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AUTHORS: Marie A. Bragg, MS, MPhil,[a] Swati Yanamadala, BA,[b] Christina A. Roberto, PhD,[a,c] Jennifer L. Harris, MBA, PhD,[a] and Kelly D. Brownell, PhD[d]

[a]Rudd Center for Food Policy and Obesity, Yale University, New Haven, Connecticut; [b]Stanford University School of Medicine, Stanford, California; [c]Department of Social and Behavioral Sciences, Harvard School of Public Health, Boston, Massachusetts; and [d]Sanford School of Public Policy, Duke University, Durham, North Carolina

KEY WORDS
obesity, food marketing, sports

ABBREVIATIONS
GRP—gross rating point
NPI—Nutrient Profile Index
NPM—Nutrient Profile Model

Ms Bragg originated the study idea and design, helped with data acquisition and analyses, led the writing of the manuscript, had full access to all of the data in the study, and takes responsibility for the integrity of the data and the accuracy of the data analysis; Ms Yanamadala helped with data acquisition and analyses and provided feedback on the manuscript; and Drs Roberto, Harris, and Brownell helped interpret the results and provided critical feedback on drafts of the manuscript.

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Address correspondence to Marie A. Bragg, MS, MPhil, 309 Edwards St, Rudd Center for Food Policy and Obesity, New Haven, CT 06510. E-mail: marie.bragg@yale.edu

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WHAT'S KNOWN ON THIS SUBJECT: Food marketing can lead to increases in food intake, purchase intentions, and brand preferences. Food companies use athlete endorsements as 1 form of food marketing. One study revealed that parents perceive athlete-endorsed food products as healthier than nonendorsed products.

WHAT THIS STUDY ADDS: This study assessed the (1) prevalence of athlete endorsements of food, (2) nutritional profile of foods endorsed by athletes, and (3) youth exposure to athlete endorsements of foods. This study reveals that adolescents saw more athlete-endorsement food commercials than adults.

abstract

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OBJECTIVE: This study quantified professional athletes' endorsement of food and beverages, evaluated the nutritional quality of endorsed products, and determined the number of television commercial exposures of athlete-endorsement commercials for children, adolescents, and adults.

METHODS: One hundred professional athletes were selected on the basis of *Bloomberg Businessweek*'s 2010 Power 100 rankings, which ranks athletes according to their endorsement value and prominence in their sport. Endorsement information was gathered from the Power 100 list and the advertisement database AdScope. Endorsements were sorted into 11 endorsement categories (eg, food/beverages, sports apparel). The nutritional quality of the foods featured in athlete-endorsement advertisements was assessed by using a Nutrient Profiling Index, whereas beverages were evaluated on the basis of the percentage of calories from added sugar. Marketing data were collected from AdScope and Nielsen.

RESULTS: Of 512 brands endorsed by 100 different athletes, sporting goods/apparel represented the largest category (28.3%), followed by food/beverages (23.8%) and consumer goods (10.9%). Professional athletes in this sample were associated with 44 different food or beverage brands during 2010. Seventy-nine percent of the 62 food products in athlete-endorsed advertisements were energy-dense and nutrient-poor, and 93.4% of the 46 advertised beverages had 100% of calories from added sugar. Peyton Manning (professional American football player) and LeBron James (professional basketball player) had the most endorsements for energy-dense, nutrient-poor products. Adolescents saw the most television commercials that featured athlete endorsements of food.

CONCLUSIONS: Youth are exposed to professional athlete endorsements of food products that are energy-dense and nutrient-poor. *Pediatrics* 2013;132:1–6

In response to the growing body of evidence demonstrating the negative effects of food marketing on dietary intake,[1–6] the World Health Organization has recommended policies that limit young people's exposure to food advertisements.[7] Simultaneously, public health experts and government agencies have called for the promotion of messages that encourage physical activity and consumption of healthful foods and beverages.[8–11] Professional athletes are in a unique position to use their highly visible status to promote healthy messages to youth, and their role as athletes may lead the public to perceive them as credible sources of knowledge on a healthy lifestyle.

