of child-directed breakfast cereal advertising in 2007; (b) an assessment of the nutritional value for all cereals advertised on television; and (c) the relationship between nutrition quality and child exposure to television advertising for major cereal brands. In 2007, the average American child viewed 757 cereal ads, and 98 per cent of these ads promoted unhealthy cereals that would be prohibited from advertising to children in the United Kingdom. Healthy cereals were advertised in 2007 in the United States, but adults, not children, were predominantly exposed to these ads. These quantitative methods can be used in the future to evaluate the impact of industry self-regulation efforts to improve the marketing landscape.

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Introduction

There are significant public health concerns about the negative influence of food marketing on children's nutrition and health.¹⁻⁴ Children in the United States view nearly 5 500 food advertisements per year and 98 per cent of those food ads promote products high in fat, sugar, or sodium.^{5,6} There is robust science linking exposure to food marketing and poor diet, and in an effort to protect children from food marketing, the public health community has proposed a variety of remedial legislative and regulatory approaches.³

In response to these concerns, many large food producers have developed voluntary nutrition standards and guidelines for foods marketed to children. To date, the largest coordinated effort of industry self-regulation in the United States is the Children's Food and Beverage Advertising Initiative (CFBAI).⁷ First announced in November 2006 by the Council of Better Business Bureaus, implementation has occurred in stages. In July 2007, industry participants announced their pledges, which included an agreement to devote at least 50 per cent of child-directed advertising to healthier products and/or messages promoting healthier lifestyles. Each company defined 'marketing to children' and 'healthier' foods according to their own criteria, but they all pledged to meet these marketing goals by January 2009. A report released in July 2008 evaluated the companies' progress in implementing their pledges between July and December 2007 and found that about half of the companies had already implemented their pledges, while the others were on schedule to do so by January 2009.⁸

While the qualitative self-reported progress described by the CFBAI reports is promising, it is critical to test objectively the rigor of the nutrition standards put forth by the CFBAI and actual change in youth exposure to food marketing. To this end, we identify and demonstrate reliable quantitative methods to evaluate the pre-CFBAI food marketing environment. These methods can be used over time to evaluate change to the food marketing landscape of youth.

We selected the cereal category for the present analyses because they are the packaged foods most heavily marketed children.⁶ A Federal Trade Commission⁹ report found that in 2006, cereal companies spent US\$229 million marketing to children aged 2-11 years, which was more than any other food category. Children's



websites are also more likely to feature cereal advertising than other products.¹⁰ Further, previous research has demonstrated that cereals marketed primarily to children are significantly less healthy than the products marketed to adults, making it an appropriate product category to monitor closely.¹¹

To demonstrate how to evaluate the effectiveness of the CFBAI pledges for cereal this paper reports: (a) baseline data on the amount of children's cereal marketing occurring before the required implementation of the CFBAI; (b) baseline quantitative data on the nutritional quality of cereals in television advertising viewed by children, adolescents, and adults; and (c) the strength of the relationship between the nutritional quality of each brand of cereal and the degree to which that brand is advertised to children, adolescents, and adults.

Methods

Sample and measures

Assessing marketing exposure

Most CFBAI participants have defined child-directed advertising as television programming where children aged 2–11 years make up a substantial proportion (for example, 25–50 per cent) of the audience.⁸ This measure is limited because children watch many shows that fall outside of the category of children's television; as a result, half of their exposure to food advertising occurs on programming with a child audience share less than 50 per cent.^{5,12}

To remedy this problem, we licensed brand-level exposure data from Nielsen Media Research for all cereal brands with national television advertising in 2007 ($n = 83$).¹³ Nielsen¹⁴ data are collected from a representative national sample of more than 18 000 people from 9000 households, who have agreed to participate. The exposure data are delivered as gross rating points (GRPs), which are the standard measure used by the advertising industry to assess audience exposure of advertising campaigns.¹⁵ GRPs are defined as reach (percent of people exposed) X frequency (number of exposures) for a specified amount of time (for example, per year). GRPs are used to provide a 'per-capita' measure of advertising exposure.

GRPs are an excellent research tool because they permit comparisons between demographic groups, to identify which subgroups are disproportionately exposed to a specific type of marketing. For example, if children aged 2–11 years were exposed to 200 GRPs of advertising for Cereal A while adults aged 18–49 years were exposed to 100 GRPs of Cereal A, then children saw twice as much advertising per-capita for Cereal A compared to adults (that is, the child/adult GRP ratio = 2.00). A high child/adult GRP ratio suggests child-targeted advertising.

