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## **Sugar as Part of a Balanced Breakfast? What Cereal Advertisements Teach Children About Healthy Eating**

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*Marketing that targets children with energy-dense, nutrient-poor foods is a likely contributor to the childhood obesity crisis. High-sugar ready-to-eat cereals are the packaged food most frequently promoted in child-targeted food advertising on television. The authors combined content analysis of product nutritional quality and messages presented in cereal television advertisements with syndicated data on exposure to those ads. The analysis quantifies children's exposure to specific products and messages that appear in advertisements and compares it with adult exposure. Children viewed 1.7 ads per day for ready-to-eat cereals, and 87% of those ads promoted high-sugar products; adults viewed half as many ads, and ads viewed were equally likely to promote high- and low-sugar cereals. In addition, the messages presented in high-sugar ads viewed by children were significantly more likely to convey unrealistic and contradictory messages about cereal attributes and healthy eating. For example, 91% of high-sugar cereal ads viewed by children ascribed extraordinary powers to these products, and 67% portrayed healthy and unhealthy eating behaviors. Given children's vulnerability to the influence of advertising, the emotional and mixed messages used to promote high-sugar cereals are confusing and potentially misleading.*

One out of three children in the United States is overweight or obese, triple the rate of 30 years ago (Ogden, Carroll, Curtin, Lamb & Flegal, 2010). Marketing of energy-dense, nutrient-poor foods and beverages targeted to children is widely considered to be a significant contributor to this public health crisis (Harris, Pomeranz, Lobstein, & Brownell, 2009; Hastings et al., 2003; Institute of Medicine, 2006; White House Task Force on Childhood Obesity, 2010). U.S. food and beverage companies spend \$870 million per year in marketing targeting children; approximately half (\$458 million) is spent on television advertising (Botha et al., 2008). According to Botha and colleagues (2008), child-targeted food marketing is concentrated in just three categories: breakfast cereals (26% of child-targeted food marketing expenditures); restaurants, including fast food (19%); and snack foods (13%). In contrast, food companies spent less than \$40 million to market healthier fruits, vegetables, and dairy products to children (Botha et al., 2008).

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According to the Institute of Medicine (2006), “food marketing works”; it causes children to prefer and ask for the advertised products. Recent studies also demonstrate broader effects on children’s eating behaviors and attitudes about categories of foods. For example, exposure to food advertising increases children’s consumption of any available snack food (Halford, Boyland, Hughes, Oliveira, & Dovey, 2007; Halford, Gillespie, Brown, Pontin, & Dovey, 2004; Harris, Bargh, & Brownell, 2009) and is associated with greater consumption of sugar-sweetened beverages and fast food (Andreyeva, Kelly, & Harris, 2011).

### **How Food Marketing Affects Children**

Food marketing affects children’s eating behaviors and food attitudes through a number of possible mechanisms (see Harris, Brownell, & Bargh, 2009). *Cultivation theory* posits that the cumulative effect of media exposure leads to views of the world that correspond to the “symbolic world” of the media (Gerbner, Gross, Morgan, Signorielli, & Shanahan, 2002). Cultivation researchers demonstrate that television viewing is highly correlated with the unhealthy eating behaviors promoted in food advertising; preferences for unhealthy foods; and specific beliefs, such as fast food meals are as nutritious as home-prepared meals (Signorielli & Lears, 1992; Signorielli & Staples, 1997). Television viewing as a child also predicts unhealthy food preferences and diet among college students (Harris & Bargh, 2009). Similarly, *social learning theory* suggests that children learn and model behaviors, cognition and affect by observing others’ actions and the consequences of those actions, including through the symbolic world presented in the media (Bandura, 2002).

