Health Communication

ISSN: 1041-0236 (Print) 1532-7027 (Online) Journal homepage: http://www.tandfonline.com/loi/hhth20

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To cite this article: Lisa B. Hurwitz, Heather Montague & Ellen Wartella (2016): Food Marketing to Children Online: A Content Analysis of Food Company Websites, Health Communication, DOI: 10.1080/10410236.2016.1138386

To link to this article: http://dx.doi.org/10.1080/10410236.2016.1138386

Published online: 16 Jun 2016.

HEALTH COMMUNICATION
http://dx.doi.org/10.1080/10410236.2016.1138386

Routledge
Taylor & Francis Group

Food Marketing to Children Online: A Content Analysis of Food Company Websites

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ABSTRACT

Since 2006, many U.S. food and beverage companies have pledged to market healthier foods to children to help combat the childhood obesity epidemic. Despite this, companies' expenditures on online advertising have increased of late. To explore this seemingly contradictory situation, the authors conducted a content analysis of approximately 100 food and beverage brand websites, examining a multitude of online marketing practices across a variety of different products, as well as the relationship between marketing techniques and the nutritional profile of promoted foods. This is the first study to examine if nutrition varied by marketing technique. Few brands maintained child-oriented websites, but the brands that did have child-oriented websites included a large number of games promoting particularly obesogenic food products. Somewhat surprisingly, games with many brand identifiers were paired with slightly less obesogenic foods. These findings present a mixed picture of the threat posed by online child-oriented food marketing.

With one out of three U.S. children overweight or obese, childhood obesity has been declared a public health threat (Skinner & Skelton, 2014). The Institute of Medicine (IOM) published a landmark report in 2006, concluding food and beverage companies regularly market unhealthy foods to children, and exposure to such marketing negatively influences children's dietary choices and adiposity. As a result, many major food companies banded together in late 2006 as part of the Children's Food and Beverage Advertising Initiative (CFBAI), pledging to improve the nutritional quality of foods marketed to children (IOM, 2013). Over time, more companies joined this initiative, with 18 currently participating.[1] Such efforts have resulted in modest improvements in the nutritional profile of foods advertised to youth on *television* (IOM, 2013).

However, in recent years, the U.S. Federal Trade Commission (FTC, 2012) reported food companies increased their child-directed *online* marketing budgets by 50%, which is alarming considering that U.S. children annually spend 65 h + using the computer (Rideout & Saphir, 2013), and that prior research indicated food marketing websites were replete with dynamic content/gaming and marketed obesogenic products to children (e.g., Henry & Story, 2009). We were interested in whether companies' marketing strategies and the nutritional profile of foods they advertise has changed over the years.

In the present study, we examine a multitude of online marketing practices across food product categories, and the relation between marketing techniques and nutritional profile of promoted foods. Our work differs from recent work in this domain, which focused on online marketing within single product categories (e.g., sugary beverages; Harris et al., 2014) or specific website content features (e.g., games; Paek et al., 2014). This study also is the first of its kind to examine the relation between marketing features and nutrition of promoted foods.

Online Marketing to Children

Roughly half of food marketing websites had special areas dedicated to children around the time of the publication of the 2006 IOM report (e.g., Henry & Story, 2009). However, food companies recently removed select child-directed websites promoting particularly unhealthy foods in response to negative public attention (Harris, 2014). Nonetheless, they concurrently increased online marketing expenditures (FTC, 2012). Given this seemingly contradictory situation, we asked: *RQ 1*: What percentage of U.S. food and beverage websites is child-oriented?

