

Popular Music Celebrity Endorsements in Food and Nonalcoholic Beverage Marketing

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abstract

BACKGROUND: Food and beverage marketing has been associated with childhood obesity. We quantified the number and type of food or beverage brands promoted by music celebrities, assessed the nutritional quality of the products, and examined Teen Choice Award data to assess the celebrities' popularity among adolescents.

METHODS: This was a descriptive study. A list of music celebrities associated with the 2013 and 2014 Billboard Hot 100 Chart, which ranks songs according to sales and radio impressions, was compiled. Data on celebrity endorsements were gathered from official company Web sites, YouTube commercials, an advertising database, and media reports. Nutritional quality of foods was assessed according to the Nutrient Profile Index, whereas nonalcoholic beverages were evaluated based on calories from added sugar. Teen Choice Award nominations were used to measure the celebrities' popularity among adolescents.

RESULTS: Of the 590 endorsements made by the 163 celebrities in the sample, consumer goods (eg, fragrances, makeup) represented the largest endorsement category (26%), followed by food and beverage (18%) and retail (11%). Sixty-five celebrities were collectively associated with 57 different food and beverage brands owned by 38 parent companies. Of these 65 celebrities, 53 (81.5%) had ≥ 1 Teen Choice Award nomination. Forty-nine (71%) of the 69 nonalcoholic beverage references promoted sugar-sweetened beverages. Twenty-one (80.8%) of the 26 endorsed foods were energy dense and nutrient poor. Baauer, will.i.am, Justin Timberlake, Maroon 5, and Britney Spears had the most food and beverage endorsements.

CONCLUSIONS: This study demonstrates that music celebrities who are popular among adolescents endorse energy-dense, nutrient-poor products.



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WHAT'S KNOWN ON THIS SUBJECT: Exposure to unhealthy food advertisements is associated with excessive consumption. Studies have shown that celebrities' food endorsements promote higher product preferences. Research has also demonstrated an association between familiarity with songs mentioning alcohol and drinking behaviors in adolescents and young adults.

WHAT THIS STUDY ADDS: The study examines the use of music celebrity endorsements of food and beverage products. Furthermore, it assesses nutritional value of endorsed products and the popularity of the celebrity endorser among adolescents.

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The Institute of Medicine and surgeon general have stated that individual-level health-promoting behavior changes are very difficult to achieve because of the current unhealthy environment.¹ Food and beverage marketing has been identified as a significant environmental contributor to childhood obesity.¹⁻⁶ Exposure to food marketing promotes excess consumption, increased purchase requests, and higher preference for the product among children and adults.²⁻⁵ A cued-recall assessment demonstrated that fast food advertising receptivity (ie, exposure and response to ads) is associated with youth obesity.⁷ Food and beverage companies spend \$2 billion annually on youth-targeted advertisements.¹ Public health experts have called for a shift toward marketing messages that encourage consumption of healthy foods and beverages and policies to establish protective thresholds for food marketing exposure targeting youth.⁸⁻¹²

Research has shown that the use of celebrity endorsements in marketing can enhance brand equity and the desirability of a product, leading consumers to more positively associate with, and easily recognize, brands.¹³⁻¹⁵ This effect is particularly relevant in the context of music celebrity endorsements because adolescents ages 12 to 18 years report spending almost 2 hours listening to music each day,¹⁶ and black and Latino youth spend 3 hours listening to music daily.¹⁷ This frequent exposure is notable in the context of previous research that showed that 20% of popular US songs mentioned alcohol brands and associated alcohol with positive consequences (eg, wealth, sex, luxury).¹⁸ This exposure is linked to self-reported alcohol consumption, with 1 study demonstrating that familiarity with songs that mention alcohol brands was associated with drinking behaviors in adolescents

and young adults.¹⁹ These findings are consistent with industry data showing that celebrity endorsement campaigns are more likely than noncelebrity campaigns to lead to substantial increases in immediate profits and long-term increases in profitability.²⁰ Given the high level of brand exposure created by these multi-million-dollar endorsement deals, public health experts have expressed concern over the potential effects of these marketing techniques on adolescents, who represent a vulnerable population well attuned to popular music trends. Indeed, grassroots action and media attention regarding celebrity athletes' endorsement of tobacco have coincided with declining tobacco endorsements^{21,22} and could provide useful lessons for addressing music celebrities' endorsements of unhealthy food and beverage products.

