Short Communication

Mobile marketing to children: a content analysis of food and beverage company apps

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Globally, mobile technology penetration among families has risen steadily. While this technology can be used to promote public health (e.g. through the mHealth movement), it also may have less desirous public health impacts. For example, food manufacturers may have created dynamic apps promoting obesogenic products similar to the unhealthy foods they market to children via television commercials and online food-branded games.[1—4] Nevertheless, in the USA, large food manufacturers recently pledged to curtail the advertising of processed foods to youth,[5] which may deter them from leveraging new mobile technologies. This first-of-its-kind study aimed to describe food-branded mobile applications (apps) available for children on iOS devices (e.g. the iPad) across food product categories to better understand the nature of this content in the USA.

To date, scholars at the Rudd Center for Food Policy are the only researchers to have studied food-branded apps, providing brief descriptions of apps promoting fast foods and sugary beverages.[1,2] In their most recent report on fast food marketing, they identified two child-directed apps, only one of which featured food.[2] They also recently identified 13 child-oriented sugary beverage apps: 9 games, 1 eBook, 1 app

promoting a contest, 1 app linked to a real-world event, and 1 art app.[1] However, they did not report on apps associated with other food categories, such as cereals or candy, some of the products most commonly marketed to children on other media platforms.[3] They also did not quantify the saturation of engaging or interactive features (e.g. the prevalence of branded characters) within apps, features which may lead to marketing's effectiveness,[3] nor did they analyze the healthfulness of foods these apps promoted.

This study aimed to expand understanding of food marketing to children by examining apps produced by America's leading food manufacturers across product categories. In the general children's app marketplace outside the context of food marketing, games and art-themed activities are popular.[6] Such apps include dynamic, potentially appealing features such as branded characters and music.[6] Food marketers may be emulating these existing apps. We thus sought to characterize the prevalence of food-branded apps, identify common types of content within them (e.g. games), tally frequently employed branding and interactivity features, and explore the healthfulness of promoted foods.

To identify a sample of apps, we consulted food company sales reports and created a stratified sampling frame of food brands (~700) produced by 36 top-selling American manufacturers. In November 2013, we selected 153 brands from this sampling frame and searched the App Store for iOS apps promoting each. We focused on iOS offerings because preliminary searches identified only one Android food app not available for iOS, which did not appear to target children. This search only yielded 36 apps. To increase our sample, we also searched for apps promoting multiple brands or the company in general, locating an additional 19 apps ($N = 55$).

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Researchers recorded app content with video cameras as they engaged with each app, exploring them until exhausting all content or at least 10 min had elapsed. Five apps were not recorded because the app required users to shake the iPad in a way that precluded recording under our protocol (2) or due to researcher error (3).

We scored video data using Datavyu coding software[7] and calculated reliability in R.[8] Initially, we examined all 50 apps, classifying each by target audience (child- or adult-oriented, $\kappa = 0.89$) and type of food promoted ($\kappa = 0.69$). Next, we focused on the child-oriented apps, identifying broad content features (e.g. games, $\kappa = 0.82$). We also noted specific food products (e.g. Honey Nut Cheerios) marketed within content features ($\kappa = 1.00$), and categorized products based on the Go-Slow-Whoa framework ($\kappa = 0.63$)[9] and the Institute of Medicine (IOM) nutritional standards for foods in schools ($\kappa = 1.00$).[10] Go-Slow-Whoa categorizes foods based on nutrient and calorie density into items individuals can eat almost anytime ('Go'), sometimes, ('Slow'), or only once in a while ('Whoa').[9] The IOM standards dichotomize foods as appropriate or inappropriate for school children based on calories, fat, sugar, and sodium.[10] Finally, coders scored each art activity and game, the two most common types of content (as discussed below), in greater detail (see Table 1).

We conducted analyses using the SPSS Complex Samples module. Initially, we examined the target audience for all 50 apps. Thirty-seven (weighted 88%) were adult-oriented, while only 13 (weighted 12%) were child-oriented. The paucity of apps may be due to the current self-regulatory environment in the USA[5] or the mHealth movement, both of which might deter companies from creating food-branded apps. Or the small number of apps at the time data were collected may be a reflection on the relative newness of app marketplaces.

Across all 50 apps, the greatest number were associated with beverages (12 apps; weighted 38%), fast foods (10, 9%), and candies (8, 20%)—percentages are weighted to estimate what would have been observed had we taken a census of all food-branded apps. The 13 child-oriented apps were linked to beverages (2, 15%), candies (2, 15%), cereals (3, 23%), fast foods, fruits/vegetables, pastas, grain-based snacks, dairy products, and a company in general (1 app per category, 8% each). Thus, a wide variety of products were featured across the sample.

The remaining analyses focused exclusively on the 13 child-oriented apps. Ten apps (77%) featured art activities, yielding 12 different art activities. The remaining three apps (23%) featured games (five games total). A total of 11 apps (85%) also featured decorative entry portals, 3 contained videos (25%), 2 contained display advertisements for company products (17%), and 1 contained a quiz/poll (8%). Altogether,

Table 1 − Art activity and game feature codes and reliability ($m = 11$ art activities and 5 games).				
Codes	No. of activities with feature	% of arts activities or games with feature	Percent agreement	κ
Art activities ($m = 11$)				
Choose from multiple stickers	10	91	100	1.00
Create multiple pieces of artwork	9	82	100	1.00
Rotate stickers	7	64	100	1.00
Save artwork to photo library	6	55	80	0.44
Use food items as decoration	5	46	80	0.55
Prompts for user to continue making art	5	46	100	1.00
Use iPad camera	5	46	100	1.00
Choose from multiple colouring utensils	4	36	80	[a]
Use branded characters as decoration	3	27	80	0.55
Share artwork externally via email or the like	3	27	80	0.67
Animate artwork	2	18	100	1.00
Import content from iPad for art	2	18	100	1.00
Music playing in background	1	9	100	1.00
Microphone available to record user's voice	0	0	100	1.00
Games ($m = 5$)				
Explicit invitations to continue playing game	5	100	75	[b]
Multiple levels	4	80	100	1.00
Scoring	4	80	100	1.00
Player moves branded food for bonus points	3	60	75	0.50
Player used food pieces as tools/equipment	3	60	100	1.00
Brand logos embedded in game background	3	60	75	0.50
Music playing in background	2	40	75	[b]
Primary goal of manipulating branded food	1	20	100	1.00
Player embodies food	1	20	100	1.00
Player shares content as a reward for winning	1	20	75	[a]
Player embodies a product mascot	0	0	100	1.00

Note. Data represent codes to capture different interactivity and branding features, unweighted number of art activities or games with a given interactivity or branding feature, weighted percentage of arts activities or games with each feature, and percent agreement and Cohen's kappa inter-rater agreement on these codes.

[a] κ could not be calculated because one coder never observed this feature.

[b] κ could not be calculated because one coder scored this feature in every game.