



Food and beverage TV advertising to young children: Measuring exposure and potential impact

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ABSTRACT

Children of all ages are vulnerable to influence from exposure to unhealthy food advertisements, but experts raise additional concerns about children under 6 due to their more limited cognitive abilities. Most companies in the U.S. Children's Food and Beverage Advertising Initiative (CFBAI) industry self-regulatory program pledge to not direct any advertising to children under 6. However, young children also watch programming primarily directed to older children and thus may view food-related advertising despite companies' pledges. Research is required to understand the amount and potential impact of this exposure on preschool-age children. Study 1 uses Nielsen advertising exposure data to compare preschoolers' (2–5 years) and older children's (6–11 years) exposure to food advertising in 2015. Preschoolers viewed on average 3.2 food ads daily on children's programming, just 6% fewer compared to 6- to 11-year-olds; over 60% were placed by CFBAI-participating companies. Study 2 exposed young children (N = 49) in a child-care setting to child-directed food ads, measured their attitudes about the ads and advertised brands, and compared responses by 4- to 5-year-olds and 6- to 7-year olds. Most children indicated that they liked the child-directed ads, with media experience associated with greater liking for both age groups. Ad liking and previous consumption independently predicted brand liking for both age groups, although previous consumption was a stronger predictor for older children. Despite pledges by food companies to not direct advertising to children under age 6, preschoolers continue to view advertisements placed by these companies daily, including on children's programming. This advertising likely increases children's preferences for nutritionally poor advertised brands. Food companies and media companies airing children's programming should do more to protect young children from advertising that takes advantage of their vulnerabilities.

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1. Introduction

Public health experts have concluded that food and beverage advertising plays a significant role in high rates of obesity and poor diet among children, placing them at risk for a lifetime of poor health and diet-related disease (Cairns, Hastings, Angus, & Caraher, 2013). The majority of food advertising to children promotes non-core food and drinks, high in calories, sugar, sodium and/or fat (Kelly, Halford, Boyland, Chapman, Bautista-Castaño, & Berg, et al., 2010). In addition, children view large amounts of this advertising. In the United States, children ages 2–11 viewed on average 11.8 ads for food and beverages in 2015 on television (TV) alone (Frazier & Harris, 2016). In the face of criticism of the food industry's role in

this public health crisis, some companies and industry groups have established self-regulatory programs pledging to improve the nutritional quality of foods and beverages advertised directly to children (Harris, Pomeranz, Lobstein, & Brownell, 2009b). In the United States, the food industry responded by establishing the Children's Food and Beverage Advertising Initiative (CFBAI) self-regulatory program in 2006 (Council of Better Business Bureaus (CBBB), 2016a). Today, 18 participating companies pledge to only advertise food and beverages that meet uniform category-specific nutrition standards in advertising directed to children under age 12.

Since the CFBAI was initiated, food-related advertising to children in the United States has improved somewhat, with some reduction in the number of TV food ads viewed by children (2–11 years) and small improvements in the nutritional quality of food ads viewed from 2003 to 2009 (Powell, Schermbeck, Szczypka, Chaloupka, & Braunschweig, 2011). However, the majority of food

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advertising during children's programming continues to promote products high in sugar, fat and/or sodium (Kunkel, Castonguay, & Filer, 2015; Powell, Schermbeck, & Chaloupka, 2013). As a result, public health experts continue to call for improvements to address limitations of the CFBAI, including expanding the types of marketing covered by company pledges (e.g., product packaging, licensed characters), as well as further strengthening the nutrition standards for foods that can be advertised to children (Healthy Eating Research, 2015).

Another potential limitation of the CFBAI receiving relatively less attention from public health advocates is companies' pledges regarding advertising to very young children. An extensive body of literature, begun in the 1970's, has concluded that any form of advertising to children under age 7 or 8 is problematic as young children do not have the cognitive ability to understand the persuasive intent of advertising (see IOM, 2006; Wilcox et al., 2004). They cannot recognize that advertising messages present a biased point of view and thus accept the information unconditionally. As a result, legal scholars have concluded that any form of advertising to young children is inherently misleading (Harris & Graff, 2012; Pomeranz, 2010). CFBAI participating companies appear to have recognized these concerns to some extent. Although not required by the CFBAI, all participating companies except one (McDonald's) have pledged that they will not direct any advertising to children under age 6, including for products that meet CFBAI nutrition standards (CBBB, 2016a). However, questions about whether these pledges effectively protect young children from advertising remain.