The food industry capitalizes on music celebrities' popularity with youth by engaging in multi-million-dollar endorsement deals. In 2012, Beyoncé Knowles signed an endorsement deal with Pepsi worth an estimated \$50 million, and Justin Timberlake received an estimated \$6 million for his involvement in the McDonald's "I'm lovin' it" tune.^{23,24} In addition, beverage industry publications credit Latino rapper Pitbull's endorsement of Dr Pepper with 4.6 million advertising impressions (ie, any views or exposure to ads) and boosting Dr Pepper sales among Latinos by 1.7%, despite overall declines in carbonated soft drink sales.²⁵ Although this instance is anecdotal, it is important to note the industry perceives it as an example of effective celebrity endorsements.

Recent food marketing research has focused predominantly on children <12 years old, whereas adolescents' exposure and response to advertising have been relatively understudied. More research on

adolescents and food marketing is needed, especially in recognition of adolescents' unique standing as impressionable consumers with more purchasing power and independence than their younger counterparts.^{26,27} In fact, research demonstrates that adolescents can be highly impulsive with purchases, in part because of peer pressure,²⁸ fear of negative evaluation,²⁸ and underdeveloped self-control systems.²⁹ This descriptive study was designed to examine the use of music celebrity endorsements of food and nonalcoholic beverage products. We aimed to determine the number and type of music celebrity endorsements, evaluate the nutritional quality of endorsed products, and assess how popular these music celebrities are among adolescents and the general public.

METHODS

We listed the top 100 songs that appeared on the 2013 and 2014 Billboard Hot 100 Chart, which ranks the year's "most popular songs across all genres, ranked by radio airplay audience impressions as measured by Nielsen Music, sales data as compiled by Nielsen Music and streaming activity data provided by online music sources."³⁰ These songs were used to identify celebrities associated with various endorsements. Some celebrities appeared multiple times on the lists, and some songs had multiple celebrities listed as performers. Thus, we identified 163 unique music celebrities for the study. We then cataloged every endorsement associated with each music celebrity between 2000 to 2014 by searching for celebrity names on AdScope, an advertisement database that contains all forms of ads (eg, television, radio) dating back to 1997. Researchers also searched for official commercials on YouTube or endorsement

announcements in news media sources.

After we listed endorsements associated with each celebrity who appeared on the 2013 and 2014 Billboard Hot 100 Chart, a research assistant blind to the purpose of the study sorted all endorsed brands into the following 11 categories: food and nonalcoholic beverages, automotive, consumer goods (eg, makeup, headphones), communications (eg, cell phone companies), finance (eg, credit cards), sports (eg, Nike), retail, tobacco and alcohol, services (eg, Google), airlines, and other. These categories were developed on the basis of the sponsorship categories created by the marketing firms.³¹

To assess the popularity of these music celebrities among adolescents, we compiled a list of music celebrities who appeared on the Teen Choice Award nomination lists between the years 2000 and 2014. The Teen Choice Awards is an annual awards show that uses adolescent viewers' votes to honor celebrities in music, movies, sports, television, and fashion.³² We then created endorsement profiles that indicated the number and type of endorsements associated with each celebrity in the sample and the number of times each celebrity was nominated for a Teen Choice Award.

To assess the general population's exposure to the celebrities and their food and nonalcoholic beverage endorsements, 2 raters independently searched YouTube for the celebrity and product or company name and cataloged the number of views associated with each of the videos. Inclusion criteria for YouTube videos consisted of official commercials, promotional videos, or music videos in which the celebrity, their song, or the endorsed product was featured that were uploaded between 2000 and 2014. Even though the Billboard Hot 100 list is restricted to 2 years for our study, capturing 14 years of endorsements

enabled us to create a comprehensive profile that portrays a fuller picture of their prominence as an endorser. YouTube videos in languages other than English were excluded. Viewership data for YouTube videos represent the total number of views as of January 2016.

Nutritional Analysis

We reviewed all advertisements featuring endorsements by music celebrities in the sample. A celebrity was considered to endorse a product if an advertisement featured the celebrity, the celebrity's song, or a music group to which the celebrity formerly belonged at the time of the endorsement. The nutrition information for products associated with celebrities' endorsements was collected from official company Web sites or actual nutrition labels.