Identifying content features within these food marketing websites further characterizes the current state of marketing. Previously, food websites included a plethora of dynamic content features, such as contests (e.g., Henry & Story, 2009); downloads such as screensavers (e.g., Culp, Bell, & Cassady, 2010); quizzes (Cheyne, Dorfman, Bukofzer, & Harris, 2013); advertisements for food or other branded content (Thomson, 2011);

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[1]As of May 2015, CFBAI included American Licorice Company, Burger King Corporation, Campbell Soup Company, Coca-Cola Company, ConAgra Foods Incorporated, Dannon Company, Ferrero U.S.A. Inc., General Mills Inc., Hershey Company, Kellogg Company, Kraft Foods Group Inc., Mars Incorporated, McDonald's USA LLC, Mondelez Global LLC, Nestle USA, PepsiCo Inc., Post Foods LLC, and Unilever United States (Better Business Bureaus, 2015). When data were collected, American Licorice had not yet joined CFBAI, but Hillshire Brands Company was a member (Better Business Bureaus, 2014b).

videos (Culp et al., 2010); texts such as newsletters, comics, or eBooks (Thomson, 2011); and games[2] (e.g., Lee, Choi, Quilliam, & Cole, 2009). Many of these features are quite effective. Specifically, video advertisements negatively influence children's food choices (IOM, 2006). Furthermore, food-themed books (de Droog, Buijzen, & Valkenburg, 2014) display advertisements such as banner or pop-up advertisements (McIlrath, 2006), and certain types of contests (Raju, Rajagopal, & Gilbride, 2010) also influence children's food choices. However, not all content features are equally effective, and games might be especially impactful. Children held more positive attitudes toward food brands after playing an advergame than watching a comparable video advertisement (Waiguny & Terlutter, 2011). It may be today's food websites privilege games over other content features. To assess this, we asked: *RQ 2*: Which content features (e.g., games; videos) do food marketers embed within child-oriented sections of branded websites?

Scholars speculate embedding branded food items in highly interactive environments may induce states of focused attention and engagement, such as flow (Waiguny, Nelson, & Terlutter, 2012) or immersion (Cheyne et al., 2013), and these psychological states may mediate persuasive outcomes. In that vein, in prior content analyses, researchers noted food advergames commonly included branded gaming features, such as product logos, companion advertisements for branded products, branded spokes-characters, branded food items used as tools or equipment, and branded food items that children collected to win games or receive bonus points (e.g., Lee et al., 2009). In addition, in previous content analyses, researchers described games as being highly interactive, dynamic, and engaging, with additional gaming features such as music, scoring, and invitations to continue playing (e.g., Cheyne et al., 2013).

Nevertheless, more nuanced research is needed to identify which of these features specifically drive games' direct or indirect effects. To date, researchers have manipulated the nutritional profile of food products featured in games (e.g., Folkvord, Anschütz, Buijzen, & Valkenburg, 2013) and the complete presence or absence of brand identifiers (van Reijmersdal, Rozendaal, & Buijzen, 2012). However, more nuanced research exploring brand identifiers and other gaming features can shed more insight into causal mechanisms. For instance, van Reijmersdal and colleagues (2012) found that a game that required children to catch branded items did not influence their attitudes toward food brands. However, it is possible that other brand identifiers (e.g., product mascots, which could prompt involvement and product affinity; see de Droog, Valkenburg, & Buijzen, 2010) might be more effective, or that a combination of several different kinds of brand identifiers might be needed to induce effects. Additionally, scholars may find non-branded gaming features such music or the presence of multiple levels enhance flow during play. To identify prevalent gaming features in contemporary advergames, we asked: *RQ 3*: What gaming features (e.g., music) are common in today's advergames?

Past research has repeatedly found food marketing to children online often promotes unhealthy foods and only occasionally teaches about nutrition (e.g., Paek et al., 2014). Prior content analysts have presented descriptive statistics on the nutritional aspects of foods promoted across websites on aggregate (e.g., Henry & Story, 2009), rather than exploring which features tend to be paired with particularly healthy or unhealthy foods. However, understanding which content and gaming features are associated with the most obesogenic foods provides important contextual information as to whether these games aid or hamper efforts to curb childhood obesity. Accordingly, our final research question asked: *RQ 4*: Does the nutritional profile of promoted foods vary systematically across different website *(a)* content and *(b)* gaming features?

In sum, the current content analysis aims to explore the present-day prevalence of child-oriented websites and characterize the content and gaming features on these sites, as well as the nutritional profile of foods promoted via these content and gaming features.