Food and beverage companies pay professional athletes vast sums to endorse their products, and companies promote these product partnerships in creative ways. For example, Peyton Manning (professional American football player) is the top product endorser among National Football League players and reportedly earns $10 million per year from contracts with Papa John's pizza (Papa John's International, Louisville, KY), Gatorade (PepsiCo, Purchase, NY), Wheaties (General Mills, Minneapolis, MN), Sony (Sony Corporation, Minako, Tokyo), and DirectTV (DirecTV Group, El Segundo, CA).[12] Kobe Bryant (professional basketball player) earned an estimated $12 million per year from his endorsement contract with McDonald's (McDonald's Corporation, Oakbrook, IL) alone.[13] Although the details involved in professional basketball star LeBron James' multiyear contract with McDonald's were not disclosed, he reportedly received $5 million dollars to endorse Bubblicious Gum (Cadbury USA, Parsippany, NJ), including his own flavor (LeBron's Lightning Lemonade).[14] In 2009, Kraft (Kraft Foods Group, Northfield, IL) targeted families through their Double Stuf Oreo "lick off" competitions with cash prizes and endorsements by Shaquille O'Neal (former professional basketball player), Serena and Venus Williams (professional tennis players), Peyton and Eli Manning (professional American football players), and Apolo Ohno (Olympic speed skater).[15] The interactive nature of these advertising campaigns (ie, children could win prizes and watch "lick off" contests) and the monetary cost of athlete endorsement contracts are a strong indicator of how much food and beverage companies value associations with celebrity athletes and suggest these endorsements are beneficial for companies.

Food and beverage companies may invest in athlete endorsements for a number of reasons. Research indicates that the use of celebrity endorsers helps build brand recognition and creates positive associations with the brand.[16–18] One study also revealed that parents perceive food products as healthier when they are endorsed by a professional athlete and are more likely to purchase those products.[19] Finally, professional athletes are highly visible celebrities in society and facilitate high levels of brand exposure, as indicated by the 106 million Americans who watched the McDonald's commercial featuring former and current professional basketball players Larry Bird, LeBron James, and Dwight Howard for the 2010 Super Bowl.[20]

The use of professional athlete endorsements in food marketing campaigns has been criticized by the public health community for promoting energy-dense, nutrient-poor foods and sending mixed messages about fitness, health, and diet,[7,10,19] yet no studies have examined the extent and reach of such marketing. This study aimed to (1) determine the frequency of professional athletes' endorsement of food and beverage products, (2) evaluate the nutritional quality of the food products endorsed by professional athletes, and (3) assess the marketing exposure of children, adolescents, and adults to professional athletes' endorsement of food products.

METHODS

One hundred professional athletes were selected for analysis from *Bloomberg Businessweek's* 2010 Power 100 report.[21] Power 100 ranks athletes according to their prominence in their sport and the value of their endorsement contracts. Information on some of the athletes' endorsement contracts was available in the report and used to generate a list of brands endorsed by professional athletes in the sample. AdScope, a marketing database that contains advertisements appearing in all forms of media (eg, television, radio), was used to search for other brands endorsed by these athletes that did not appear on the 2010 Power 100 rankings. Information on brands endorsed by athletes can be found by using AdScope's search engine.

After generating the list of 100 athletes and the brands they endorsed during 2010, a research assistant blind to the purpose of the study sorted all endorsed brands into the following 11 categories: food/beverages, automotive, consumer goods, service providers, entertainment, finance, communications/office, sporting goods/apparel, retail, airlines, and other. These categories were developed on the basis of the categories that marketing firms use to organize sponsorships.[22] Researchers then developed endorsement profiles indicating the number and type of endorsements associated with each athlete in the sample.

Nutritional Analysis

Researchers reviewed all TV commercial food advertisements featuring athletes in this sample that appeared in AdScope's database during 2010. These

TV commercials were coded to determine the brand shown. Researchers coded the product shown and collected nutrition information for each product from the brand Web sites. Information for several products was not available online and was obtained by examining the product packaging in a supermarket.

