

28

MEDIA AND OBESITY

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The developed world is experiencing an unprecedented childhood obesity crisis in which nearly 20 percent of children living in both the United States and Europe are obese (World Health Organization, 2012). Serious health problems associated with obesity (e.g., diabetes, heart disease, stroke, and certain cancers) have sparked projections that US children will have shorter life spans than their parents for the first time in modern history (Olshansky et al., 2005). The global prevalence of childhood obesity has largely been attributed to environmental factors, such as media exposure. This chapter examines the relationship between media exposure and childhood obesity, including the mechanisms by which media may contribute to or curtail the obesity epidemic.

Media's contribution to childhood obesity

Longitudinal studies have linked media exposure to childhood adiposity. An analysis of a nationally representative sample of UK children revealed that heavy media exposure during childhood predicted higher body mass indices at the age of 30 (Viner and Cole, 2005). For each additional hour of television consumed on the weekend at age 5, the risk of adult obesity increased by 7 percent. Although the relationship between media exposure and adiposity is complex, scholars have proposed five major mechanisms by which media may contribute to childhood obesity. These are (1) food advertising's influence on increased caloric intake, (2) overeating during exposure, (3) lower metabolic rates during media exposure, (4) increased sedentary behavior during exposure, and (5) media disrupting sleep patterns (American Academy of Pediatrics, 2011).

Food advertising

Among the mechanisms by which media exposure could contribute to childhood obesity, food advertising has received the most attention and empirical support. The US food industry spends approximately \$2 billion per year advertising to children (Teinowitz, 2008), nearly triple what the United States Department of Agriculture spends on nutrition education and promotion (Institute of Medicine, 2006).

Content analyses have consistently found that most televised food advertisements targeted to children fall into one of five categories: (1) sugar-coated cereals, (2) candy/sweets, (3) salty

Media and obesity

snacks, (4) soft drinks, and (5) fast-food restaurants (Institute of Medicine, 2006). One content analysis of over 50,000 food advertisements showed that 98 percent of food advertisements viewed by children were for foods high in fat, sugar, or salt (Powell et al., 2007). Stitt and Kunkel (2008) found that only 3 percent of advertised foods on US television fit the nutritional guidelines from the Department of Health and Human Services for high-nutrient/low caloric foods that should be consumed often. The over-abundance of television advertisements for low-nutrient foods is not unique to the United States; 84 percent of food advertisements targeting New Zealand children promoted low-nutrient foods (Wilson et al., 2006).

The increasing popularity and accessibility of the internet is prompting food marketers to expand to online venues to reach children. Content analyses of online media reveal similar patterns in food marketing to those of television. Seven of the ten most popular children's websites analyzed by Alvy and Calvert (2008) contained food ads, most often for foods high in calories and low in nutritional value. The media advertising landscape, then, is saturated with foods that are low in nutritional value. When a child picks up a remote control or double-clicks a mouse, the child will likely be exposed to foods that are high in fat, sugar, or salt. Children, particularly the youngest ones, may be especially vulnerable when exposed to marketed food products because they do not understand the persuasive intent of commercial content (Calvert, 2008).

Systematic reports by the National Academies (Institute of Medicine, 2006), the UK Food Standards Agency (Hastings et al., 2003), and the European Commission (Matthews et al., 2005) concluded that the kinds of advertisements directed at children increase the risk for adiposity, that food marketers spend considerable monies distributing these kinds of commercials, and that children before age 8 have considerable difficulty understanding commercial intent. Specific marketing techniques, including branded characters and product placement, are often used to blur the lines between entertainment and advertising to child audiences, thereby increasing product demands and purchases while fostering brand loyalty (Calvert, 2008).

Marketing food to children

Branded characters are media personalities created by a company to promote a specific product (e.g., Tony the Tiger promotes Kellogg's Sugar Frosted Flakes) or already popular licensed characters that are used for marketing (e.g., Shrek promotes McDonald's Happy Meals). Children 2 to 6 years of age recognize branded characters and associate them with products (Calvert, 2008). Associating a branded character with a food product can create positive feelings toward the food, even influencing perceptions of taste. In one experimental study, children who saw popular media characters on a cereal box liked the taste of the breakfast cereal more than children who saw a nearly identical cereal box without those media characters (Lapierre et al., 2011).