Method

Sample Selection and Data Collection

The websites in this content analysis were sampled as part of a larger, cross-platform study (see Hurwitz et al., 2015). To generate the sample, we first created a stratified list of all brands (~700) produced by 36 top food companies (18 CFBAI companies + a matched list of 18 additional companies). We then sampled 153 brands (see Henry & Story, 2009 for similar sample size), oversampling brands with products companies identified as being nutritious and appropriate to advertise to children in their CFBAI pledges (Better Business Bureaus, 2013).

In November 2013, researchers manually recorded their exploration of each website (N = 100) using Camtasia screen capture software (2013, TechSmith, Okemos, MI). When websites exclusively targeted adults, only featuring adult-centric content such as exercise tips, researchers scrolled through homepages once before ending recordings. Otherwise, they clicked every visible link on each homepage, excluding links to clearly adult-directed content. On the second page of a website, researchers played games for 1 min or one level and watched videos for 2 min. Some websites featured multiple links to the same game or video; in these cases, researchers only engaged with a given game or video the first time they encountered it. Five websites were not recorded due to researcher error and thus not included in analyses.

Coding

We scored data with Datavyu video coding software (Datavyu Team, 2014). Initially, researchers assessed the target audience of all 95 websites using a custom six-point scale that ranged

[2]In prior studies, scholars sometimes have differentiated between advergames that feature at least one brand identifier, and games that do not (e.g., Cheyne et al., 2013). Because all of our data were collected from food websites, we use both terms interchangeably.

from "The website is clearly targeting adults (e.g., calorie-counting websites using small fonts with few visuals)" (1) to "The website is clearly targeting children (e.g., there is an explicit address to kids)" (6). Sites with scores of 3 or below are referred to as *adult-oriented* and those with scores of 4 or higher as *child-oriented*. Inter-rater agreement was 82% (Cohen's κ = 0.74).

Focusing only on child-oriented websites (M = 19.83 min per website, SD = 17.66 min), three coders scored every content feature using a list based on previous research (e.g., Cheyne et al., 2013), categorizing each as a *game, video, static picture*, or *other* kind of feature. *Other* content was recategorized as either *comic/eBook, downloadable image, contest, arts activity, quiz*, or *other*. Coders only scored a content feature the first time it was visible. Coders also noted the specific food product(s) advertised in each content feature. Inter-rater agreement for the number of features present in each website was 80% (Weighted κ = 0.68), for the categorization of features was 80% (Cohen's κ = 0.69), and for advertised product(s) was 89% (Cohen's κ = 0.81).

Researchers tabulated energy (or calorie) density (ED) for each food product or set of products in each content feature using nutritional information from company websites. ED is a metric that explains how "filling" food items are and is calculated by dividing the total calories per serving of a food item by its weight in grams (Monsivais & Drewnowski, 2007). Food items low in ED allow individuals to eat larger portions without adding many calories to their diets. For example, a person may eat an entire cup of grapes (92 g) and consume only 60 calories (ED = 60 Cal/92 g = 0.65). However, she may only eat ¼ of a small candy bar (11 g) and still consume 60 calories (ED = 60/11 = 5.45). The larger portion of grapes will leave her feeling more satiated than if she ate the candy bar, because grapes contain more mass for the same calories. Foods with EDs of 4 or greater should rarely, if ever, be consumed ("What is energy density?", 2009). High ED foods have been associated with higher trans fats, saturated fats, and the glycemic index, as well as weight gain (Bes-Rastrollo et al., 2008). ED for each product or set of products in our sample ranged from 0.17 to 6.56 (M = 4.08, SE = 0.017; ICC(3,1) = 0.98).

For every game in every child-oriented website, researchers coded many of the branding and interactivity gaming features identified in the studies reviewed above (e.g., Lee et al., 2009) and in pilot explorations of the current dataset. Specific codes and reliabilities are in Table 1.