Modern social cognitive models also suggest that exposure to food advertising can lead directly to normative beliefs about eating and attitudes about different foods in the absence of attention and rational thought (Harris, Brownell, & Bargh, 2009; Livingstone & Helsper, 2006). Much of advertising is designed to simply associate positive emotions with a product through a classical conditioning process (Cohen, Pham, & Andrade, 2008), even when those emotions have little or no relevance to the product itself. Therefore, food advertising that portrays children having fun or engaged in cool activities will, over time, create perceptions in children’s minds that the advertised products are fun or cool. Advertising effects may be especially pronounced in young children, who do not yet have the ability to critically evaluate advertising messages. Until the age of 7 or 8 years, children do not have the cognitive ability to understand that advertisements present a biased point of view and thus consider advertising to be simply another source of information about their world (John, 1999; Kunkel et al., 2004). Although older children have the cognitive abilities to critically assess advertising, even 10- to 11-year-olds do not regularly use these skills while watching ads (John, 1999).

According to these theories, the specific messages conveyed in food advertising, as well as the cumulative effect of continued exposure to these messages, teach children about expected outcomes from consuming these primarily unhealthy products and model “normal” eating behaviors. In addition, because of children’s limited abilities to critically evaluate advertising messages, the sophisticated creative techniques commonly used can be unfair or inherently misleading (Harris & Graff, 2011; Pomeranz, 2010).

### **Research on Food Marketing to Children**

Previous research to monitor television food advertising to children has evaluated three factors that likely affect children’s eating behaviors and diet: the nutritional

quality of products advertised, the messages and creative techniques used in children's food advertising, and the number of ads viewed. These studies typically use (a) content analyses to document the products, messages, and/or creative techniques in food advertisements seen by children; or (b) exposure analyses to document the number of advertisements viewed by children and the category and nutritional content of products in the ads.

In content analyses, researchers record and examine in detail all advertisements that appeared during a specified time frame on a certain type of programming (e.g., children's television or primetime). Content analyses repeatedly show that nearly all food ads that appear during children's television programs promote foods that are high in fat, sodium, or added sugars, or low in nutrients (Batada & Wootan, 2007; Folta, Goldberg, Economos, Bell, & Meltzer, 2006; Institute of Medicine, 2006; Reece, Rifon, & Rodriguez, 1999; Stitt & Kunkel, 2008). Similarly, food ads that appear during general-audience programming viewed most often by children feature products high in fat and sodium (Harrison & Marske, 2005).

Food advertisements that are targeted to children also communicate similar direct and indirect messages. They typically portray unhealthy eating behaviors, such as snacking that occurs any time or anywhere (Harrison & Marske, 2005), and promote unhealthy foods using emotional appeals, such as fun or cool (Folta et al., 2006; Schor & Ford, 2007). The Institute of Medicine (2006) similarly concluded that fun, taste, and product performance messages appear most often in children's food and beverage television advertising. Child-directed advertising also often makes use of specific creative techniques, including branded spokecharacters, licensed popular fictional characters (such as SpongeBob SquarePants), celebrity endorsers, and offerings of toys or other giveaways (Institute of Medicine, 2006). A limitation of content analyses, however, is that they cannot determine the number of times that a child was exposed to advertisements that promote different types of products or contain the different messages or creative techniques examined.

On the other hand, exposure analyses typically use syndicated advertising data, such as gross ratings point (GRP) data from Nielsen, to measure the number of advertisements seen by the average child across all types of programming during a specified period of time. For example, Holt, Ippolito, Desrochers, and Kelley (2007) found that U.S. children view 20,000 advertisements in total per year and approximately 5,500 (28%) are for food and beverages. Powell, Szczypka, and Chaloupka (2010) showed that the average preschooler (2–5 years) viewed 11.5 television food ads every day in 2007, and the average child (6–11 years) viewed 13.1. Studies have also shown that children view the most advertising for cereal and fast food restaurants, followed by sweets (including candy), beverages, other restaurants, and snack foods (Holt et al., 2007; Powell, Schermbeck, Szczypka, Chaloupka, & Braunschweig, 2010), and that 87% of television food ads seen by children promote foods high in fat, sugar, and/or sodium (Powell et al., 2010). A limitation of previous exposure analyses is that they do not examine the specific messages or creative techniques used in these advertisements.

