

Review Article

Food advertising to children and its effects on diet: review of recent prevalence and impact data

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In the context of a global obesity epidemic that has led to an unprecedented burden of non-communicable disease, the role of food and beverage marketing to children has been scrutinised in numerous studies. This article discusses the broader concept of an obesity-promoting food environment, before reviewing key, recent (last 5 yr) international research findings with regard to both the prevalence and effects of food and beverage advertising on children's intake. Evidence relating to the two main avenues of food marketing exposure, television, and the Internet, is explored and consideration is given to the differences in consumer experience of these types of promotion. Despite methodological differences and the varying population samples studied, the outcomes are broadly consistent – food advertising is prevalent, it promotes largely energy dense, nutrient poor foods, and even short-term exposure results in children increasing their food consumption. Policymakers are implored to drive forward meaningful changes in the food environment to support healthier choices and reduce the incidence of obesity and related diseases. This article aims at providing an overview of recent developments in this field. After limiting the search to the last five full years 2009–2014, we searched the following databases: Web of Knowledge and PubMed (keyword search terms used: television, Internet, new media, food advertising, food marketing, children, food intake, energy intake, consumption, and combinations of these terms). In addition we used the references from the articles obtained by this method to check for additional relevant material.

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The World Health Organisation (WHO) has stated that the commercial promotion of energy-dense, micronutrient-poor food and beverages ('food and beverages' hereafter referred to just as 'food') to children is a significant contributor to childhood obesity and chronic disease (1). Similarly, public health experts assert that a food environment characterised by ubiquitous, powerfully effective food marketing that encourages consumption of high fat, sugar, salt (HFSS) products is a leading cause of the obesity epidemic (2, 3). In the WHO European Region 21.3% boys and 23.3% of girls aged 5–9 yr are overweight (including obesity), and in the Americas the figures are 23.4% for boys and 22.6% for girls (4). In many cases, rates have more than doubled in the last 40 yr (4).

For young people, carrying excess weight is associated with a number of health-related and psychosocial consequences, both in the short and long terms. Children and adolescents who are obese are at increased risk of suffering psychological ill health (e.g., related to bullying and social isolation resulting in low self-esteem and poor quality of life), cardiovascular risk factors, asthma, chronic inflammation, orthopaedic abnormalities, liver disease, and diabetes (types I and II) (5).

Early intervention is crucial. Obese children become obese adults and such individuals have an elevated likelihood of suffering cardiovascular risk factors, diabetes, some forms of cancer, depression, arthritis, adverse socioeconomic outcomes, and premature

mortality (5). This burden of associated co-morbidities is not only damaging for the individual but can be an economic challenge for society as a whole. For example, obesity has been estimated to cost the UK National Health Service £1 billion annually, with the total impact on employment potentially costing up to £10 billion (6).

The role of food marketing in the development of youth obesity is a particular concern given that children are preferentially targeted by marketers (7). This is because they beneficially affect product sales in three ways: they are independent consumers (with pocket money often spent on snacks and confectionery), they have significant influence over family purchases, and they are also future adult consumers whose brand loyalty, if established in youth, can be highly financially rewarding for the company over the lifespan (8).

Food marketing creates demand for both highly palatable foods and, notably, highly appealing brands. The term 'brand' can be defined as 'a name, term, sign, symbol, design, or a combination of these, that identifies the goods or services of one seller or group of sellers and differentiates them from those of the competition' (9). Branding is a critical aspect of advertising, particularly for children and young people; the majority of child-oriented food advertisements take a branding approach (10). Television advertising is thought to be very effective at building strong brands (11). Of all commodities, food is one of the most highly branded items, with over 80% of US grocery items being branded (8). This level of branding of food products lends itself well to major advertising campaigns, and food manufacturers carry out advertising activity with the aim of building brand awareness and brand loyalty as there is a belief that brand preference precedes purchase behaviour (8). Brand preference is thought to be developed through a number of associations fostered between the brand and the consumer, such as 'need association' (repeatedly linking the product with a particular need, thus linking the two concepts in the consumer's mind via conditioning) and 'behaviour modification' (conditioning consumers to buy the brand by the manipulation of cues and rewards) (12).

Indeed, there are a number of routes via which marketing is thought to affect dietary health including influencing food preferences and choices, brand and product attitudes, purchase intentions etc. (see reference 13 for an excellent review). However, with a view to brevity and clarity, this article will focus solely on effects on food intake as this is arguably the most pertinent outcome measure for links to weight gain and therefore risk of suffering diabetes and other obesity-related co-morbidities. We will consider advertising impact on both the quantity (amount) and quality (relative intakes of healthy vs. unhealthy) of food intake where possible.