Using R (R Core Team, 2015), we conducted an item cluster analysis of the gaming features to see if there were commonly co-occurring sets of characteristics. This analysis indicated a three-cluster solution (Pattern Fit = 0.93; RMSR = 0.08). However, internal consistency was acceptable only for one cluster (Cronbach's α = 0.61), which we refer to as the *brand indicator* cluster. This cluster consisted of four items Lee and colleagues (2009) referred to as "brand as active game component II" (p. 143): playing a game as anthropomorphized food (e.g., sledding as a personified piece of Cinnamon Toast Crunch cereal), playing a game as a product mascot (e.g., swimming as Toucan Sam, the Froot Loop mascot), manipulating food as a game's primary goal (e.g., playing a matching game with Pop-Tart-branded cards), and using food items as tools/equipment (e.g., using a Butterfinger candy bar as fishing bait). We summed those four items for each advergame to create a composite *brand indicator* variable.

Table 1. Gaming features and inter-rater reliability.

Code	Unweighted counts of features	Weighted percentage with feature (%)	SE (%)	Percent agreement (%)	κ
Music	68	88	4	81	0.60
Scoring	72	84	4	96	0.78
Multiple levels	51	70	3	96	0.85
Brand logos embedded in background of game	29	48	3	81	0.54
Explicit invitations to continue playing game	27	46	5	85	0.70
Companion ads for brand/food products	62	42	10	81	0.62
Primary goal of game to manipulate branded food items[a]	28	40	3	89	0.78
Player can manipulate branded food items to earn bonus points	16	18	6	93	0.47
Player can embody a piece of food while playing the game[a]	27	18	3	96	0.87
Player can embody a product mascot while playing the game[a]	25	17	10	100	1.00
Player can use food pieces as tools/ equipment[a]	13	16	3	96	0.65
Player can share content as a reward for successful gameplay	1	8	1	96	[b]
Player can upload photos of themselves into the game	1	8	1	100	1.00
Product code needed to start game	2	1	1	100	1.00
Recommendations for other advergames	1	1	0	100	1.00

Note: Codes to capture gaming features, unweighted counts of the number of games with each feature, estimates of the percentage of all branded websites owned by sample companies containing each gaming feature and standard errors on those estimates, and percent agreement and Cohen's Kappa inter-rater agreement.

[a]Codes that formed the brand indicator cluster.

[b]κ could not be calculated because the secondary coder never observed this feature.

Statistical Analysis

We analyzed data with the SPSS 22 Complex Samples module (http://www-03.ibm.com/software/products/en/spss-complex-samples). This software weighted data to account for our stratified sampling and for the multiple observations we made in each website. The findings below reflect both our observations and estimate the results we would have observed had we taken a census of all food branded websites across all 36 companies.

Results

RQ1: Prevalence of Child-Oriented Food Websites

In the first set of analyses, we examine all 95 websites to identify the proportion of child-oriented sites. Most sites in our sample (unweighted count = 80) exclusively target adults. Had we taken a census of all branded sites across the 36 companies, we estimate 94% (SE = 3) would have been adult-oriented, and only 7% (SE = 3%) would have been child-oriented. Thus, child-oriented websites are not highly prevalent.

RQ2: Content in Child-Oriented Food Websites

Next, we tallied the content features present *within each of the 15 child-targeted websites*. The websites included a variety of content features (see Table 2). Games were the most common feature: 13 of the 15 child-oriented websites included games, and in sum these websites featured 86 games (M = 5.84 games per website, SE = 0.69). Pictures advertising articles such as branded food items and mobile applications (apps), and videos were the next most common features.

RQ3: Gaming Features in Child-Oriented Advergames

Next, we explored the gaming features present *within each of the 86 advergames*. As shown in Table 1, the vast majority of games played music, kept scores, and featured multiple levels, and almost half included invitations to continue playing (e.g., "You didn't win this time. Try again!"), companion advertisements bordering the game (e.g., a McDonalds logo sitting just outside the gameplay space), and were constructed so children's primary goal was to manipulate pieces of food. The other gaming features occurred much less frequently.

RQ4: Relation between Content and Gaming Features, and ED of Promoted Foods

To assess whether ED varied by content feature, we ran a one-way analysis of variance (ANOVA), followed by Holm-corrected post hoc comparisons. The overall model was significant, *Wald* $F(3,3) = 10.42$, $p = 0.043$, $\eta^2 = 0.27$. As shown in Figure 1, follow-up tests revealed static pictures ($p = 0.015$) and "other" kinds of marketing (includes comics/eBooks, downloadable images, giveaways, and arts activities; $p = 0.006$) were used to market foods lower in ED (i.e., less obesogenic) than games. Static pictures also promoted foods lower in ED than "other" content features ($p = 0.028$). No other comparisons achieved statistical significance.