## **Present Research**

In response to public health concerns about the amount of marketing for nutritionally poor food directed to children, the Council of Better Business Bureaus launched the Children's Food and Beverage Advertising Initiative (CFBAI) in 2006 (Kolish, Hernandez, & Blanchard, 2011). Seventeen food companies, including the four largest

cereal companies, participate in the CFBAI and have pledged to market only healthier dietary choices in child-directed advertising (Kolish et al., 2011). However, questions remain about the potential effectiveness of the CFBAI. Critics argue that it allows participating companies to set their own definitions of “healthier dietary choices” and “child-directed” advertising, which has enabled them to continue to advertise products of questionable nutritional quality to children (Powell, Schermbeck, et al., 2010; Stitt & Kunkel, 2008). For example, cereal products such as Froot Loops or Reese’s Peanut Butter Puffs consisting of up to 44% sugar by weight are classified as “healthier dietary choices” (Harris, Schwartz, et al., 2009). In addition, approximately half of all food advertising seen by children appears during general-audience programming that is not covered by the CFBAI (Holt et al., 2007). Most participating companies define child-directed advertising as advertising that appears during programming with an audience of no more than 35% children 2–11 years of age (Children’s Food and Beverage Advertising Initiative, 2012). This definition does not incorporate the use of messages or creative techniques that appeal predominately to children, such as animation, brand spokescharacters, and appeals to “fun” and “cool.” Therefore, it is important to continue to monitor food advertising to children.

This paper evaluates food advertising to children following implementation of CFBAI pledges in 2008 and expands on existing research by incorporating content and exposure analysis methods. Combining these two methods allows us to measure together all three factors that likely affect children’s eating behaviors and diet: the nutritional quality of products advertised, the messages and creative techniques used to promote those products, and the amount of advertising to which children are exposed. Thus, it provides a comprehensive qualitative and quantitative look at all television advertising for cereals seen by children.

We chose to examine advertising of ready-to-eat (RTE) cereals for two reasons. First, they are frequently advertised to children. In 2009, the average child (age 6–11 years) saw 2.1 cereal ads every day, the second most frequently viewed food category behind fast food (Powell, Szczpka, et al., 2010); and cereal companies spent more on child-targeted advertising than any other food category (Botha et al., 2008). Second, cereal companies advertise their least nutritious cereals to children. Child-targeted cereals have more sugar and sodium and less fiber and protein than adult-targeted cereals (Schwartz et al., 2009; Schwartz, Vartanian, Wharton, & Brownell, 2008), while the more nutritious children’s cereals are advertised primarily to parents (Harris & Schwartz, et al., 2009).

In this article, we address three specific research questions: (a) What are the most frequent messages and creative techniques used to promote RTE cereals and do they differ by cereals’ nutritional quality?; (b) How many of these products, messages, and techniques do children view in total?; and (c) What products, messages and techniques are used disproportionately more often to appeal to children compared with adults?

## Method

Content analysis was used to document the products and creative content of cereal advertisements. We also licensed data from Nielsen to measure child and adult exposure to the specific ads included in the content analysis. Last, we combined this information to document the number of ads viewed by children and adults that promoted specific products and contained different messages and creative techniques.

### Content Analysis

We purchased video copies of all RTE cereal advertisements that appeared on U.S. television between January 1, 2008, and March 31, 2009, from Kantar Media AdScope, a database of advertisements (Kantar Media, 2011). Ads were excluded if they were (a) minor revisions or shortened versions of a longer ad; (b) only a media sponsorship message, typically presented as a simple and very brief clip with the message, “sponsored by \_\_\_\_\_ cereal;” (c) Spanish-language; or (d) promoting hot cereals or specialized products (e.g., diabetic or baby cereals). To develop the coding manual, we reviewed previous content analyses and identified messages and techniques commonly used in food marketing to children (Ippolitio & Pappalardo, 2002; Kunkel, 1992; Reece et al., 1999; Warren, Wicks, Wicks, Fosu, & Chung, 2008). We also viewed a sample of cereal ads to identify additional features that frequently appeared in cereal advertising.

The coding manual included five main categories to identify the products, messages, creative techniques and eating behaviors presented in the ads. The Appendix lists the specific items coded under each category. *Characters* describes the main characters in the ads, including humans, animated characters, and animated cereal pieces. *Product description* details features or attributes of the product itself, including nutritional content, direct claims that the product is healthy or nutritious, and other features of the product. *Product promise* describes direct and indirect benefits of consuming the product, including health outcomes, other health benefits, emotional benefits (e.g., fun, cool) and family ties.