A nutrition score for each endorsed food product was generated from Nutrient Profile Model (NPM). The NPM was selected because it has been used in food marketing research studies and is used as the standard for child-targeted food marketing in United Kingdom.³³⁻³⁵ The NPM provides a score that represents the healthfulness of each food product based on nutrient content. Foods gain points for nutrients that should be limited (calories, saturated fat, sodium, or sugar) and lose points for nutrients that are encouraged (fruits, vegetables, nuts, fiber, and protein). Higher scores represent less healthful products, whereas lower scores represent products with healthy qualities. To translate the NPM score to an easy-to-understand scale, the final NPM score was converted to a Nutrient Profile Index (NPI), where 1 is the worst nutrition score and 100 is the best score. The NPI has been used in previous food marketing research.³⁶ The NPI uses the following formula: $NPI \text{ score} = -2 \times NPM \text{ score} + 70$. A score ≥ 64 is considered the threshold for products that can be advertised to

children in the United Kingdom. One limitation of the NPM is that it codes some sugar-sweetened beverages (SSBs) as healthy. Therefore, we coded nonalcoholic beverages into 11 drink categories, 3 sugary drink subcategories, and 5 other drink categories as outlined in the Rudd Center's Sugary Drink FACTS Report.³⁷

In some instances, celebrities endorsed a brand that did not mention a specific product or a brand that offered mixed meals (eg, fried chicken, biscuits, cole slaw) that could not easily be entered in the NPM formula. In those cases, we generated the NPM scores based on the Rudd Center's Fast Food FACTS Report,³⁸ a comprehensive analysis of all menu items for a variety of food and nonalcoholic beverage brands. In cases where data were not available through the FACTS report, we assessed the nutrition information for every food product associated with that brand and averaged the NPI scores of the entire line of products listed on the company Web site. Five companies (Chili's, Pizza Hut, Longhorn Steakhouse, Wingstop, and Michael Jackson's Premium Chocolate) were excluded from the nutritional analyses because the serving size information for most items was unavailable or unusable (eg, "serving size equals one slice").

Marketing Analysis

To assess the popularity of the celebrities among adolescents, we compiled a list of music celebrities nominated for a Teen Choice Award between the years 2000 and 2014. We cross-referenced the list of Teen Choice Award nominees with celebrities in our sample who endorsed food and nonalcoholic beverages. To assess broad audience exposure (ie, adults, adolescents, children), we quantified the number of YouTube video views associated with the celebrities' food

and nonalcoholic beverage brand endorsements.

RESULTS

We identified 590 endorsements associated with 163 unique music celebrities in the sample. Consumer goods was the largest endorsement category (26%), followed by food and nonalcoholic beverages (18%) and retail (11%). We cataloged 107 food and beverage brand endorsements, although several brands appeared multiple times because multiple celebrities endorsed the brand. Overall, full-calorie soft drinks were the most commonly endorsed food or nonalcoholic beverage product. In contrast, water-related endorsements appeared 3 times in the form of a Brita filter endorsement, CORE Hydration, and WAT-AAH!'s water brand. The celebrities with the highest number of food and nonalcoholic beverage endorsements were Baauer ($N = 5$), will.i.am ($N = 4$), Britney Spears ($N = 3$), Justin Timberlake ($N = 3$), Maroon 5 ($N = 3$), Pitbull ($N = 3$), and Jessie J ($N = 3$) (Table 1).

Endorsements by Food or Beverage Brand

There were a total of 107 food and beverage endorsements in the sample, associated with 38 parent companies. Fifty-one music celebrities were associated with 69 beverage references in 63 beverage advertisements (ie, ads were defined as television commercials, print ads, or promotional videos [eg, concert sponsored by Pepsi]) (Table 2). The number of references (ie, references were defined as the image of beverage can or bottle, verbal mention of the brand, or image of the parent company logo) exceeds the number of ads because 5 of the ads included a reference to multiple types of beverages (eg, Pepsi ad showing both Pepsi Regular can and Diet Pepsi can). Of the 69 beverage references, 49 were for SSBs, 7 were for non-SSBs

TABLE 1 Music Celebrities Ranked by Number of Food or Beverage Brand Endorsements