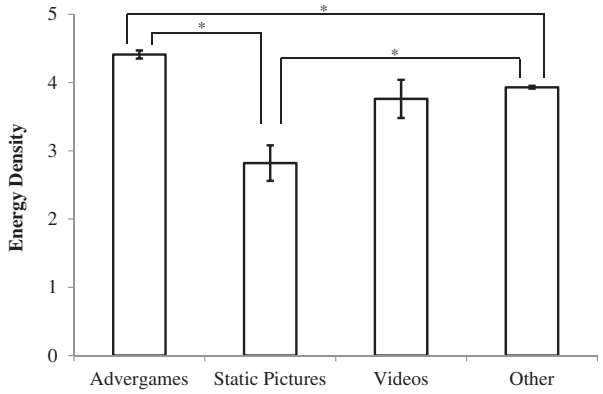

Figure 1. Mean energy density and standard errors for each content feature. *$p < 0.30$.

To test if the presence of brand indicators within games (the set of gaming features with acceptable internal consistency) related to nutritional quality, we ran an ordinary least squares (OLS) regression across the 86 games. ED once again served as dependent variable, and the composite brand indicator variable served as the predictor variable. The model was significant, $R^2 = 0.15$, *Wald* $F(1,3) = 42.23$, $p = 0.007$. For each additional brand indicator included in a game, the ED of the featured product *decreased* by 0.22 (SE = 0.034), meaning games with *more* brand identifiers marketed *more* nutritious products.

Table 2. Website content features.

Feature	Unweighted no. of sites	Weighted percentage (%)	SE (%)	M	SE (M)
Advergames	13	92	4	5.84	0.69
Static pictures	12	47	6	1.22	0.22
Videos	10	39	6	1.33	0.31
Comics/eBooks	3	12	7	0.67	0.49
Downloadable images	2	8	4	0.08	0.04
Contests	2	8	0	0.08	0.00
Art activities	1	4	4	0.04	0.04
Quizzes	0	0	0	0.00	0.00
Virtual worlds	0	0	0	0.00	0.00

Note: Unweighted counts of the number of websites containing each content feature; weighted estimates of the percentage of all branded websites owned by sample companies containing each feature and standard errors on those estimates; average number of times each content feature was present within each website and standard errors on those estimates.

Discussion

In 2006, IOM concluded food marketing to youth contributes to childhood obesity (IOM, 2006), and since then, the food industry has limited the advertising of obesogenic foods to children (IOM, 2013). This study examined food marketing to children across company websites to provide a benchmark of current practices. Our results present a mixed but promising picture.

In and around 2006, about half of food websites featured children's areas (e.g., Henry & Story, 2009), whereas in our 2013 dataset, only a small proportion of food company websites are child-oriented. Although we lack sufficient evidence to make definitive causal claims, this implies that in the U.S. self-regulatory measures such as CFBAI (Better Business Bureaus, 2014a) and/or general public pressure (IOM, 2013) may have prompted food companies to eliminate some child-targeted marketing online.

The finding that static pictures promote particularly *nutritious* foods also is consistent with other data we have collected. Other research within this dataset suggests apps typically promote foods lower in ED than websites, which is promising, as youth begin to spend more time on mobile devices (Zupancic, Alvarez, Wartella, & Hurwitz, 2015).

The findings about the prevalence of games are comparatively more concerning. Websites seem to be increasingly privileging games over other content features. For example, in 2006, nearly half of child-directed food company websites had contests (Culp et al., 2010), whereas in more recent work (Cheyne et al., 2013) and this study, only 1 in 10 websites include such content. Conversely, most past content analyses found 80–85% of websites had games (e.g., Henry & Story, 2009), whereas in our study, a projected 92% do—although 80% falls within our 95% confidence window. It is encouraging that websites may be featuring less of certain effective features, such as contests (Raju et al., 2010). However, it is more worrisome that today's websites contain just as many if not more advergames, a technique demonstrated to be even more effective than other forms of advertising in prior research (Waiguny & Terlutter, 2011), and the technique used to promote the most obesogenic foods in our study.