*Eating behaviors* includes depictions of other foods, time and place of consumption, and other suggestions about diet or health (e.g., balanced breakfast, physical activity). Each of these behaviors was also classified as healthy or unhealthy. As in previous research (Harrison & Marske, 2005), healthy eating behaviors include consuming the food at a table or clearly as a meal, whereas unhealthy eating behaviors include snacking and other consumption during non-meal times or while engaged in other activities (e.g., in front of the TV or computer). Depictions of other healthy foods (e.g., fruit, milk) were classified as healthy eating behaviors, as well as depictions of other healthy behaviors (e.g., balanced breakfast, physical activity). Depictions of other unhealthy foods in the ad (e.g., chocolate, Rice Krispie Treats, ice cream) were classified as unhealthy eating behaviors.

The specific product that was advertised was also recorded. Ads that promoted the company as a whole, multiple products, or a brand of cereals with multiple variations that did not specify one variation were not coded for nutritional quality. Sugar content was used to classify the nutritional quality of cereal products advertised. Previous research has documented the high sugar content of children's cereals (Consumer Reports, 2008; Schwartz et al., 2009; Schwartz et al., 2008; Which?, 2009), whereas the majority of cereals qualify as low fat and low sodium by Food and Drug Administration standards (Food and Drug Administration, 2009). Previous studies have also found that sugar is the only ingredient that varies widely across RTE cereals (Harris & Schwartz et al., 2009; Schwartz et al., 2008); and child-targeted cereals contain 85% more sugar than those marketed to adults (Harris & Schwartz et al., 2009). Sugar grams and grams per serving were retrieved from the nutrition facts on cereal companies' websites on May 31, 2009. Designations for “high-sugar” cereals versus “low-sugar” cereals were based on guidelines developed by the U.S. Interagency Working Group on Food Marketed to Children (2011) for nutritious foods that positively

contribute to children's health. Cereals were designated as *high sugar* if they contained more than 13 grams of sugar per 50 grams of product (i.e., 26% of product by weight).

Following review of initial coding results, the coding manual was modified to clarify areas of confusion or dispute. Two coders were randomly assigned to code all advertisements, with 25% overlap for reliability testing. Cohen's kappa was calculated to assess interrater reliability for each coding item; where kappa could not be computed due to low incidence of the variable, percent agreement was used.

After an initial examination of the content analysis results, we grouped coding items according to common themes (see the Appendix for specific items that were classified under each of these themes). Ads that portrayed the product as more than food by showing the cereal pieces as a plaything, for a purpose other than eating (i.e., "animated cereal"), or conveying emotional benefits from consuming the food (i.e., fun, cool, peer acceptance) were identified. *Health and nutrition benefits*, another common theme, included ads with product features and promises related to the nutritional quality or health benefits of the cereals. Many of the ads portrayed healthy and unhealthy eating behaviors (e.g., a picture of an orange or glass of milk as part of a balanced meal together with depictions of eating the food anytime and any place, such as at a bowling alley or during a treasure hunt). We combined these two categories to identify ads that portrayed *healthy eating behaviors only*, *unhealthy eating behaviors only*, *both healthy and unhealthy behaviors*, or *no eating behaviors*.

### ***Exposure to Advertising Content***

To assess the frequency with which advertisements for cereals of varying nutritional quality, messages and creative techniques were viewed, we licensed GRP data from Nielsen to assess individuals' exposure to RTE cereal advertisements. GRPs measure the number of times individuals in a specific demographic group (e.g., age group) viewed each advertisement during the period of interest and thus provide a per capita measure to assess relative exposure between groups. Nielsen calculates GRPs by summing all advertising exposures for all individuals within a demographic group (i.e., total impressions), dividing this total by the size of the population, and multiplying by 100. Therefore, GRPs divided by 100 provides the number of advertisements viewed by the average individual in the demographic group during the time period examined. To compare child exposure versus adult exposure to different messages, we obtained GRP data for children (2–11 years) and adults (18–49 years) for all RTE cereal advertisements that appeared on national (network, cable, and syndicated) and local (i.e., spot) television programming from January 1, 2008, through March 31, 2009. To obtain the number of advertisements viewed by the average child or adult during this period, we divided GRPs by 100.