Product placement surreptitiously integrates brands into entertainment media content to increase brand awareness. Exposure to product placement can increase a consumer's familiarity with a product, resulting in an affinity for a given brand (Calvert, 2008). One of the most successful food product placements occurred when the film character E.T. ate Reese's Pieces, as national sales of the candy subsequently increased nearly 66 percent (Tylee, 2005). Product placement is increasingly prevalent in today's media landscape. For example, children view about five times as many product placements as they do traditional television advertisements for Coca-Cola products (Speers et al., 2011).

Advergaming incorporate branded products into the content of online games to foster favorable attitudes toward products (Calvert, 2008). Advergaming generally promote poor-nutrient

foods. The manufacturers of Cheetos, for example, allow visitors to their website to choose an allegiance and fight the ultimate battle: crunchy vs. puffy cheese curl snacks. On ClubBK, Burger King's website for children, users create avatars that can be employed each time they play advergaming. Purchasing food products at Burger King gives children points they can redeem for virtual accessories for their avatars. These accessories can then improve the child's game performance.

Viral marketing creates a "buzz" about products by encouraging individuals to pass on product information by word-of-mouth in an effort to maximize exposure to a promotional message (Calvert, 2008). Two fast-food chains, Wendy's and Burger King, recently created humorous web-videos with the intent to make them "go viral" and be passed on from person-to-person via the internet, especially among younger audiences (Howard, 2005).

Theoretical explanations for advertising and marketing effects

Several cognitive and behavioral theories are well suited to predict why children may be vulnerable to marketing techniques. Taken together, the cognitive and behavioral theoretical approaches reflect a common theme: young children have difficulty recognizing and understanding that the intent of commercial messages is to sell them products.

Classical conditioning describes the implicit and unconscious relation that develops between a stimulus and a response. In the case of food marketing, the advertisement can create positive emotional experiences that become associated with an actual product or with a branded character that represents that product (Calvert, 2008). For example, the positive associations found by Lapierre et al. (2011) between branded characters and perceptions of better cereal taste could be the result of associating positive feelings with the character.

According to **social cognitive theory**, children can learn behaviors by observing social models (Bandura, 2002). In order for a behavior to be cognitively acquired, a child must observe the behavior of others, learn the consequences of that behavior, and encode that information to determine the appropriateness of imitating the observed behavior in future situations. Behavior that is perceived as leading to reward is more likely to be imitated than behavior that is punished. For example, if children view a television commercial where other children are rewarded for eating a candy bar, the viewers may be more likely to imitate the observed behavior and request or purchase a candy bar for themselves.

The **information processing model** describes how stimuli are received, interpreted, stored, and retrieved (Calvert, 2008). In this model, the child has limited cognitive resources to deploy at any given time. For instance, when children play advergaming they must invest cognitive resources to win the game. As such, children may only process the advertising messages implicitly, making it difficult to simultaneously defend themselves against any embedded commercial messages. This distraction may be compounded by the emotional and entertaining experiences of gaming, which may decrease children's ability to build a rational defense against marketed products. Although it could be argued that the advertisement would go unprocessed, research supports that implicit processing through mere exposure can influence familiarity with a product and later preference for that product (Bornstein, 1989).

The **processing of commercialized media content model** proposes that significant pressures weaken individuals' defenses against advertisements throughout childhood and adolescence (Buijzen et al., 2010). Before age 5, children perceive advertisements primarily as entertainment, failing to understand their persuasive intent to sell. Due to limited cognitive ability, automatic responses to bright colors or lively music can create positive attitudes toward the advertised product. By middle childhood (ages 6–9), a child can understand the persuasive

Media and obesity

intent of an advertised message, though intent is still sometimes difficult to discern. During late childhood (ages 10–12), a child becomes more critical of persuasive messages, yet peer influences can interfere with the ability to defend against an advertisement. During adolescence (ages 13–16), youth gradually achieve the levels of processing needed to be critical of commercial messages, but peer pressure and identity formation can still influence adolescent consumers.