An overall nutrition score for each product was generated on the basis of the Nutrient Profile Model (NPM). The goal of the NPM is to produce a single score that represents the healthfulness of each food or beverage product. The NPM score is based on the amounts of specific nutrients in a product. Foods and beverages gain points for nutrients to limit (amounts of calories, saturated fat, sugar, or sodium) and lose points for nutrients to encourage (amounts of fruits/vegetables/nuts, fiber, and protein). Higher scores represent less healthful products, whereas lower scores reflect more healthful products. To translate the NPM scores to an easy-to-understand scale, the final NPM score was converted to a Nutrient Profile Index (NPI) where 1 is the worst possible nutrition score and 100 is the best score. The NPI uses the following formula: NPI score = $(-2) \times$ NPM score + 70.[23] A score of $\geq$64 is considered the threshold for products that can be advertised to children in the United Kingdom. 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 the United Kingdom.[24–26] Beverages were not coded by using the NPM because a limitation of the NPM is that it scores some sugar-sweetened beverages as healthy even though they are sugar-sweetened. Rather, beverages were coded as energy dense, nutrient poor if 100% of calories came from added sugar. To be conservative with our cutoffs for unhealthy products, beverages were coded as healthy if $<$100% of the calories came from added sugar.

In some instances, athletes endorsed a restaurant brand or a brand that had mixed meals (eg, fried chicken, biscuits, cole slaw) that could not easily be entered into the NPM formula. When a restaurant was endorsed, researchers averaged the NPM scores of the top-5 marketed products because these are the most prominent products for the brand and those that are most heavily marketed. When mixed meals needed to be analyzed, researchers entered each individual food product into the NPM model and averaged the scores for all of the mixed-meal components.

Marketing Analysis

Nielsen data were used to determine how many TV advertisements for athlete-endorsed food and beverage products were viewed by individuals in different age groups during 2010. Nielsen data quantify TV commercial exposure on the basis of gross rating points (GRPs), which measure the total audience delivered by a brand's media schedule. More specifically, GRPs represent the percentage of the population that is exposed to each commercial over a given time period across all types of TV programs. GRPs are converted into "number of commercials per individual" by using the following formula: 100 GRPs = 1 commercial viewed per individual. For example, a food product with 2000 GRPs for the year 2010 would mean that any given individual would have seen 20 commercials for that product during 2010. In this study, GRPs were used to measure the number of commercials seen by children and adolescents as compared with adults. For example, if a brand had 2000 GRPs in 1 year for children aged 2 to 11 years and 1000 GRPs for adults aged 18 to 49 years, it is permissible to conclude that children saw twice as many commercials for that brand. AdScope's database was also used to determine the number of athlete-endorsed food advertisements that appeared in 2010. Specifically, researchers calculated the number of AdScope advertisements featuring athletes in the sample as a proxy for their prominence as a marketing tool.

Athlete Endorsement Index

An overall index was created to reflect the "negative marketing and nutrition impact" of each athlete. The index is based on a scale of 1 to 100, where 1 indicates the most negative impact made by athletes based on available marketing and nutrition data (Table 3). The lowest index score indicates that the athlete has the highest Power 100 ranking, the highest number of advertisements and food endorsements, and the highest percentage of food endorsements compared with other endorsements. The lowest index score also indicates that the food endorsed was the least healthy in the sample. Athletes had lower (ie, worse) scores if they had a high Power 100 ranking because this indicates that they are popular and highly prominent in their sport and would likely have high visibility for their endorsements. The index was created on the basis of the following variables: number of food endorsements, number of food advertisements, average NPI (nutrition) score, and Power 100 ranking. To generate the index score we first converted all 4 of the index variables, which were measured on different scales, to *z* scores to standardize the values. Because no *z* score could be a negative value, we added 0.87 to the lowest *z* score of -0.86 to ensure it was above zero. The *z* scores were then averaged, and that average was multiplied by 100 and divided by 2. Finally, we added 20 to that value to create an index scale from 1 to 100. Because financial data for endorsement contracts are unavailable, this index only

reflects impact from the 4 variables stated above.

RESULTS

Of the 512 brand/product endorsements associated with the 100 athletes in the sample, sporting goods/apparel was the largest category (28.3%), followed by food/beverage brands (23.8%) and consumer goods (10.9%). There were 122 food/beverage brand endorsements across all the athletes in the sample. LeBron James (National Basketball Association), Peyton Manning (National Football League), and Serena Williams (tennis) had more food/beverage endorsements than any other athletes (Table 1). The National Basketball Association was associated with the most athletes who endorse food (n = 18 of the 100 athletes in the sample), followed by the National Football League (n = 12), and Major League Baseball (n = 10).