1.1. Evaluating food advertising to preschool-age children

Recent research has examined preschool-age children's total exposure to food advertising on TV since CFBAI implementation. In 2009, children ages 2 to 5 viewed on average 10.9 food-related ads on TV daily (3979 ads per year), just 14% fewer than the 12.7 ads viewed daily by older children (ages 6–11), using Nielsen gross ratings point (GRP) data to measure actual advertising exposure by age group (Powell et al., 2013). Less than one-half of the food ads viewed by young children (46%) appeared during children's programming as defined by CFBAI participating companies (i.e., programming with an audience of 35% or more children under 12). Furthermore, 96% of the ads that children viewed during children's programming and 84% of the ads they viewed overall were for products high in nutrients that should be limited (i.e., sugar, fat and/or sodium). From 2009 to 2011, the number of food-related TV ads viewed by children ages 2 to 5 increased by 9%–11.9 ads daily, or 4335 ads viewed in 2011 (Dembek, Harris, & Schwartz, 2013).

Recent research assessing children's brand knowledge (i.e., accurate recognition of marketing techniques such as brand logos and characters) has also demonstrated that marketing exposure may present health risks for very young children. In studies of 3- to 6-year-olds, knowledge about high fat, sugar and/or sodium food brands was associated with higher BMI (Cornwell, McAlister, & Polmear-Swendris, 2014), and knowledge of fast food and soda brands was associated with preferences for fat, sweet and salty tastes (Cornwell & McAlister, 2011). Similarly, fast food brand knowledge among 4- to 8-year-olds was associated with higher BMI (Arredondo, Castanedo, Elder, Slymen & Dozier, 2009). Although young children's knowledge of nutritionally poor food brands is related to parents' diets (Cornwell & McAlister, 2011; Tatlow-Golden, Hennessy, Dean, & Hollywood, 2014) and their experiences with these foods (Cornwell & McAlister, 2011), in these studies commercial TV viewing also independently predicted brand knowledge. Interestingly, one study demonstrated that commercial TV viewing was related to brand knowledge for highly advertised

unhealthy, but not for the lesser advertised healthy, brands among children under age 6 (Tatlow-Golden, Hennessy, Dean, & Hollywood, 2014). Furthermore, in a study of responses to fast food ads, young children (ages 3–7) were less likely to recall healthy food items presented in the ads compared to premiums and other foods (Bernhardt, Wilking, Gilbert-Diamond, Emond, & Sargent, 2015).

Thus studies of young children's food brand knowledge indicate a relationship to commercial TV viewing, but studies with somewhat older children have shown direct effects of exposure to TV food advertisements on brand attitudes. Derbaix and Bree (1997) first demonstrated that affective reactions to food and other types of TV ads (measured by verbal responses and facial expressions) predicted brand attitudes in 7- to 10-year-olds following exposure. Moore and Lutz (2000) also demonstrated that both product trial and advertising exposure influence food brand liking in children (7–11 years old). Importantly, when children viewed an advertisement before trying a product for the first time, their affective response to the advertisement transferred to the product. Thus, advertising may “frame” children's responses to novel products such that, if they like the ad, they will also like the taste of the food more than if they had not first seen the ad. This study showed that previous product trial attenuated these effects, but advertising independently influenced liking of advertised foods.