Music Celebrity	Endorsed Food or Beverage Brands	Number of Food or Beverage Endorsements	Mean NPI Score for Food Products ^a	% of Endorsements That Are Food or Beverage Brands
Baauer	A&W Restaurants, Dr Pepper, Hot Pockets, Red Bull, Pepsi Regular	5	50.43	71
will.i.am	Coca-Cola, Doritos, Dr Pepper, Pepsi Regular	4	42.59	15
Britney Spears	GG Tea, McDonald's, Pepsi Regular	3	48	27
Justin Timberlake	Chili's, ^b McDonald's, Pepsi Regular	3	46.75 ^b	25
Jessie J	McDonald's, Pop Tarts, Cadbury's	3	34.18	100
Pitbull	Dr Pepper, Pepsi Regular, Sheets Energy Strips	3	70	30
Maroon 5	Coca-Cola, Snapple	2	—	18
Chris Brown	Got Milk, Wrigley's Doublemint	2	46.89	100
Snoop Dogg	Hot Pockets, Monster Energy	2	52.67	20
Psy	Wonderful Pistachio, Nongshim Shin Ramyun Black Cup	2	48	33
Shakira	Pepsi Regular, Activia	2	71.46	40
Carrie Underwood	Vitamin Water, Hershey	2	27.88	40
Usher	Honey Nut Cheerios, Twix	2	33.9	50
Juicy J	CORE Hydration, Red Bull	2	—	100
Katy Perry	Pepsi Regular, PopChips	2	51.86	22
Blake Shelton	Pepsi Regular, Pizza Hut ^b	2	^b	40
Nelly	Honey Nut Cheerios, Mike and Ike	2	44.23	50
Macklemore	Cracker Jack, Dr Pepper	2	39	20
One Direction	Nabisco, Pepsi Regular	2	43.47	29
Ne-Yo	Pepsi Regular	1	65.67	40

—, indicates that the artist only endorsed beverage products, meaning NPI scores did not apply.

^a Lower scores represent less healthful foods.

^b Complete nutrition information was unavailable for this company, so it was excluded from analyses.

(ie, diet beverage or water), and 13 references were associated with verbal mention of the brand or image of the parent company logo (ie, no product shown). Full-calorie soft drinks were the largest category of endorsements overall ($N = 33$). In terms of company prominence in endorsements, PepsiCo endorsements appeared most frequently ($N = 23$), followed by the Coca-Cola Company ($N = 8$) and Dr Pepper Snapple ($N = 4$) (Table 3). Seven no-calorie nonalcoholic beverage endorsements included diet soft drinks ($N = 5$), water ($N = 1$), and milk ($N = 1$).

Twenty-nine music celebrities were associated with 38 food endorsements in our sample. Thirty-three of those

endorsements were unique because several brands (eg, McDonald's) were endorsed by multiple celebrities. Fast food was the largest category of food endorsements ($N = 6$), with McDonald's accounting for the most food endorsements in the sample. The remaining endorsements involved chips, candy, cereal, non-fast food restaurants, and miscellaneous snacks. There were no endorsements for fruits, vegetables, or whole grains, but one celebrity endorsed Wonderful Pistachio, which was the only food product with a healthy score (66/100).

Nutritional Quality of Celebrities' Endorsements

NPI scores were determined for 26 food brands. Results indicate

TABLE 2 Nutrition Information of Beverages Featured in Commercials, as Ranked by Company