Nutritional Quality of Athletes' Products

Sports beverages were the largest category of athlete endorsements (n = 39), followed by soft drinks (n = 21) and fast food (n = 16). The products appearing in tennis star Serena Williams' advertisements had the worst NPI scores, whereas Ryan Howard (professional baseball player) endorsed the fewest energy-dense, nutrient-poor food products in his advertisements. Seventy-nine percent of 62 food products appearing in athlete-endorsement advertisements in the sample were energy dense and nutrient poor according to the NPI scores. Ninety-three percent of the 46 beverages that appeared in athlete-endorsement advertisements received 100% of their calories from added sugars.

Number of Commercials and TV Advertising Exposure

There were 109 total athlete-endorsement advertisements that appeared in AdScope during 2010, and these advertisements included TV commercials, radio advertisements, and newspaper and magazine advertisements (Table 2). Peyton Manning (professional American football player) had more advertisements for food or beverage products than any other athlete in the sample (n = 25), followed by Ryan Howard (professional baseball player) (n = 21) and Serena Williams (professional tennis player) (n = 13). Nielsen data were available for 28 of the 48 TV food commercials featuring the 10 athletes in our sample who had the most food-endorsement contracts. Adolescents aged 12 to 17 years saw the most food commercials with athlete endorsers during 2010 (n = 35.1 commercials), followed by adults (n = 32.5 commercials) and children (n = 21.0 commercials). Data were unavailable for the amount of exposure generated by the 61 advertisements from newspapers, magazines, and radio. Based on the athlete endorsement index (measured from 0 to 100, with lower scores reflecting worse food marketing and nutrition impact scores), Peyton Manning (score of 28.9), Serena Williams (score of 32.4), and LeBron James (score of 42.8) had the most negative food marketing and nutrition impact scores (Table 3).

TABLE 1 Athletes Ranked by Number of Food or Beverage Brand Endorsements

Endorsed Food and/or Beverage Brands	Sports Organization/Team	Athlete Name
Sprite, Glaceau (Vitaminwater), McDonald's, Powerade	NBA/Miami Heat	LeBron James
Gatorade, General Mills Wheaties Fuel Cereal, Nabisco, Pepsi-Cola	NFL/Denver Broncos	Peyton Manning
Kraft Oreo, Gatorade, Nabisco 100 Calorie Pack Snacks, Got Milk?	WTA tennis	Serena Williams
Glaceau (Vitaminwater), McDonald's, Powerade	NBA/LA Clippers	Chris Paul
Gatorade, Kemps, Pepsi-Cola	MLB/Minnesota Twins	Joe Mauer
Amp Energy, Mountain Dew (dewmocracy.com), Hellmann's Mayonnaise	NASCAR driver	Dale Earnhardt, Jr
Gatorade, Dempsters Bread, Tim Hortons	NHL/Pittsburgh Penguins	Sidney Crosby
Red Bull, Dew Tour, Dew Tour Wendy's Invitational Sponsored Event, Dew Tour Toyota Challenge (various sponsors for event)	Skateboarding	Ryan Sheckler
Burger King, Coca-Cola, McDonald's	NASCAR driver	Tony Stewart
Coca-Cola, America's Milk Processor, Nabisco (Oreos)	Speed skater	Apolo Anton Ohno
Subway, Powerade	MLB/Philadelphia Phillies	Ryan Howard

Source: Power 100[21] rankings and AdScope[33]. LA, Los Angeles; MLB, Major League Baseball; NASCAR, National Association for Stock Car Auto Racing; NBA, National Basketball Association; NFL, National Football League; NHL, National Hockey League; WTA, Women's Tennis Association.

DISCUSSION

These results reveal a high prevalence of food/beverage brand endorsements among professional athletes. LeBron James (basketball), Peyton Manning (football), and Serena Williams (tennis) had more food and beverage brand endorsements than any other athletes in the sample. When taking into account the nutrient quality of the products endorsed and the amount of advertising for each product, Peyton Manning, LeBron James, and Serena Williams are the highest contributors to the marketing of unhealthy foods. Food and beverage brands were the second-largest category of endorsements behind sporting goods, and most of these food and beverage brand endorsements were for sports beverages, soft drinks, and fast-food companies. In addition, most of the food and beverage products appearing in athlete-endorsement advertisements

TABLE 2 Professional Athletes' Endorsement Profiles Organized by NPI Scores for Food Products