Although researchers have not examined the direct effects of exposure to food advertising on taste evaluations by younger children (under age 7), research has shown that branding (i.e., foods presented in McDonald's packaging) (Robinson, Borzekowski, Matheson, & Kraemer, 2007) and licensed characters (Roberto, Baik, Harris, & Brownell, 2010) lead preschool-age children to believe that foods taste better than the same foods presented in plain packaging. Therefore, it is possible that exposure to food advertising may also lead to positive representations of brands in the minds of very young children that could help explain the associations found between commercial TV viewing and taste preferences or diet. These advertising effects could be even more powerful for very young children who do not have the cognitive ability to counter-argue the messages in the advertising and who may not have previously tried the advertised products. In one study, parental encouragement of healthy or unhealthy choices did not moderate the effects of advertising exposure on young children's choice of McDonald's french fries or apples (Ferguson, Munoz, & Medrano, 2012), suggesting that even parents may not be effective at counteracting the effects of advertising on young children.

Furthermore, psychological research suggests that positive emotional associations with food brands developed through exposure to advertising and other brand experiences may be difficult to change, especially when established at an early age when children's brains are highly malleable (Harris, Brownell, & Bargh, 2009a). Similarly, Kelly and colleagues (Kelly, King, Chapman, Boyland, Bauman, & Baur, 2015) propose a model in which both explicit and implicit awareness of marketing and brands leads to positive attitudes and preferences for the brands, which in turn predict purchase intent, requests, and consumption.

2. Aims

In this paper, we present the results of two studies. Study 1 measures the effectiveness of industry self-regulation to protect young children (under age 6) from exposure to food advertising, and Study 2 assesses young children's responses to food advertisements commonly viewed on TV programming primarily directed to children under age 12, such as children's cartoons and programming on children's cable networks (e.g., Nickelodeon,

Cartoon Network). In Study 1, we quantified and compared the amount of food and beverage advertising viewed by preschoolers (2–5 years) and older children (6–11 years) during children's TV programming in 2015. We also evaluated the effectiveness of CFBAI participating companies' pledges to not direct advertising to children under age 6. In Study 2, young children watched food advertisements commonly viewed on children's TV, including ads that CFBAI companies purportedly target to children aged 6 and older. We measured children's responses to the ads and their attitudes towards and experiences with the advertised brands, comparing responses of 4- to 5-year-olds to those of 6- to 7-year-olds.

3. Study 1

3.1. Material and methods

Gross ratings point (GRP) data from Nielsen syndicated market research data were used to quantify and compare exposure to food-related advertising by preschoolers and older children in the United States. GRPs represent a per capita measure of advertisements viewed by individuals in a specific demographic group (e.g., age range) over a period of time. We licensed GRP data for all companies and brands included in Nielsen's food, beverage and restaurant categories that aired during children's programming on English-language network, cable, and syndicated TV from January 1 to December 31, 2015 for preschoolers (2–5 years) and older children (6–11 years). We utilized Nielsen's classification to define children's programming, which includes the following program types: child day animation, child day-live, child evening, child multi-weekly, and child news-information. TV networks with the highest number of ads viewed on children's programming include Nickelodeon, Cartoon Network, and Disney XD. Data were obtained and analyzed in 2016. Nielsen calculates GRPs as the sum of all advertising exposures for all individuals within a demographic group, divided by population size, and multiplied by 100. Researchers divided GRPs by 100 to obtain the average number of ads viewed by individuals in each age group for each brand. Nielsen data have been used in previous studies to quantify children's food advertising exposure (e.g., Harris, 2014; Powell et al., 2011; 2013).

Each advertised brand (e.g., Honey Nut Cheerios) was assigned to a product category (e.g., cereal) and the CFBAI status (i.e., participating or not participating) for the company (e.g., General Mills) as of January 2016 (CBBB, 2016b). Brands with fewer than 100 GRPs for both age groups (i.e., preschoolers and children saw on average less than one ad in 2015 for the brand) were excluded from the analysis. To assess relative exposure to ads for preschoolers versus older children, targeted ratios were calculated for each brand by dividing GRPs for ages 2–5 by GRPs for ages 6–11. A targeted ratio greater than 1.0 indicates that preschoolers viewed the ads more often compared with older children.