Sample of cereal brands

As stated above, data were licensed for all 83 cereal brands advertised nationally in 2007. For the present analyses, brands were removed if the ads were for websites instead of cereal products ($n = 3$) and if nutritional information was not available from online sources ($n = 9$), resulting in a final sample of 71 cereal brands. These brands are marketed under the names of nine different manufacturers, although some smaller manufacturers (for example, Kashi) are actually owned by larger ones (for example, Kellogg's). The companies included in our sample are: Kellogg's (30 brands), General Mills (20), Quaker (8), Post (8), B&G Foods (1), Gerber (1), Nature Valley (1), Glucerna (1), and Kashi (1). To streamline the analyses, we collapsed the last 5 single brand five companies into a group labeled 'Other'.

Assessing nutrient profile of breakfast cereals

In their CFBAI pledges, companies created their own definitions for 'better-for-you' foods by setting limits on calories, total fat, saturated fat, trans fat, sodium, and sugar.⁸ Some company definitions also address whether the food has some positive nutrients (for example, vitamins and minerals), functional benefit, or provides a serving of fruits or vegetables.⁸ As an example, General Mills considers its breakfast cereals better-for-you if each serving has: ≤ 175 calories, ≤ 12 grams of sugar, ≤ 230 mg of sodium, 0 g labeled trans fats, and ≤ 2 g saturated fat.⁸ The 2008 CFBAI progress report indicates that nearly all General Mills cereals meet these criteria, including Reese's Puffs, Cocoa Puffs, Lucky Charms, and Cookie Crisp.⁸ This calls the discriminatory utility of these standards into question and suggests



that monitoring changes in the nutrient profiles of children's cereals requires a more sensitive assessment tool.

To address this need, we employ a quantitative, continuous nutrition rating system called the United Kingdom Nutrient Profiling model (NP).¹⁶ The NP was developed by Michael Rayner and colleagues for the Food Standards Agency in the United Kingdom. This model has been validated by comparing ranked nutrition profile scores with the judgment of professional nutritionists and it is currently used in the United Kingdom to regulate food marketing to children.¹⁷ We chose the NP model because it provides greater detail and discrimination among brands than the definitions for better-for-you foods created by the industry.⁸

The NP produces a single score for a food product based on seven factors: total calories, grams of saturated fat, grams of sugar, milligrams of sodium, grams of fiber, grams of protein, and the percent composition of unprocessed fruits, nuts, and vegetables.¹⁶ Scaled scores are subtotaled for the healthful components (fiber, protein, and fruits/nuts/vegetables) and less healthful components (sugar, sodium, saturated fat, and total calories). The final score is the difference between the healthful and less healthful subtotals, and it is possible to have negative scores. The model is reverse coded (that is, a higher score indicates a less nutritious food). Only foods with a score of '4' or lower are designated as 'healthy' and are allowed to be advertised to children in the United Kingdom.

To obtain the NP score for each of the cereal brands, we gathered cereal nutrition information from company websites and cereal package labels during September 2008. This nutrition information was not contemporaneous with the telecast of the advertisements. Instead, these data reflected recent changes in cereal formulations.⁸ When the ads were for a brand family with more than one flavor, we used the average nutrition score for all of the varieties included ($n = 10$).

Analytic plan

In the first set of analyses, we use GRP measures to establish how much cereal marketing children, adolescents, and adults were exposed to in 2007 and which cereals appear to be targeting each group. Second, we apply the NP model to all of the cereals advertised

in 2007 and report the nutrition scores for each advertised brand. We then put these two scores together (GRP scores and NP scores) for each brand and show the healthfulness of the cereals marketed to children and adolescents.

Finally, we use regression analyses in four models to assess quantitatively the direction and strength of the relationship between poor nutritional value and youth-targeted cereal marketing. The first model (Model A) tested the hypothesis that children will be overexposed relative to other age groups to cereals of lesser nutritional quality. The outcome variable was set to 1 if the GRPs for children ages 2–11 were larger than GRPs for teens ages 12–17 or adults ages 18–49 years. Logistic regression was used to model this outcome variable using the NP nutrition score. The observational units were individual brands, except when we used nutrition score averaging because the advertising was for a family brand. The cereal company that produced the brand and the use of averaging were indicated as covariates. The next three models (B, C, and D) tested the hypothesis that the magnitude of exposure to brand-specific advertising (as measured in GRPs) for children, teens, and adults, increases as a function of nutrition score. Because GRPs provide a per capita measure of exposure, this variable behaves as a count variable, and its distribution was best described by a Poisson or negative binomial function. Owing to overdispersion ($P < 0.0001$) in the Poisson model, a negative binomial model was used. The predictor variables entered into Models B–D were the same as Model A.