In the **persuasion knowledge model**, consumers use their knowledge of persuasive tactics to interpret, evaluate, and respond to advertisements (Friestad and Wright, 1994). Recognizing the intent of marketers allows consumers to critically analyze, discount, and reject the advertised message. However, if consumers are not consciously aware of the persuasive intent of an advertisement, their cognitive defenses are lowered and they will process the message differently. For example, the stealth marketing techniques used in viral marketing campaigns make consumers more vulnerable to the marketers' messages than a more obvious television commercial or print advertisement (Calvert, 2008).

Overeating during media use

Food marketing may influence the consumption of poor-nutrient foods, but mere exposure may prime an individual to eat simply by stirring up appetite. When people eat on television, those at home may do so too—likely due to priming appetitive thoughts or to imitation of observed on-screen food consumption. Studies in the United States and China support the claim that food advertising may facilitate overeating; specifically, exposing children to *any* food advertising increased consumption of food, including foods that were not even advertised to the children (Harris et al., 2009; Parvanta et al., 2010). More research is needed to empirically support the hypothesis that children overeat during media exposure.

Decreased metabolic rates

Do metabolic rates drop when children view television? One experimental study found that watching television reduced children's resting energy expenditure more than sleeping did, leading the authors to suggest that metabolic rates are lower when watching television than when engaged in other sedentary behaviors (Klesges et al., 1993). However, these results have not been replicated and have generally been considered a weak explanation for any relation between media exposure and childhood obesity.

Media as a sedentary behavior

Time is a zero-sum phenomenon; there are only 24 hours in a day. According to the displacement effect, the amount of time spent with media influences the total time available for other pursuits, including physical activity (Mutz et al., 1993). However, a meta-analysis yielded weak relations between television viewing and both body fat percentage and lower levels of physical activity among children, leading the authors to question a displacement effect (Marshall et al., 2004).

Media, sleep patterns, and obesity

Media exposure could also increase obesity because it disrupts children's sleep. Two relationships—one between shorter sleep duration and obesity (Cappuccio et al., 2008) and another between disrupted sleep patterns and media exposure (Owens et al., 1999)—have been documented. However, the causal patterns between media exposure, sleep patterns, and obesity are not well

Bond, Richards, and Calvert

understood. Time spent with media may displace time needed for sleeping, screens may emit light or noise that disrupts sleeping patterns, media may over-stimulate children immediately prior to scheduled sleep time, or perhaps children who are heavy media consumers spend less time in physical activity, subsequently leading to both obesity and sleep troubles (Wolfson and Richards, 2011).

Using media to promote health

Exposing children to healthy messages on television could influence their diet and levels of physical activity. Children who viewed public service announcements for healthy foods were more likely to select fruits and juice as snacks than children who did not view the announcements (Gorn and Goldberg, 1982). If marketing devices like product placement and branded characters can increase the desire for low-nutrient foods among youth, the same marketing techniques could potentially increase the desire for high-nutrient foods. For example, children who viewed a Popeye cartoon in the morning were more likely to select spinach for lunch than children who had not viewed the cartoon (Harris and Baudin, 1972), a finding consistent with social cognitive theory.

Product packaging also influences children's desires to consume high-nutrient foods, perhaps through positive associations with branded characters created through classical conditioning. When shown a chocolate bar/broccoli pairing with no branded characters on the packaging, 22 percent of 3- to 5-year-old children preferred the broccoli to the chocolate bar. When images of *Sesame Street's* Elmo character were on the vegetable's packaging, however, 50 percent of children chose the broccoli (Cole et al., 2010).

Online gaming experiences could modify the dietary habits of children by marketing healthier foods and beverages and by promoting active lifestyles. For example, 9- to 10-year-old children from low-income families were more likely to select healthy snacks after playing a PacMan advergame in which they gained points for consuming bananas and juice and lost points for consuming sodas and chips, when compared to children who played the advergame with the opposite incentives (Pempek and Calvert, 2009). This study suggests that persuasive gaming messages may improve children's health behaviors via classical conditioning.

Exergames are a physically active form of gaming increasingly considered an important venue for stemming the obesity epidemic. In a review of exergame studies involving children and adolescents, Biddiss and Irwin (2010) found that energy expenditure and heart rate during exergame play were on average 222 percent and 64 percent higher than resting rates, respectively. Cooperative exergame play with a peer has also been found to increase weight loss for overweight and obese adolescents (Staiano et al., in press).