3.2. Results

On average, preschoolers (2–5 years) saw 1155 food, beverage and restaurant ads on children's TV programming in 2015, while older children (6–11 years) viewed on average 1313 of these ads (see Table 1). Thirty-two different food-related companies placed ads on children's programming, and nine CFBAI participating companies were responsible for 63% of the ads viewed by preschoolers and 69% of ads viewed by older children. Notably, less than 1% of these ads promoted products that were not approved by CFBAI companies for advertising to children ages 6 to 11. One non-participating company (Chuck E. Cheese's) was responsible for 16% and 11% of the ads viewed by preschoolers and older children, respectively.

Among CFBAI-participating companies, cereal products were featured in over one-quarter of food-related ads viewed by both age groups on children's TV programming, followed by fast-food restaurants and yogurt. However, advertising placed by non-CFBAI companies (primarily Chuck E. Cheese's) ranked second in all advertising to both preschoolers and older children. Other types of products advertised most frequently on children's programming by non-CFBAI companies included candy (6–8% of ads viewed) and fast-food restaurants (6–7% of ads).

Across all product categories, preschoolers viewed on average 20% fewer ads placed by CFBAI-participating companies compared with older children, although differences varied by category. Preschoolers saw 28%–30% fewer ads for beverages and other snacks, but just 15% fewer CFBAI-approved fast-food restaurant ads. Of note, McDonald's was the only CFBAI-participating fast-food restaurant with advertising on children's programming in 2015, and McDonald's is the only CFBAI-participating company that *does not* pledge to not advertise to children under age 6. In contrast, preschoolers saw 5% more ads placed by non-participating companies than older children saw, including 24% more ads for Chuck E. Cheese's.

3.3. Discussion

Although all CFBAI-participating companies, with the exception of McDonald's, have pledged that they will not advertise directly to children under age 6, preschoolers ages 2 to 5 continue to view large numbers of ads placed by CFBAI companies. On average, preschoolers in the United States viewed 1.6 ads-per-day on children's programming in 2015 placed by CFBAI-participating companies that pledged they would not advertise directly to this age group. This analysis did not examine the specific proportion of children under age 6 in the audience of the programming examined, so we cannot determine whether participating companies complied with their pledges to not target advertising directly to children under age 6. However, even though CFBAI companies may have followed the letter of their pledges to not directly target children under age 6, these results demonstrate that their pledges do not adequately protect preschool-age children from exposure to their advertising. Furthermore, at least one non-participating company (Chuck E. Cheese's) may have directly targeted advertising to preschoolers, as indicated by higher numbers of ads viewed by preschoolers compared to older children.

4. Study 2

In Study 2, children viewed examples of common child-directed food advertisements, and we compared post-exposure attitudes of preschoolers (4–5 years) about these ads and the products advertised with attitudes of somewhat older children (6–7 years). Although CFBAI-participating companies have pledged to not advertise directly to children under age 6, we hypothesized that children in both age groups would like the child-directed commercials similarly. Furthermore, as in previous studies, we predicted that both liking the commercial and previous consumption of the advertised products would be associated with liking the brand for both age groups.

4.1. Material and methods

Eighty-four children, including 49 4- to 5-year-olds and 35 6- to 7-year-olds ($M = 5.4$, $SD = 1.1$) participated at their preschool, school, or after-school program in a small, racially diverse New England city. Table 2 provides characteristics of the study participants. Parents provided written informed consent for their child to

Table 1
Average number of TV ads for food products viewed on children's programming in 2015 by food category and CFBAI status.

Product category	# of brands	Preschoolers (2–5 years)		Older children (6–11 years)		Ratio of ads viewed: preschoolers/older children
		Average # of ads viewed	% of total food ads viewed on children's TV	Average # of ads viewed	% of total food ads viewed on children's TV	
CFBAI-participating companies (<i>n</i> = 9)	28	732.2	63%	910.0	69%	0.80
Fast-food restaurants	1	134.2	12%	157.2	12%	0.85
Cereal	12	300.3	26%	371.8	28%	0.81
Fruit snacks	4	73.1	6%	88.0	7%	0.83
Other snacks	6	75.5 ^a	7%	104.2	8%	0.72
Yogurt	3	101.0	9%	119.9	9%	0.84
Beverages	2	48.1	4%	68.9	5%	0.70
Non-participating companies (<i>n</i> = 23)	31	422.3	37%	402.8	31%	1.05
Fast-food restaurants	7	78.3	7%	84.7	6%	0.92
Other restaurants	5	200.7	17%	165.9	13%	1.21
Candy	8	73.0	6%	102.0	8%	0.72
Snacks	2	2.6	<1%	3.1	<1%	0.82
Other	9	67.9	6%	47.1	4%	1.44
Total	59	1154.5	100%	1312.7	100%	0.88