The exposure and content analyses used advertisements from different data sources. Therefore, researchers manually matched the actual advertisements from the content analysis to Nielsen's descriptive titles. Advertisements that could not be matched or that did not contain descriptive information in the Nielsen database were eliminated from the analysis. We then appended the GRP data for each advertisement to the content analysis results and summed GRPs by age group, product type (i.e., high-sugar cereals vs. low-sugar cereals) and coding items. Chi-square analyses were used to determine differences between high- and low-sugar cereal ads and disproportionate differences in exposure for children versus adults.

## Results

We initially obtained 397 cereal ads, including 177 unique ads; 19 ads could not be matched with the Nielsen data, resulting in 158 ads for the full analysis. There were a total of 53 items in the coding manual. Interrater reliability was good. Of the 53 items coded, 38% ( $n = 20$ ) did not receive enough occurrences to compute kappa values. All of these items, however, did elicit at least 98% coder agreement. Interrater reliability for 29 of the 33 remaining items yielded kappa coefficients in the substantial to almost perfect range of agreement (.61 or higher; Viera & Garrett, 2005). Four items scored in the fair to moderate range (.21 to .60). For reporting purposes, we have grouped these items into 19 summary categories (see Table 1).

### *Content and Exposure Analyses*

Of the 158 ads in the analysis, 47% promoted high-sugar cereals and 33% featured low-sugar cereals. The remaining 20% featured a variety of products or promoted the company as a whole and were not classified as high- or low-sugar cereals. Table 1 presents the percentage of ads in total that contained items from each of the categories examined and differences between ads for high- and low-sugar cereals. Nearly half (49%) boasted at least one specific health/nutrition claim or other health-related product benefit. In addition, 43% of ads portrayed the product as more than food by promoting emotional benefits and/or animated cereals. The majority of ads (80%) portrayed some form of eating behavior; healthy and unhealthy eating behaviors together appeared most often (36%), followed by healthy eating behaviors only (29%). Just 15% of ads portrayed only unhealthy eating behaviors. Ads for high-sugar cereals were significantly more likely to portray the product as more than food: 44% used animated cereals and 59% promoted emotional benefits. They also were more likely to feature healthy and unhealthy eating behaviors in the same ad. Low-sugar cereal ads, however, featured more health/nutrition benefits.

Table 2 presents the number of ads viewed by children and adults for high- and low-sugar cereals that contained each of the common themes identified. The average child viewed 806 RTE cereal advertisements (1.7 ads per day) during the 15-month period analyzed, and the majority of ads viewed by children (87%) promoted high-sugar cereals. Examining their exposure to common themes revealed that 83% of all ads viewed by children, and 91% of ads for high-sugar cereals, portrayed cereals as more than food. In addition, nearly all ads viewed by children (96%) portrayed some type of eating behavior, with both healthy and unhealthy eating appearing together in 67% of ads viewed. Even 71% of high-sugar cereals portrayed healthy and unhealthy behaviors, and 22% portrayed only healthy eating.

Compared with adults, children viewed 42% more RTE cereal advertisements in total, including approximately four times the number of ads for high-sugar cereals (698 high-sugar cereal ads for children vs. 198 high-sugar cereal ads for adults). Adults viewed significantly more ads for low-sugar cereals. Children also were significantly more likely to view ads that portrayed cereal as more than food and that portrayed healthy and unhealthy eating behaviors together. However, children viewed significantly fewer ads that contained messages about health/nutrition benefits, family ties, and unhealthy eating only.