Results

How much were youth exposed to cereal advertising in 2007?

Cereal advertising comprised 17 per cent of all food advertising seen by children in 2007.¹³ The vast majority of children's exposure to cereal ads occurred while watching television on cable networks (93.2 per cent), followed by national broadcast networks (4.4 per cent), spot advertising (1.5 per cent), and nationally syndicated shows (0.9 per cent). The GRP data from 2007 reveal that the average American child was exposed to approximately 758 cereal advertisements on television. In comparison, adolescents saw an



average of 417 cereal ads and adults saw 321. This means children saw 136 per cent more cereal advertising than adults and adolescents saw 30 per cent more cereal advertising than adults.

To identify the cereals marketed specifically to children and adolescents, we calculated each brand's child/adult and adolescent/adult GRP ratio. A ratio over 1.0 suggests targeted marketing. We found that 35 brands had child/adult GRP ratios over 1.0. All of these cereals also had an adolescent/adult GRP ratio over 1.0, indicating that children and adolescents are overexposed to the same brands. These brands and their GRP ratios are listed in the first two columns of Table 1. These ratios suggest that for some brands, such as General Mills Cookie Crisp and General Mills Trix, children are exposed to nearly eight times the amount of advertising as adults.

What is the nutritional quality of cereals marketed to youth?

In addition to exposure scores, we calculated the nutrition score for each cereal brand. As discussed, in the United Kingdom an NP score of 4 or below is considered 'healthy' while a score above 4 is considered 'less healthy'. The nutrition scores for our sample of cereals ranged from a very healthy score of -6 (Post Shredded Wheat) to a very unhealthy score of 21 (Quaker Cap'n Crunch). However, the distribution was skewed, as 86 per cent failed to meet the 'healthy' criteria. These unhealthy cereals made up 98 per cent of the total cereal advertising exposure for children. The third column of Table 1 lists each brand's nutrition score.

The GRP data also identified 36 brands with child/adult and adolescent/adult ratios less than 1.0, which indicates that most of the people exposed to these ads are adults. An analysis of variance was used to test for significant differences in nutrition profile for those cereals compared with cereals primarily marketed to children across companies (see means and standard deviations in Table 2). The findings indicate that children's cereals have significantly worse nutrition than their non-children's cereal counterparts across all four major companies ($F(1,62) = 65.8$, $P < 0.0001$). The brands in the 'other' category (that is, B&G Foods, Gerber, Nature Valley, Glucerna, Kashi) did not have any cereals marketed primarily to children, and had significantly better nutrition profiles compared with the other four companies.

Table 1: Exposure and nutrition scores for cereals with child-targeted marketing

	Age 2-11 <i>child/adult GRP</i> ratio	Age 12-17 <i>adolescent/adult</i> GRP ratio	Nutrition score
<i>General Mills</i>			
Cookie Crisp	7.97	3.25	15
Trix	7.94	3.17	16
Lucky Charms	7.89	3.2	17
Cinnamon Toast Crunch	7.88	3.2	17
Reese's Puffs	7.80	3.2	18
Cocoa Puffs	7.68	3.16	16
Berry Lucky Charms	7.53	2.69	17
Chocolate Lucky Charms	7.42	2.91	17
Honey Nut Cheerios	3.26	1.64	13
Family of Cereals	2.02	1.23	11
Fruity Cheerios	1.75	1.16	11
<i>Kellogg's</i>			
Froot Loops Smoothie	7.54	3.23	16
Eggo Family of Cereals	7.27	1.58	14
Apple Jacks Crashers	7.39	3.16	15
Froot Loops Colossal	7.12	2.82	16
Eggo Maple Syrup Cereal	7.03	2.71	13
Froot Loops	6.99	2.83	16
Froot Loops Darkberries	6.90	2.8	16
Frosted Flakes	6.88	2.73	14
Cocoa Krispies Choconilla	6.83	2.71	18
Apple Jacks	6.83	2.78	15
Froot Loops Starberries	6.63	2.54	16
Pops Chocolate Peanut Butter	4.67	3.59	20
Corn Pops	4.38	3.27	17
Family of Cereals	2.27	1.2	10
Cocoa Krispies	2.23	1.22	15
<i>Post</i>			
Fruity Pebbles	7.40	3.17	16
Bamm-Bamm Berry Pebbles	7.28	3.01	13
Honey-Comb	7.17	3.13	12
Chocolate Honey-Comb	7.02	3.25	11
Cocoa Pebbles	3.99	1.95	16
<i>Quaker</i>			
Cap'n Crunch's Crunch Berries	7.05	2.51	20
Cap'n Crunch's Peanut Butter Crunch	6.91	1.29	19
Cap'n Crunch's Choco Crunch	6.39	2.3	13
Cap'n Crunch	6.00	2.2	21