^a Includes a small number of ads for products that CFBAI-participating companies did not approve for advertising to children (5.8 ads viewed by preschoolers and 6.2 ads viewed by older children).

Table 2
Study 2 participant characteristics.

		4-5 years <i>n</i> (%)	6-7 years <i>n</i> (%)	Difference by age group
Total		49 (58%)	35 (42%)	$\chi^2 (1, N = 84) = 2.40, p = 0.12$
Gender	Female	28 (57%)	14 (40%)	
	Male	21 (43%)	21 (60%)	
Race/ethnicity ^a	Black	5 (10%)	11 (31%)	5.52, <i>p</i> = 0.03
	White	24 (49%)	17 (49%)	0.50, <i>p</i> = 0.82
	Mixed/other	6 (12%)	6 (17%)	0.31, <i>p</i> = 0.58
	Speak Spanish at home	9 (18%)	6 (17%)	0.02, <i>p</i> = 0.89
Media experience	Low (0–1)	14 (29%)	7 (20%)	$\chi^2 (2, N = 84) = 2.23, p = 0.33$
	Moderate (2)	16 (33%)	17 (49%)	
	High (3–4)	19 (39%)	11 (31%)	

^a Two children did not answer this question.

participate. On the day of the study, researchers met with the children in a group, told them about the study and what they would be asked to do (i.e., watch TV commercials and answer some questions), and then asked the children if they wanted to participate. A small number of children declined to participate. Children were debriefed after participating in the study and parents received a written debriefing. All methods, including consent procedures, were approved by the university's Human Subjects Committee.

Nielsen advertising data were used to identify the food and beverage products advertised most often to children on TV during the first six months of 2012. Researchers defined child-directed brands using two criteria: 1) children (ages 6–11) viewed at least 7.5 TV ad on average for the brand from January 1 to June 30, 2012; and 2) children saw at least twice as many of these ads compared with adolescents (ages 12–17). These brands included the 20 food brands with the most advertising viewed by children on children's TV programming in 2012.

From the brands identified above, researchers selected seven child-directed products representing the four food categories advertised most often to children and adolescents: fast-food restaurants, snacks, sugary drinks, and cereals (see [Appendix 1](#)) (FTC, 2012). Although we did not specifically select CFBAI company brands, all brands that met our criteria were from CFBAI companies except one (Chuck E. Cheese's). Notably, Chuck E. Cheese's had the most advertising on children's TV programming of any food brand. Copies of TV commercials for these products that aired in the first half of 2012 were obtained from a market research database of TV

commercials (Kantar Media, 2017). All but one of the selected advertised child-targeted products were offered by CFBAI companies and included on the list of CFBAI child-directed products as of 2012 (CBBB, 2012).

To capture children's attitudes, pictorial scales with smiley faces were adapted from previous research with children (D'Alessio, Laghi, & Baiocco, 2009; Derbaix & Bree, 1997; Moore & Lutz, 2000; Pecheux & Derbaix, 2002), and pretested with children ages 4 to 7. The measures were simplified by replacing 5-point scales with 3-point scales, and the number of items was reduced to fit the cognitive ability and attention spans of children as young as 4 years old. Attitude toward the ad (i.e., ad liking) was measured with four 3-point smiley-face scales asking if the child liked the commercial, if they thought it was cool, if they thought it was fun, and if the commercial made them happy. Items were coded as –1 for negative responses (e.g., "I don't like it"), 0 for neutral responses (e.g., "It's ok") and 1 for positive responses (e.g., "I like it"). Responses to these four items for all commercials viewed were averaged to create one ad liking score for each ad, ranging from –1 and +1. An average ad liking score was also calculated for each child by averaging the ad liking score for the two ads he or she viewed. Previous ad viewing was measured by asking participants if they had ever seen the commercial before (yes/not sure/no), coded as 1 for "yes" and 0 for "no" and "not sure." In addition, 6- to 7-year-old participants indicated their attitude about who would like the commercial the most (someone their own age, someone younger, or someone older than them). Attitude toward the brand (i.e., brand