Policy options and recommendations

Media literacy

Media literacy refers to the ability of individuals to critically analyze the production techniques and impact of media messages. Improving media literacy is a potential school-based method of reducing the influence of media on children's consumption of poor-nutrient foods and sedentary behaviors (Institute of Medicine, 2006). Although the results of several studies on media literacy interventions are promising (see Dennison et al., 2004), the efficacy of a national school-wide curriculum in the United States remains unknown.

Media and obesity

Practitioner training

The doctor's office may be fertile ground for providing parents with the knowledge and resources needed to understand the influence of media on health so that parents can regulate their children's media consumption. The American Academy of Pediatrics (2011) urges pediatricians to counsel parents on monitoring media accessibility (e.g., monitoring length of viewing, monitoring the content of programs viewed, removing televisions from children's bedrooms) because physicians are trusted sources of information.

Advertising restrictions

Sweden, Norway, and Finland have prohibited commercial sponsorship of children's television programs, Ireland has banned the use of cartoon characters to promote foods, and France has passed legislation requiring healthy messages to accompany advertisements for foods and beverages high in sugar, salt, or artificial color (Institute of Medicine, 2006). The primary argument for a federal ban on advertising poor-nutrient foods in the US lies in the cognitive inability of children to distinguish persuasive messages from entertainment, but advertising restrictions are complicated by the possibility of reduced financial support for children's programming and First Amendment protections for advertisers (Institute of Medicine, 2006).

Financial incentives

Tax revenues on poor-nutrient food ads could be used to fund nutrition education campaigns and programs (Institute of Medicine, 2006). Taxing food advertisements may be difficult, however, given the political unpopularity of taxes and the likely backlash from the food and beverage industry. For example, Coca-Cola spent nearly \$10 million to lobby against marketing restrictions and food taxes in 2010 (Center for Responsive Politics, 2011). Alternatively, governments could encourage the marketing of high-nutrient foods through subsidies.

Recommendations for future research

The most common method of quantifying media exposure is participants' self-reports of media use, but the validity of this method is questionable. Developing more valid measures of media exposure will allow researchers to analyze relationships between media exposure, obesity, and interventions more accurately. Vandewater and Lee (2009) note that new technologies, from wearable bands that would detect screen media use to mobile event recorders, may provide researchers with novel, innovative methods of tracking media consumption.

More experimental studies are needed, especially in the area of intervention and the influence of newer media. Studies in these areas could move the needle forward in our understanding of how media exposure contributes to obesity. They could also provide evidence for the establishment of media literacy and intervention programs as a way to stem the childhood obesity epidemic.

Children are living in a world where individuals with genetic dispositions toward obesity are very likely obese, largely because of an obesogenic environment that encourages the expression of genetic obesity (Wadden et al., 2002). As such, assessments of mediators and moderators in the relationship between media exposure and childhood obesity are also needed.

Race is a possible moderating variable that has been understudied. African American children spend more time with media than Caucasian children (Rideout et al., 2010) and have higher rates of obesity than Caucasian children (Anderson and Whitaker, 2009). Studies also demonstrate that

television programming popular with African American audiences is more likely to contain low-nutrient food advertisements than television programming popular with general audiences (Tirodkar and Jain, 2003). However, the role of race as a moderator in the relationship between television exposure and adiposity has yet to be strongly supported by empirical evidence.

Conclusions

Obesity rates continue to escalate throughout the developed world. Although eliminating the childhood obesity epidemic is a complex puzzle composed of many critical genetic and environmental influences, the influence of food advertising on children's preferences, requests, and consumption of high fat and low-nutrient foods has received considerable empirical support. The same marketing techniques used to sell unhealthy products, however, can also be used to improve the health of children and adolescents. Concerted long-term research, educational, and policy efforts are needed to transform the media environment from one that may be increasing obesity to one that produces healthy outcomes for the youngest and most vulnerable citizens of our world.

SEE ALSO in this volume chapter by Harrison and chapter by Jordan and Gilmore.

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Media and obesity

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