It is unclear how to interpret our finding linking brand identifiers to more nutritious foods. If certain brand identifiers truly enhance children's brand preferences, it is promising that these features tend to be paired with more nutritious foods. Nevertheless, in a 2009 study, 69% of games featured brand identifiers (Lee et al., 2009) compared to 16% in our study. This may mean newer games both include fewer brand identifiers and promote more obesogenic foods. That said, ultimately, brand identifiers may only have minimal impact on children's food preferences (van Reijmersdal et al., 2012). Future research is needed to clarify the nature and impact of brand identifiers.

Our findings present a conundrum for any parents and child welfare advocates who may wish to help strengthen children's defenses against child-directed food marketing: Past research indicates parent-child dialogue around marketing can reduce children's tendencies to request advertised products (e.g., Buijzen & Valkenburg, 2005), but parents may struggle to identify food advergames with few visible brand identifiers as active game components—the games most likely to promote obesogenic products. Reformers should encourage food marketers to include prominent warnings about the selling and persuasive intent of advergames; such warnings may be salient to parents and, in prior work, have reduced advergames' effectiveness (Panic, Cauberghe, & De Pelsmacker, 2013).

We recommend future scholarship continue prioritizing advergames, rather than extending scholarly understanding of the effectiveness of uncommon features such as contests, and begin to unpack *how* specifically games might induce flow or immersion though gaming features highlighted in this study. For example, research with adults suggests music leads to greater attention to advertisements (Rodero, 2014), which may be a prerequisite for entering a state of flow. Given how common music was in our dataset, future work should test whether this result holds for youth (research outside the context of advertising suggests it might; e.g., Anderson & Lorch, 1983). Equipped with stronger theory, advocates can call for more fine-grained policies regulating the use of common and highly effective gaming features.

Limitations

The proportion of child-oriented food company websites we found in this study may seem rather small. However, we still examined 86 advergames and about the same number of websites as researchers did in a recent prior work in this domain (e.g., Cheyne et al., 2013). Additionally, our study focused exclusively on food company websites. Re-examining the prevalence of child-targeted food advertisements on highly trafficked children's websites would provide complementary information about the scope of online food marketing to children. Relatedly, in other past research, large numbers of children visited food branded sites (e.g., Harris, Speers, Schwartz, & Brownell, 2011), and analyzing web traffic data also would provide more evidence about the scope of online food marketing to children. Furthermore, we only engaged with games for 1 min or one level. We may have observed additional gaming features had we played games longer.

Conclusion

Have self-regulatory measures taken by U.S. food and beverage companies (Better Business Bureaus, 2014a) and growing public pressure (IOM, 2013) motivated companies to create a healthier online marketing environment for children? If we focus on the sheer volume of food websites with child-oriented content (or the lack thereof), the answer is a resounding yes. However, if we deeply explore the few child-oriented websites identified in this study, we may have somewhat more cause for concern. These websites are replete with advergames promoting obesogenic foods. It is also possible newer games, which may feature fewer brand identifiers, might promote even less nutritious food than older games, although more research is needed to understand the role of brand identifiers in food marketing to children. Thus, it appears that overall, self-regulatory measures and pressures on food companies have effectively led to the creation of a more healthful marketing environment online, but continued monitoring and experimental studies focused on advergames are warranted as we continue the fight against childhood obesity.

Acknowledgment

The authors would like to thank Aubry L. Alvarez, Alexis R. Lauricella, Eric D. Morales, Thomas H. Rousse, Brianna Hightower, Lillian Yi, and Sanaz Amirpour for their indispensable assistance recording and coding the data analyzed in this article. They would also like to thank Leanne Beaudoin-Ryan and Alexis R. Lauricella for their feedback on drafts of this manuscript and to members of Northwestern's Center on Media and Human Development and MTS PhD program for additional feedback on this project.

Funding

This research was supported by the National Science Foundation Grant #1251745 to Ellen Wartella.

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