Table 2 also presents significant differences in child and adult exposure to common themes in ads for low-sugar cereals versus high-sugar cereals. In advertising for low-sugar cereals, there were no significant differences in the common themes viewed by children and adults. However, children and adults viewed significantly different

**Table 1.** Content analysis: Proportion of individual ads with specific messages and creative techniques

	Kappa coefficient ranges*	Proportion of ads			<i>p</i> **
		All ads ( <i>N</i> = 158)	High-sugar cereals ( <i>n</i> = 75)	Low-sugar cereals ( <i>n</i> = 52)	
Characters in the ad					
Human	.66 to .93	66%	61%	63%	<i>ns</i>
Animated	.81 to .89	33%	55%	19%	<.001
Animated cereal	0.75	30%	44%	21%	.01
Product description					
Nutrient content claims	.84 to 1.00	20%	13%	21%	<i>ns</i>
Product claims—Health/nutrition	.73	8%	4%	8%	<i>ns</i>
Product claims—Other	.36 to .91	55%	80%	35%	<.001
Product promise					
Health outcome benefits	1.00	13%	4%	35%	<.001
Other health benefits	.53 to 1.00	22%	9%	33%	.001
Emotional benefits	.38 to .89	29%	59%	2%	<.001
Family ties	.77	11%	8%	19%	.10

Eating behaviors						
Other foods depicted	.55 to .81	53%	68%	40%	<.01	
Time of consumption	.63 to 1.00	60%	72%	54%	.04	
Place of consumption	.55 to .81	59%	72%	54%	.03	
Other suggestions	.79 to 1.00	37%	67%	12%	<.001	
Common themes						
Health/nutrition benefits	.63 to 1.00	49%	21%	79%	<.001	
More than food	.38 to .89	43%	69%	23%	<.001	
Both healthy and unhealthy eating	.55 to 1.00	36%	49%	27%	.02	
Healthy eating only	.63 to .95	29%	28%	31%	<i>ns</i>	
Unhealthy eating only	.55 to .1.00	15%	17%	10%	<i>ns</i>	

\*Variables with very low or no occurrence did not receive a kappa value. Individual items within the categories are not represented here; however, coder agreement ranged from 98% to 100% for such code items.

\*\* High-sugar ads versus low-sugar ads; signifies that the message appears in a disproportionately high number of high- or low-sugar ads compared with the number of high- and low-sugar ads.

**Table 2.** Total ads and messages viewed by children and adults for low- and high-sugar cereals\*

	Total cereal ads viewed			Low-sugar cereal ads viewed			High-sugar cereal ads viewed		
	Children	Adults	<i>p</i>	Children	Adults	<i>p</i>	Children	Adults	<i>p</i>
Total exposure	806	467		68	175	<.001	698	198	<.001
Product messages**									
More than food	83%	40%	<.001	34%	35%	<i>ns</i>	91%	53%	<.001
Health/nutrition benefits	21%	52%	<.001	76%	78%	<i>ns</i>	14%	28%	<.001
Family ties	3%	12%	<.001	16%	14%	<i>ns</i>	1%	13%	<.001
Eating messages***									
Healthy only	22%	23%	<i>ns</i>	32%	31%	<i>ns</i>	22%	19%	<i>ns</i>
Unhealthy only	7%	18%	<.001	10%	10%	<i>ns</i>	6%	22%	<.001
Both healthy and unhealthy	67%	46%	<.001	50%	50%	<i>ns</i>	71%	53%	<.001
No eating messages	3%	13%	<.001	9%	10%	<i>ns</i>	1%	7%	<.001

\*Time period: January 2008 through March 2009.

\*\*Not mutually exclusive.

\*\*\*Mutually exclusive.

messages for ads promoting high-sugar cereals. Compared to the high-sugar cereal ads viewed by adults, those viewed by children were more likely to promote the product as more than food and present healthy and unhealthy eating behaviors together. In contrast, high-sugar cereal ads viewed by adults were more likely to contain messages about health/nutrition, family ties, unhealthy eating only, and no eating behaviors. Approximately one quarter of high-sugar cereal ads viewed by children and adults portrayed only healthy eating behaviors; this was the only common theme used to promote high-sugar cereals that did not differ between age groups.