liking) for each commercial viewed was measured using a 3-point smiley face scale asking participants to indicate how much they liked the product in the commercial. Responses were coded as 1 (“I like it”) or 0 (“It’s ok” or “I don’t like it”). Researchers also measured children’s previous consumption of the product by asking whether they remembered eating the product before, with responses coded as 1 (“yes”) or 0 (“no” or “not sure”). Children also answered four age-appropriate media usage questions: Do you have a TV in your bedroom, and did you watch TV yesterday, play on a cell phone/iPad yesterday, and play on a computer yesterday? The number of items with a “yes” response was added to create a media score for each child, ranging from 0 to 4. Children’s media experience was categorized as high (3–4), medium (2) and low (0–1). Finally, children answered some simple demographic questions.

Study procedures differed somewhat for children ages 4–5 and 6–7 based on attention spans and cognitive abilities. All children participated in groups of three to five. From the list of seven child-targeted ads, two ads were randomly selected for each group to watch. This procedure was used to ensure that children’s responses to individual ads were representative of their responses to a range of the ads that they commonly viewed. Younger children were only able to watch two ads. Older children also watched two additional ads that were not child-directed (not presented in this manuscript). They all watched each commercial twice as a group and then answered questions about the advertisement just viewed and the advertised brands. Researchers sat with each preschooler independently to obtain their attitudes about the commercial and the advertised brand. With the older children, one researcher read the questions, and the children filled out their answers independently, with other researchers available to assist if needed. After answering the questions about all advertisements viewed, participants answered demographic and media experience questions in the same manner. All data were collected in 2013 and 2014.

Analyses were conducted using IBM SPSS 22. Chi-square analyses assessed differences by age group in proportion of children indicating they had previously viewed the ads and previously consumed the advertised products, as well as differences in demographic characteristics of the two samples. A two-way analysis of variance (ANOVA) assessed differences by age and media experience groups in children’s average ad liking for child-directed ads. A binary logistic regression model identified predictors of brand liking for each ad viewed ($N = 168$), including ad liking, previous product consumption, age, demographic characteristics that differed by age group and interactions between variables.

4.2. Results

The majority of children in both age groups responded positively to the child-directed ads, indicating that they liked the commercials, they were fun and cool, and the commercials made them feel happy (Table 3). However, older children (6–7 years) were significantly more likely to indicate that they had seen the commercial before compared with preschoolers (4–5 years) (80% and 43%, respectively), $\chi^2(1, N = 167) = 22.6, p < 0.001$. Older children also were more likely to indicate that they had eaten or drunk the advertised product before (90% and 64%, respectively), $\chi^2(1, N = 168) = 14.4, p < 0.001$. Only one demographic characteristic differed between children in the two age groups: 10% of preschool-age children identified as black compared with 31% of 6- to 7-year-olds (see Table 2). When asked who would like these ads most, 42% of older children (6- to 7-year-olds) thought someone younger than them would like them the most. Approximately one-third (35%) thought someone their own age would like them the most, while just 23% thought that someone older than them would like the child-directed ads the most.

The two-way ANOVA revealed a significant main effect of media experience on ad liking, $F(2,78) = 6.43, p < 0.001$, partial $\eta^2 = 0.14$. Children with lower media experience liked the ads less ($M = 0.40, SD = 0.57$) compared to children with medium and high media experience ($M = 0.74, SD = 0.31$ for both). However, ad liking did not differ significantly by age group ($p = 0.58$), and the interaction was not statistically significant ($p = 0.41$).