Athlete Name	NPI Score for Food Products	Number of Food/Beverage Endorsement Contracts	Percentage of Total Endorsements That Are Food/Beverage Brands	Number of 2010 AdScope Ads	Power 100 Ranking
Ryan Howard	67.5	2	50.0	21	14
LeBron James	60.7	4	57.1	9	2
Chris Paul	54.0	3	27.3	3	44
Sidney Crosby	53.3	3	75.0	3	39
Peyton Manning	51.6	4	36.4	25	5
Tony Stewart	40.8	3	30.0	12	48
Joe Mauer	44.0	3	60.0	5	19
Apolo Anton Ohno	24.0	3	37.5	4	64
Dale Earnhardt, Jr	20.0	3	23.1	9	20
Serena Williams	12.0	4	33.3	13	16

TABLE 3 Athlete Endorsement Ranking

Athlete Name	Index Value
Peyton Manning	28.9
Serena Williams	32.4
LeBron James	42.7
Joe Mauer	66.5
Dale Earnhardt, Jr	67.8
Ryan Howard	71.3
Sidney Crosby	76.3
Tony Stewart	83.9
Apolo Anton Ohno	90.7
Chris Paul	100.0

The lowest index score indicates that the athlete has the highest Power 100 ranking, the highest number of advertisements and food endorsements, and the highest percentage of food endorsements compared with other endorsements. The lowest index score also indicates that the food endorsed was the least healthy in the sample.

featured energy-dense, nutrient-poor products.

AdScope marketing data indicate that food and beverage advertisements associated with professional athletes have far-reaching exposure, with ads appearing nationally on TV, the Internet, radio, and in newspapers and magazines. Serious concern has been raised about the marketing of unhealthy foods to children,[6] and the results of this study indicate that adolescents aged 12 to 17 years saw the most TV advertisements for athlete-endorsed food products.

These results support calls to address the use of professional athletes in food marketing. The promotion of energy-dense, nutrient-poor products by some of the world's most physically fit and well-known athletes is an ironic combination that sends mixed messages about diet and health. It is possible that food companies associate with athletes simply because they are celebrities, but research shows that athlete endorsements are associated with higher healthfulness ratings on the products they endorse.[19]

Tobacco companies had a long history of using athletes to promote products with significant health risks. Although tobacco certainly differs from food products in many ways, similarities have been drawn between the marketing practices of the tobacco industry and the food industry, and the use of athlete endorsements appears to be another parallel.[27] Baseball stars such as Babe Ruth, Joe DiMaggio, Ted Williams, and Lou Gehrig appeared in cigarette advertisements during the early 1900s.[28] It was not until the tobacco industry adopted the voluntary Cigarette Advertising Code in 1964 that it announced it would not depict well-known athletes in advertisements. In 2004, China's largest cigarette company signed a 21-year-old Olympic gold medalist hurdler to endorse their cigarettes in print ads and commercials.[29] Criticism from health advocates led Beijing TV to cancel the commercial and the company to cancel the campaign. It would now be a serious public relations liability for an athlete and the team he or she represents if the athlete endorsed cigarettes. With growing public pressure, such as criticism of the sponsorship of the 2012 London Olympics by McDonald's and Coca-Cola,[30–32] it may become a similar liability for athletes to endorse unhealthy foods and beverages.

One limitation of the current study is that we were only able to capture brand endorsements that were listed on the Power 100 report or found through AdScope's advertisement database. It is possible that the list of endorsements is not comprehensive and hence is an underestimate of total exposure. In addition, we evaluated endorsements for 1 year and did not capture endorsements held by athletes across their entire career. This limitation results in more conservative estimates of total athlete endorsements. Another limitation is that data were only available for 28 of the 48 TV advertisements associated with the top 10 athletes, which only enabled examination of 28 of the 109 total ads (across TV, radio, and the Internet) that were listed in AdScope. Therefore, these viewership data should be interpreted with caution given the limited amount of data available. Future research should examine how professional athletes' endorsement of food products affects consumption, attitudes toward food and beverage brands, and intentions to purchase athlete-endorsed products.

The results from this study should inform the development of global policies to address the use of athletes

in food marketing. Professional athletes have an important opportunity to promote the public's health, particularly for youth, by refusing endorsement contracts that involve promotion of energy-dense, nutrient-poor foods and beverages. In addition, countries worldwide should consider policies that would restrict food advertisements featuring professional athletes in youth-targeted media.

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