## **Discussion**

The average child views almost two television ads for RTE cereals per day, and these ads are ten times more likely to promote high-sugar cereals versus low-sugar cereals. Some features of cereal advertising could promote good health, such as health/nutrition messages in advertising for low-sugar cereals. However, high-sugar cereal ads are more likely to contain messages that do not promote healthy eating, including healthy and unhealthy eating behaviors portrayed in the same ad; high-sugar products associated with positive emotions, such as fun and being cool; and animated depictions of cereals with nonfood properties.

This analysis replicates other studies showing that high-sugar cereals are advertised more often to children compared with adults. However, it is the first to show that children also are exposed to disproportionately more confusing and potentially misleading messages about the benefits of consuming high-sugar cereals. Children view hundreds of ads per year for high-sugar cereals that ascribe extraordinary powers to these products: they are fun to eat, make you cool and popular, and magically transform into cartoon characters, roller coasters, and playthings. In comparison, fewer than half of all cereal ads and just more than half of high-sugar cereal ads viewed by adults contain such messages.

These findings raise ethical, as well as public health concerns, given children's limited abilities to critically process the messages raised in cereal advertising (John, 1999; Kunkel et al., 2004). Previous research on advertising exposure has demonstrated that preschool (2–5-year-old) children view just 13% fewer cereal ads than do older (6–11-year-old) children (Powell, Schermbeck et al., 2010). It is unlikely that these very young children will be able to understand that the magical powers attributed to cereals in these ads are not real. Given the potential effects of cumulative exposure to large numbers of ads that portray common themes and messages (Gerbner et al., 2002), cultivation and social learning theories predict that even older children will believe that high-sugar cereals provide emotional benefits that no food can produce, there are no negative consequences from consuming them (e.g., weight gain or long-term health risks), and that eating these high-sugar products for breakfast is “normal.” These beliefs can lead to parent-child conflict if parents do not agree (Buijzen & Valkenburg, 2003). Modern social cognitive theories also predict that children's exposure to significant numbers of ads that associate positive emotions with high-sugar cereals will create long-term affinity for these less nutritious products.

The eating behaviors presented in high-sugar cereal ads viewed by children also are likely to teach them conflicting and potentially misleading messages about health and nutrition. Although 89% of cereal ads viewed by children portrayed healthy eating behaviors (e.g., consuming food at a table during mealtime, other healthy foods featured in the ads, suggestions to eat a balanced breakfast), nine out of ten of these

healthy portrayals appeared in ads for high-sugar cereals. Thus, these healthy messages may lead children to believe that high-sugar cereals are also healthy choices. In addition, three quarters of the ads that portrayed healthy eating behaviors also portrayed unhealthy eating behaviors (e.g., consuming food in front of the TV or computer and/or at non-meal times, other unhealthy foods featured in the ad), further counteracting the healthy messages conveyed and presenting a confusing picture of cereal nutrition. These contradictory messages likely make it even more difficult for parents to teach children about proper nutrition and the health consequences of consuming too much sugar. In contrast, the high-sugar cereal ads viewed by adults were more likely to portray only unhealthy eating behaviors, therefore, conveying messages about the products that are more consistent with their nutritional quality.

### *Industry Initiatives to Improve Advertising to Children*

As previously discussed, CFBAI-participating companies have specified their own definitions of what constitutes a healthy dietary choice. The cereal company definitions currently allow up to 12 grams of sugar per serving (typically 27 to 30 grams of cereal, the serving size for the majority of cereals in this analysis) (Children's Food and Beverage Advertising Initiative, 2011). This standard is more lenient than the Interagency Working Group standard of 13 grams of sugar or less per 50 grams of cereal that we used to classify low-sugar cereals in this analysis. The CFBAI has issued new nutrition standards that will limit sugar in children's cereals to 10 g per serving (i.e., 30–37% of cereal content by weight) by 2013 (Kolish, 2011). These new sugar limits represent an improvement over the children's cereal products in this analysis. However, cereals would need to contain just 7 or 8 g of sugar per serving to meet the Interagency Working Group criteria for foods that should be marketed to children (Interagency Working Group, 2011), and it is unlikely that cereal companies will make further changes. General Mills called the guidelines "arbitrary, capricious, and fundamentally flawed" and, if implemented, would not allow any of the company's cereals to be advertised to children (General Mills, 2011). Kellogg argued that it was more important to limit calories than added sugars in the fight against childhood obesity (Kellogg Company, 2011).