Company	Brand	Drink Category	Music Celebrity Associated With Each Drink Category
PepsiCo	Pepsi	Regular soda, full calorie	will.i.am, ^a Christina Aguilera, Justin Timberlake, ^a Britney Spears, Pitbull, Kelly Clarkson, Nicki Minaj, One Direction, Mariah Carey, Calvin Harris, Blake Shelton, ^a P!nk, Enrique Iglesias, Shakira, Beyoncé, Lee Brice, Wiz Khalifa, Michael Jackson
PepsiCo	Pepsi	Parent company logo or brand name mention only ^b	Katy Perry, Bruno Mars, Ne-Yo, Hunter Hayes
PepsiCo	Diet Pepsi	Other, diet drink (soda)	Baauer, will.i.am, ^a Justin Timberlake ^a
PepsiCo	Mountain Dew	Regular soda, full calorie	Mac Miller, Jason Aldean, Brantley Gilbert
PepsiCo	Lipton Iced Tea	Iced tea, full calorie	Lady Antebellum, American Authors
PepsiCo	Pepsi-Cola: Real Sugar	Regular soda, full calorie	Blake Shelton ^a
PepsiCo	Gatorade Thirst Quenchers	Parent company logo or brand name mention only ^b	Lil Wayne
PepsiCo	Brisk (Lipton)	Iced teas, full calorie	Eminem
Coca-Cola	Coke	Regular soda, full calorie	Christina Aguilera, Daft Punk, Calvin Harris, Jay Z, Of Monsters and Men
Coca-Cola	Glaceau Vitamin Water	Flavored water, full calorie	Alicia Keys, Kelly Clarkson, Carrie Underwood
Coca-Cola	Coke	Parent company logo or brand name mention only ^b	will.i.am, Maroon 5
Coca-Cola	Sprite	Regular soda, full calorie	Imagine Dragons, Wale, Drake
Coca-Cola	Diet Coke	Other, diet drink (soda)	Taylor Swift
Coca-Cola	Fuze	Parent company logo or name only	Rihanna
Dr Pepper Snapple Group	Dr Pepper	Regular soda, full calorie	will.i.am, Macklemore, Pitbull, Baauer ^a
Dr Pepper Snapple Group	Diet Dr Pepper	Other, diet drink (soda)	Baauer ^a
Dr Pepper Snapple Group	Snapple	Iced tea, full calorie	Maroon 5
Red Bull	Red Bull	Energy drink, full calorie	Pharrell, AWOLNATION
Red Bull	Red Bull	Parent company logo or brand name mention only ^b	Of Monsters and Men, Baauer
Nestle	Nesquick	Children's drinks, full and reduced calorie	Ariana Grande ^a
Nestle	Nestea	Iced tea, full calorie	Nico & Vinz
Nestle	Nescafe	Parent company logo or brand name mention only ^b	Mariah Carey
Nestle	Nespresso	Iced tea or coffee, reduced sugar	Lana Del Rey
Monster Energy Company	Monster Energy	Parent company logo or brand name mention only ^b	Snoop Dogg
Starbucks	Starbucks	Parent company logo or brand name mention only ^b	Lady Gaga
Vita Coco	Vita Coco Pure Coconut Water	Flavored water, full calorie	Rihanna
Celsius	Celsius	Energy drink, reduced sugar	Flo Rida
Wat-Ahh!	Wat-Ahh!	Other, plain water	Ariana Grande
Core Hydration	Core Hydration	Parent company logo or brand name mention only ^b	Juicy J
Got Milk?	Got Milk?	Other, low- and no-fat milk	Chris Brown

^a Indicates that the music celebrity endorsed SSBs and non-SSBs.

^b Indicates that the ad featured only the parent company logo or verbal mention of the brand or did not feature a product with a label indicating diet or SSB.

that Doritos, Cracker Jack, Mike and Ike candy, Nabisco, Eckrich, Kentucky Fried Chicken, McDonald's, Burger King, Hot Pockets, A&W Restaurants, Wrigley's gum, Chipotle, Cadbury, Hershey's, Pop-Tarts, Twix, Nongshim USA, Dairy Queen, Honey Nut Cheerios, and PopChips had NPI scores <64, indicating that they are energy dense and nutrient poor (Table 1). In contrast, Big Red gum, 5 Gum, Taco Bell, Subway, Activia, and Sheets Energy Sheets were the only

brands endorsed by these celebrities that had NPI scores of ≥64.

Endorsement Viewership and Teen Choice Award Ratings

Celebrities in the sample appeared frequently on the nominee lists for the Teen Choice Awards between 2000 and 2014. Of the 163 celebrities in the sample, 102 appeared at least once on the Teen Choice Award nominee lists. Additionally, there

were a total of 312 849 504 views of the YouTube video versions for food and beverage endorsements associated with celebrities in the sample. Rihanna's 2006 song "We Ride," which promotes the Coca-Cola product Fuze, had a total of 61 712 783 views since being first uploaded to her YouTube VEVO channel in 2009³⁹ (Table 4), the most YouTube views in our sample. Pepsi's 2004 "We Will Rock You" commercial featuring Britney Spears, P!nk,

TABLE 3 Food and Beverage Company Endorsements Ranked by Number of Endorsing Artists