Table 2: Means and standard errors for nutrition scores for children's versus non-children's cereals

<i>Company</i>	<i>Children's cereal nutrition score</i>	<i>Non-children's cereal nutrition score</i>
General Mills	15.3 (0.72)	9.8 (0.80)
Kellogg's	15.4 (1.3)	7.1 (1.3)
Post	13.6 (2.2)	3.0 (2.8)
Quaker	18.3 (2.1)	6.0 (2.1)
Other	NA	3.2 (2.0)

NA= Not Applicable.

How strong is the relationship between poor nutritional quality and youth targeted marketing?

Four regression models were tested to quantify the relationship between poor nutrition and marketing targeted at youth. Model A tested the hypothesis that children will be overexposed relative to other age groups to cereals of lesser nutritional quality. Entering all covariates produced a statistically significant model ($-2\text{Log Likelihood (LL)} 39.363$, chi-square 59.050 , $df 6$, $P < 0.0001$). However, only the nutrition score covariate was statistically significant. Re-running the model using stepwise variable entry (Forward:Likelihood Ratio) produced a statistically significant model ($-2LL 46.966$, chi-square 51.447 , $df 1$, $P < 0.0001$) with a Hosmer-Lemeshow goodness-of-fit test of 19.0184 ($df 8$, $P < 0.02$). The model correctly classified 86 per cent cases (that is, 61 of 71 brands). The coefficient (log odds) for the nutrition score was 0.59 (Wald 18.76 , $df 1$, $P < 0.0001$), indicating that for every unit that the nutrition score worsens, the odds of the brand overexposing children increases by 1.77. In essence, any cereal with an NP score worse than 13 was predicted to overexpose children. This result was independent of the company producing the cereal brand and the use of nutrition score averaging.

We present the coefficients and incidence rate ratios from the regression analyses in Table 3. Models B, C, and D examined the relationship between different age groups' exposure to advertising and (a) the brand's nutrition score; (b) the company producing the brand; and (c) whether or not nutrition score averaging was used for that brand. Model B tested whether 2–11-year-old children's

Table 3: Regression results for relative exposure by age group and nutrition score

Variable	Children (Model B)		Adolescents (Model C)		Adults (Model D)	
	Coeff	IRR	Coeff	IRR	Coeff	IRR
Nutrition Score	0.10***	1.11***	0.04	1.04	-0.05*	0.96*
General Mills	1.61**	4.99**	1.12	3.07	0.73	2.08
Kellogg's	1.04	2.83	0.68	1.97	0.65	1.92
Post	1.68**	5.36**	1.15	3.17	0.78	2.17
Quaker	0.50	1.65	0.10	1.10	-0.08	0.92
Averaging of nutrition score	-0.641	0.53	-0.71**	0.49**	-0.61	0.55

Abbreviation: IRR=Incidence rate ratio.

* $P < 0.10$; ** $P < 0.05$; *** $P < 0.01$.

exposure to cereal advertising was significantly related to the nutrition score of the brand and found an incidence rate ratio of 1.11, which indicates that the number of GRPs increased by a factor of 1.1 for each worsening point in the nutrition score. The significant effects for General Mills and Post indicate that some of the variation in advertising exposure for 2–11-year-olds is owing to cereals from those companies.

Model C tested whether adolescent exposure to cereal advertising was related to nutrition score and found there was no significant relationship. Model D tested whether adult exposure to cereal advertising was related to nutrition score and found a marginally significant relationship in the opposite direction. This indicates that less healthy cereals are less heavily advertised to adults. The incidence rate ratio was 0.95, which indicates that for each worsening point in the nutrition score, adult exposure declined by a factor of 0.95.