The logistic regression model to assess the relationship between ad liking, previous product consumption and age on brand liking for child-directed ads was statistically significant, $\chi^2(5) = 28.14, p < 0.001$. Overall prediction success was 74% (91% for liking the brand and 24% for not liking it), Nagelkerke $R^2 = 0.24$. Due to significant differences by child age group, black race was also included in the model, but brand liking did not differ by race. As shown in Table 4, both ad liking and previous consumption made unique significant contributions to the model. Children reporting positive ad liking were 3.6 times more likely to like the brand than those who did not like the ad, while children who remembered eating or drinking the product were 16.7 times more likely to like the brand. The main effect of age was not significant ($p = 0.42$). However, there was a significant interaction between age and previous product consumption. Among younger children, 71% who had previously consumed the advertised product reported liking the brand, compared to 55% who had not previously consumed the product. This difference was greater for older children; 89% of older children who had previously consumed the advertised product reported liking the brand, while just 33% who had not consumed the product reported liking the brand.

4.3. Discussion

As predicted, both preschoolers (4–5 years) and slightly older children (6–7 years) liked the child-directed food ads they viewed in this study. Despite companies’ claims that these ads are directed to children ages 6 and older, there was no significant main effect of age on ad liking, although previous product consumption may have affected brand liking for older children more than for younger children. Furthermore, 42% of 6- to 7-year-olds indicated that the ads were not for someone their own age, but for someone younger than themselves. Notably, children with low media experience in both age groups liked the ads significantly less compared with children reporting medium and high media experience, indicating that familiarity with audio-visual media could increase young children’s enjoyment of advertising. Also as predicted, liking the ad and previous product consumption independently predicted liking of advertised brands for children in both age groups. It is also interesting that preschoolers who did not remember consuming the advertised product had higher probability of liking the brand, than did older children who had not consumed the product. As older children were more likely to indicate that they had previously consumed the advertised products, this finding suggests greater opportunities for advertising to influence preschool-age children’s brand attitudes before they have tried it. As demonstrated in previous research with somewhat older children (Moore & Lutz, 2000), this exposure could frame their subsequent experience with the product when they try it for the first time and lead to greater liking.

This study does have limitations. To our knowledge, it is the first to assess responses to advertising by children under age 6. All measures and procedures were adapted from those used in previous studies with older children (e.g., D’Alessio et al., 2009; Derbaix & Bree, 1997; Moore & Lutz, 2000; Pecheux & Derbaix, 2002), but many had to be adjusted to accommodate preschoolers’ more limited attention spans and cognitive abilities. The media experience measure in particular was greatly simplified compared with other measures of children’s media usage. Future research should

Table 3
Ratings of ad liking and brand liking for child-directed food ads viewed.

	4-5 years # (%)	6-7 years # (%)
N (ads viewed) ^a	98	70
Ad liking		
How much did you like the commercial you just saw? Responding "I like it"	67 (68%)	52 (74%)
How did watching the commercial make you feel? Responding "Happy"	59 (61%)	55 (79%)
Did you think the commercial was fun? Responding "Yes"	84 (86%)	58 (83%)
Did you think the commercial was cool? Responding "Yes"	83 (86%)	51 (73%)
M (SD)	0.65 (0.39)	0.66 (0.45)
Previous ad viewing		
Have you ever seen this commercial before? Responding "Yes"	42 (43%)	56 (80%)
Previous product consumption		
Do you remember ever eating/drinking this product before today? Responding "Yes"	63 (64%)	63 (90%)
Brand liking		
How much do you like this product? Responding "I like it".	61 (62%)	58 (83%)

^a Ratings of individual ads (two ads viewed per child).

Table 4
Logistic regression model predicting brand liking for child-directed ads.