Company	Brand	No. Artists Endorsed	Music Celebrity Name
PepsiCo	Pepsi	23	Bauuer, Beyoncé, Blake Shelton, Britney Spears, Bruno Mars, Calvin Harris, Christina Aguilera, Enrique Iglesias, Hunter Hayes, Justin Timberlake, Katy Perry, Kelly Clarkson, Lee Brice, Mariah Carey, Michael Jackson, Ne-Yo, Nicki Minaj, One Direction, P!nk, Pitbull, Shakira, will.i.am, Wiz Khalifa
	Mountain Dew	4	Brantley Gilbert, Jason Aldean, Lil Wayne, Mac Miller
Coca-Cola	Coca-Cola	7	Calvin Harris, Christina Aguilera, Daft Punk, Jay-Z, Maroon 5, Of Monsters and Men, will.i.am
	Diet Coke	1	Taylor Swift
Red Bull GmbH	Sprite	3	Drake, Imagine Dragons, Wale
	Red Bull	5	AWOLNATION, Bauuer, Juicy J, Of Monsters and Men, Pharrell
Dr Pepper Snapple Group	Dr Pepper	4	Bauuer, Macklemore, Pitbull, will.i.am
Energy Brands/ Glacéau	Glacéau	3	Alicia Keys, Carrie Underwood, Kelly Clarkson
	Vitamin Water		
McDonald's	McDonald's	3	Britney Spears, Jessie J, Justin Timberlake
General Mills	Honey Nut Cheerios	2	Nelly, Usher
	Hot Pockets	2	Bauuer, Snoop Dogg
Nabisco (Mondelez)	Nabisco	2	5 Seconds of Summer, One Direction

TABLE 4 Music Celebrities' Popularity Among Adolescents

Music Celebrity Name	Endorsed Food or Beverage Brand	Number of Teen Choice Award Years ^a	Number of YouTube Views ^b
Chris Brown	Got Milk, Wrigley's Doublemint	20	29969
Britney Spears	GG Tea, McDonald's, Pepsi	12	56395174
Beyoncé	Pepsi	11	54695715
Usher	Honey Nut Cheerios, Twix	11	31254
Carrie Underwood	Hershey, Vitamin Water	10	138884
Justin Timberlake	Chili's, McDonald's, Pepsi	9	846424
Rihanna	Fuze, Vita Coco	9	61929844
Eminem	Lipton Iced Tea	8	4447961
Christina Aguilera	Coca-Cola Regular, Pepsi	7	579272
Taylor Swift	Diet Coke	7	514091
Pitbull	Dr Pepper, Pepsi	7	247227
Selena Gomez	Borden Milk	6	464925
Kelly Clarkson	Pepsi, Vitamin Water	6	120657
Maroon 5	Coke, Snapple	6	90851
Katy Perry	Pepsi, PopChips	5	1217070
Nicki Minaj	Pepsi	5	177125
Nelly	Honey Nut Cheerios, Mike and Ike	5	22158
Bruno Mars	Pepsi	4	18873728
Coldplay	Chipotle	3	9126275
One Direction	Nabisco, Pepsi	3	7673116
Shakira	Pepsi, Activia	3	4449956
Mariah Carey	Nescafe, Pepsi	3	1010914
Juicy J	CORE Hydration, Red Bull	1	26367501

^a Teen Choice Award Data 2000–2014.^b YouTube as of January 2016.

and Beyoncé was the second most watched video in the sample, with >42 million views since the video was loaded on YouTube in 2009⁴⁰ (Table 4). Pepsi's 23 celebrity endorsement commercials had the most collective YouTube views in the sample ($N = 160\,293\,981$) (Table 5).

DISCUSSION

This descriptive study demonstrates that music celebrities often endorse energy-dense, nutrient-poor products. Food and nonalcoholic beverage brands were the second largest endorsement category behind consumer goods (eg, fragrances, makeup). Full-calorie soft drinks were the largest category of food or nonalcoholic beverage endorsements, and Bauuer, will.i.am, Britney Spears, Justin Timberlake, Maroon 5, Pitbull, and Jessie J had the most food/nonalcoholic beverage endorsements. Celebrity ads appear to be popular, with >312 million viewers watching the 94 videos associated with celebrity food and nonalcoholic beverage endorsements in this sample on YouTube alone. However, it is impossible to conclude that all these viewers are indeed unique because a portion of the views may be repeated exposure. Although YouTube does not provide demographic data on viewers, the frequent appearance of these celebrities on the Teen Choice Award nomination lists suggests high levels of popularity among adolescents.