Discussion

Our results provide an important benchmark to monitor the impact of food industry self-regulation. Companies have pledged that at least 50 per cent of advertising primarily directed to children will be for healthier foods or for promoting healthier lifestyles. According to a scientifically validated nutrition profile model, 98 per cent of children's exposure to cereal advertising in 2007 was for less healthy



brands. These data illustrate that the relationship between poor nutritional quality and overexposure to marketing is so strong that the nutrition score alone is sufficient to predict, with 86 per cent accuracy, whether children saw proportionately more advertising than either teens or adults. Dramatic improvements to industry marketing practices are needed.

A major limitation of the CFBAI is the lack of independently established definitions of ‘advertising primarily directed to children’ and ‘healthier food’ and objective indices of change over time. Our analyses demonstrate the value of the NP score in identifying meaningful distinctions in the nutritional quality of cereals. The cereals receiving poor scores tended to be low in fiber and high in sugar, and those receiving extremely poor scores contained fat as well (often from peanut butter). This score sets a high standard for healthfulness, but is also very sensitive to change, as it includes both healthy and unhealthy features of food products. It is likely to pick up on the changes cereal manufacturers make as they reformulate their products to improve their nutrient profiles.

The present study also demonstrates the utility of defining ‘advertising to children’ by child/adult and adolescent/adult GRP ratios. This strategy produces a quantitative score that captures the degree to which children and adolescents are being specifically targeted by an advertising campaign. The Nielsen exposure data also provide a level of detail and evidence of targeted advertising that goes beyond previous work identifying which brands are children’s cereals.¹¹ GRP ratios can also be captured for each brand, which will allow for comparisons among different brands within and between companies over time.

The issue of overexposing children relative to adults to ads for unhealthy cereals seems to be a universal practice among the four major US cereal companies. The comparison of children’s exposure to that of adults is important as the CFBAI asserts ‘it remains the primary responsibility of parents to guide their children’s behavior’.⁸ When children are overexposed to advertising for cereals of lesser nutritional quality, receiving as much as seven times the advertising exposure of adults on a per-capita basis, this potentially undermines parents’ abilities to deliver contextual information to their children about healthy eating habits. The present study was not designed to compare cereal companies to each other, but the results from one

regression suggest that cereals advertised to children aged 2–11 years from General Mills and Post are most likely to be unhealthy. This warrants further research attention.

Another issue that must be addressed in future research is that in addition to television advertising, children are exposed to significant marketing through radio, print, and Internet. The CFBAI guidelines regarding advertising placement apply only to television, leaving tremendous opportunities to market to children through other media.

Limitations

Nutrition profiling systems are subject to criticism.¹⁸ Critics of nutrition profiling list shortcomings such as failure to account for portion sizes, frequency of consumption, combinations of foods, bioavailability of nutrients, and the inclusion/exclusion of fortificants. The model we chose for our analysis has been specifically designed for use in the context of limiting advertising of foods high in fat, sodium, and sugar to children, and has been independently validated by nutrition professionals. Future research could examine other models to determine whether similar results would be achieved.

The use of GRP ratios to establish targeted marketing is also subject to debate. If marketers operate rationally and attempt to concentrate exposure to a target audience with advertising expenditures, a group with higher GRPs relative to another group will receive proportionately more exposure for the same advertising investment. Child/adult GRP ratios alone are not sufficient to prove targeting, but present a compelling economic argument according to a 2004 decision by a California appeals court in a case brought under the 1997 landmark Tobacco Master Settlement Agreement.¹⁹

Another potential limitation of this study is that our analysis considered ages 2–11 years as the demographic group of interest when examining children's advertising exposure. Some cereal companies have issued statements that they do not advertise to children under the age of 6 years.^{20,21} If as a result of these policies, more advertising exposure is concentrated on ages 6–11 than on ages 2–5 years, then the GRPs for age 6–11 may be higher than age

2–11 years. This would not change the results of this analysis, but would suggest exploring age 6–11 years' exposure in future research.

Finally, many companies' voluntary guidelines state that advertising must promote healthier products or messages about healthier lifestyles. The present study did not perform any content analysis of the ads to make an assessment of their messaging. Even if, however, every ad directed to children encourages them to go out and play before eating, the relative nutritional quality of what they consume will still have an impact on their weight and health.

Conclusion

Marketing of unhealthy food products has been clearly identified as a contributor to the poor eating habits of United States youth. Industry self-regulatory efforts are an important step toward the goal of improving the marketing landscape and creating an environment that promotes healthful foods rather than products with excess sugar, fat, and calories. The effectiveness of industry self-regulatory efforts remains to be seen, and it is critical that the public health field monitor changes in an independent, quantitative manner.

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