	B	(SE)	Odds ratio: 95% CI		
			Odds ratio	Lower	Upper
Constant	-1.28	(0.95)	0.28		
Ad liking	1.27**	(0.41)	3.57	1.59	7.99
Previous consumption	2.81**	(0.99)	16.65	2.39	116.17
Age group	0.82	(1.01)	2.27	0.32	16.32
Race: Black	-0.41	(0.51)	0.66	0.25	1.79
Age x Previous consumption	-2.26*	(1.13)	0.10	0.01	0.95

* $p < 0.05$, ** $p < 0.01$.

validate this measure with responses by children's parents and other previously used measures. In addition, all measures were self-reported by children and thus subject to bias, including demand effects and agreement bias. In addition, reported attitudes toward the ads and advertised products could not be independently validated, although this research incorporated measures and methods used in previous studies as much as possible to address these potential concerns.

Furthermore, preschoolers' more limited cognitive skills may have reduced their understanding of the measures. However, all measures were pretested for children's understanding, and there were no significant differences in media experience or responses for ad and brand liking by age group, indicating that preschoolers and somewhat older children similarly understood the measures. Preschoolers also were significantly less likely to indicate that they had seen the ads or consumed the products previously compared with 6- to 7-year-olds, which would be expected given their younger age. This finding also rules out the possibility of greater agreement bias by younger children. It is also possible that differences in methods for younger and older children, including showing older children two additional ads that were not child-directed, may have affected their responses to the ads of interest. However, this concern is alleviated by the absence of significant differences by age group in children's liking of the ads and brands. Although preliminary, these results suggest that advertising purportedly aimed at a slightly older audience (ages 6–11) may similarly affect preschoolers' preferences for advertised products.

5. Conclusions

Together, these two studies demonstrate that current practices to protect preschool-age children from food advertising are inadequate. As children under age 6 also watch children's TV programming, they were exposed to more than three food-related ads

per-day on these channels. Furthermore, CFBAI companies were responsible for more than 60% of the food ads viewed by U.S. children under age 6. Therefore, despite most CFBAI companies' pledges to not direct advertising to children under age 6, by directing their advertising to somewhat older children, they also frequently reach younger children who also watch children's programming. Furthermore, this advertising appears to similarly appeal to and affect children under 6, as well as somewhat older children. This advertising has the potential to be even more influential on preschoolers as younger children were less likely to have tried the advertised products previously. Previous research has shown that preschool-age children exhibit more coercive behavior (i.e., forceful or persistent purchase influence attempts) when shopping with their parent in the supermarket (Buijzen & Valkenburg, 2008). Therefore, exposure to advertising may contribute to young children's requests to parents to purchase the products.

This research adds to the growing academic literature showing that young children's exposure to advertising contributes to preferences for advertised products, including the nutrient-poor energy-dense food and beverages frequently promoted (e.g., Bernhardt et al., 2015; Cornwell et al., 2014; Kelly et al., 2015; Tatlow-Golden et al., 2014). Academic scholars have concluded that any advertising to children under age 7 or 8 is unfair and should be regulated due to young children's inability to recognize the persuasive intent of advertising (IOM, 2006; Wilcox et al., 2004). Legal scholars have also argued that for this reason advertising to young children is inherently misleading, and thus is not covered by the First Amendment's commercial speech protections in the United States (Harris & Graff, 2012; Pomeranz, 2010). Food and media companies must do more to protect very young children from advertising exposure. At a minimum, food companies should not advertise during programming with large audiences of children under age 6, regardless of whether somewhat older children are also watching. Media companies that broadcast children's TV programming could also take action, such as the Walt Disney Company's initiative to establish tighter restrictions on food advertising to children on its networks (The Walt Disney Company, 2012). Although companies that advertise to very young children likely view this investment as a cost-effective strategy for creating life-long loyal customers, the potential consequences for children's health are unacceptable.

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Conflicts of interest

None.

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Appendix 1. Products advertised in the child-directed food commercials shown to children

Company	Products
Kraft Foods, Inc.	Capri Sun fruit drink
McDonald's USA	Happy Meal kids' meal
General Mills, Inc.	Lucky Charms cereal
The Kraft Heinz	Lunchables prepared food
CEC Entertainment, Inc.*	Chuck E Cheese's restaurant
General Mills, Inc.	Reese's Puffs cereal
Pepperidge Farm	Goldfish Crackers snack

*This company does not participate in CFBAI.

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