Obesity has become such a pressing public health issue that society must acknowledge the human suffering and costs associated with diabetes, obesity, and associated comorbidities. Musicians, actors, and other celebrities can be tremendously influential, particularly for the young fan base that may be swayed by their endorsements. Celebrities should leverage their influence to promote more healthful messages, and more effort should be made to reduce the exposure of children and adolescents to marketing,

TABLE 5 Music Celebrities Ranked by Number of YouTube Views

Endorsed Food or Beverage Brand	Music Celebrity Names	Number of YouTube Views ^a
Pepsi	Baauer, Beyoncé, Blake Shelton, Britney Spears, Bruno Mars, Calvin Harris, Christina Aguilera, Enrique Iglesias, Hunter Hayes, Justin Timberlake, Katy Perry, Kelly Clarkson, Lee Brice, Mariah Carey, Michael Jackson, NeYo, Nicki Minaj, One Direction, Pitbull, P!nk, Shakira, will.i.am, Wiz Khalifa	160 293 981
Red Bull	AWOLNATION, Baauer, Juicy J, Of Monsters and Men, Pharrell	31 948 643
CORE Hydration	Juicy J	26 363 187
Chipotle	Coldplay	9 126 275
Nestea	Nico & Vinz	7 855 423
Lipton Brisk	Eminem	4 447 961
Coca-Cola Regular	Calvin Harris, Christina Aguilera, Daft Punk, Maroon 5, Of Monsters and Men, will.i.am	1 396 110
Sprite	Drake, Imagine Dragons, Wale	1 284 256
Popchips	Katy Perry	1 213 441
McDonald's	Britney Spears, Jessie J, Justin Timberlake	385 008

^a YouTube, January 2016.

particularly for unhealthy food and nonalcoholic beverages. Every year, American children see 4700 advertisements, and adolescents view 5900 advertisements.¹ The scale of this exposure is similar to that of youth-targeted tobacco advertisements, which permeated television, video games, sporting events, and movies.^{41–44} However, voluntary corporate pledges related to food marketing (eg, Children's Food and Beverage Advertising Initiative) focus only on reducing marketing to children <12 years old, whereas tobacco policies restrict advertisements targeted to anyone <18 years old.

Given the heavy targeting of adolescents^{36–38} and the amount of money adolescents spend on food and beverages, voluntary food marketing reduction pledges should expand to include adolescents. Expanding voluntary pledges to include adolescents would also be consistent with the food marketing reduction recommendations published by the American Academy of Pediatrics (2006),⁴⁵ which encourage pediatricians to support local and national efforts to reduce food marketing while also counseling patients to limit screen time. Finally, grassroots action and media

attention can help make celebrity food endorsements a public liability in the same way these methods have been used for other celebrities who endorsed tobacco.²¹ Although a number of professional athletes endorsed tobacco in the early 1900s, policy changes and shifts in public perception of smoking coincided with declining endorsements; when Liu Xiang, an athlete on the Chinese Olympic team, endorsed cigarettes in 2006, public outcry led him to be labeled an "inappropriate" ambassador for tobacco, demonstrating a strong shift in public opinion about endorsements.²²

This study has some limitations. We may not have captured every endorsement that occurred between 2000 and 2014, which would lead to an underestimate of exposure to celebrity endorsements. Furthermore, we do not have direct adolescent viewership data, and 21 commercials were not available on YouTube, thus leading to conservative estimates of exposure. One limitation related to assessing popularity among adolescents includes criticism of the Teen Choice Awards' lack of transparency in whether the winners are ultimately determined by adolescents' votes or by the

show's corporate producers.⁴⁶ This limitation may lead to inaccuracies in determining celebrities' popularity among adolescents.

Future research should examine the effect of music celebrities' food and nonalcoholic beverage endorsements on consumption, particularly for children and adolescents. Additionally, researchers should examine the effect of music celebrity endorsement on youth attitudes toward food brands and purchase intentions. The popularity of music celebrities among adolescents makes them uniquely poised to serve as positive role models, so these celebrities should be aware that their endorsements could exacerbate society's struggle with obesity and endorse healthy products instead.

These results can inform policies designed to address the use of celebrities in food marketing. Many food and beverage companies have agreed not to target children <12 years old, but these pledges should include adolescents as well. To reduce exposure to energy-dense food and beverage endorsements, research is needed on the regulations of food marketing in environments highly populated by both children and adolescents.

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ABBREVIATIONS

NPI: Nutrient Profile Index
 NPM: Nutrient Profile Model
 SSB: sugar-sweetened beverage

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