The Children's Advertising Review Unit (2009) has also established guidelines for appropriate messages in child-targeted advertisements to ensure that they are not "deceptive, unfair or inappropriate" for children. These guidelines specify that children's advertising should not "mislead children about benefits from use of the product," including "the acquisition of strength, status, popularity, ..." or "unduly exploit a child's imagination." Given the large number of RTE cereal ads that associate high-sugar cereals with emotional benefits and present highly fantasized themes, it appears that the Children's Advertising Review Unit does not consider these portrayals to violate their guidelines. In addition, nearly all the cereal ads children view contain conflicting messages about healthy eating and nutrition; therefore, guidelines about advertising to children also should address the potential for these mixed messages to confuse and mislead.

Further research is needed to evaluate the impact of common messages that appear in high-sugar cereal advertising to determine whether they mislead children about cereal nutrition and/or unfairly exploit their more limited cognitive abilities. Studies should also examine whether the contradictory and potentially misleading health messages presented in cereal advertising affect children's more general beliefs about health and nutrition and their eating behaviors. It is also important to study how advertising to children affects parents' purchasing behavior and attitudes about the products, for example, by conveying that these products are appropriate to serve

to children and/or nutritious breakfast options. The public health community must begin to look beyond the specific products advertised and examine how the messages in children's food advertising may counteract efforts of parents and schools to teach children healthy eating practices.

This study is the first to combine exposure and content analyses to quantify children's exposure to high- and low-sugar cereal ads as well as the messages used to promote these products. It adds to previous analyses to demonstrate that the messages in high-sugar cereal ads viewed by children are significantly different than those viewed by adults; and that the volume of children's exposure to these messages is substantial. These findings also raise ethical and public health concerns about the messages used in advertising to promote products of questionable nutritional quality. Recent public health efforts, such as the Interagency Working Group nutrition recommendations and cereal company plans to reduce the sugar content in their child-targeted cereals, will help improve the nutritional quality of cereal products promoted in advertising to children. However, these efforts do not address the confusing and potentially misleading messages and creative techniques used to promote these products and their potential effects on children's understanding of nutrition and healthy eating.

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### Appendix Descriptions of coding categories used in content analysis

Category	Item	Description	Common themes			
			More than food	Health/ nutrition benefits	Healthy eating	Unhealthy eating
Products	High-sugar cereals	More than 13 grams of sugar per 50 grams (26% of total weight)				
	Low-sugar cereals	Equal to or less than 13 grams of sugar per 50 grams (26% of total weight)				
	Brand family	Ads for some or all products in a brand line (e.g., different varieties of Cheerios)				
	Company	Ads which promote the parent company (i.e., Kellogg) as a whole				
Characters	Human	Adult, parent, child, teen/tween, family, spokesperson, celebrity				
	Animated	Brand character, nonbrand character, licensed character				
	Animated cereal	Cereal pieces used as characters or props.	×			
Product description	Nutrient content claims	Whole grain, low/no fat, low sugar, vitamins/minerals, calcium, fiber, protein		×		
	Product claims—Health/nutrition	Healthy/nutritious			×	
	Product claims—Other	Competitive/unique, new, quantity/size/amount, taste/odor/smell/texture, convenience, value for money, kids like it, shape				

Product promise	Health outcome benefits	Heart disease, cancer, osteoporosis, lowers cholesterol or blood pressure	×
	Other health benefits	Physiological functioning (strong bones, digestive or heart health, physical performance, mental performance, satisfies/fills you up, weight control/loss)	×
	Emotional benefits	Fun, cool, affiliation/peer acceptance	×
	Family ties	Promotes family togetherness, bonding, love	
Eating behaviors	Other foods depicted	Other healthy foods	×
		Other unhealthy foods	×
	Time of consumption	At mealtime	×
		As snack	×
		Anytime	×
		Unclear	×
	Place of consumption	At the table	
		In front of TV/computer	×
		Other	×
	Other suggestions	Eat as part of balanced/good breakfast, suggestions for physical activity	×