Therefore, we review recent developments in research exploring the issue of food marketing to children, with a focus on children's exposure to food advertising and also the power of that exposure to influence their food intake.

The obesogenic environment

The obesogenic environment has been defined as 'the sum of influences that the surroundings, opportunities, or conditions of life have on promoting obesity in individuals or populations (p. 564)' (14), and a large body of literature suggests that current obesity levels are the result of a normal human response to the obesogenic environment that exists in most developed countries (15). Indeed, the dramatic rises in obesity rates observed in the past few decades imply that changes in body weight are largely due to environmental, rather than genetic, causes (16). The most prominent environment drivers of obesity are thought to be within our food system, where there exists an increased supply of cheap, palatable, and energy-dense nutrient-poor foods which are readily accessible and increasingly promoted (15).

Although this article will focus on the food promotion element of this relationship, it is useful to also briefly consider the literature relating to individual and societal accessibility to food as this is critically important to our understanding of the pathways through which marketing may operate. The past decade has seen consumption of food away from the home increase by 29% in the UK (17) while the number of fast food outlets has also seen considerable growth (18). However, studies aiming to explore how particular obesogenic food environments (e.g., areas such as cities, school, and communities) may promote poor diets and weight gain have considered both the unavailability of healthy foods and abundance of unhealthy food outlets, and have often reported contradictory findings (19–21). Indeed when considering unhealthy food outlets, a review of studies into exposure and body weight found fewer than half reported positive associations (22). Even fewer studies reported associations with unhealthy dietary outcomes (22, 23). However one recent UK study into links between environmental exposure to takeaway food outlets found that exposure in home, work, and commuting environments collectively was significantly associated with marginally higher (in magnitude) consumption of takeaway food, increased body mass index (BMI) and greater odds of obesity (19).

Perhaps the most consistent evidence into food accessibility playing a role in determining body weight comes largely from the United States, with studies suggesting that greater availability of healthy foods and healthier food outlets are associated with lower obesity rates

(24, 25) and increased consumption of healthier foods (26). Researchers posit that methodological issues (e.g., use of brief dietary assessments) may hamper this literature resulting in false findings and reduced power to distinguish associations (19, 23). Furthermore, differences in food environments by country (e.g., cultural, environment and socioeconomic factors) limit generalisability of data to regions other than where studies are conducted (27). Thus research into accessibility of foods remains challenging and, as it stands, the evidence base is not substantial enough to drive government policy intervention towards modifying obesogenic neighbourhoods (19). However, research studying the promotion of foods is perhaps more consistent and clear cut. This will now be explored.

Food marketing and media: exposure

Food and beverage advertisers spend in the region of \$15 billion each year targeting the US youth market alone (28), and therefore it is perhaps unsurprising that children can be exposed to marketing through an abundance of avenues (29), including event sponsorship (30), outdoor advertising (31), magazines (32, 33), and at point of sale in retail environments (34) (Fig. 1). However, research into food advertising and its effects has tended to focus on traditional broadcast media (primarily television) and, more recently, new non-broadcast media avenues (primarily the Internet and social media) as being most important in terms of reach and impact and therefore this article will focus on these two methods.

Television offers one of the first mediums through which a child will encounter commercial food promotion (35) and findings from a survey by the UK broadcast regulator shows that television is the media device that would be most missed by children and adolescents (36). Despite the increasing availability of other options, television is still the media activity 5–15 yr olds would prefer to do when given the choice and as such more time is spent watching television every week (an average of 14.6 h) than undertaking any other media activity (36). Thus, television remains the chief medium for food and drink advertising globally (37).

A 2010 study (37) provides a global perspective on the prevalence of television food advertising to children, with the inclusion of data from 13 research groups covering Australia, Asia, Western Europe, and North and South America. Overall, food advertisements comprised 11–29% of all advertisements analysed, but of those, between 53 and 87% represented foods that were high in undesirable nutrients, including fat, sodium, or energy. In Germany, the United States, and Canada these ‘non-core’ foods accounted for greater than 80% of all foods advertised on television. Across the sample non-core food advertisements were more prevalent at times when higher

numbers of children would be watching television (peak viewing times) (37). In an extension of this study design to further explore the UK landscape, we studied over 5000 h of commercial programming on channels popular with young people and found that 12.8% of all advertisements were for food (with higher rates during peak vs. non-peak child viewing periods) and the majority were for non-core, unhealthy foods (38).

A US study used television ratings data of 2003, 2005, 2007, and 2009 to analyse the nutritional content of foods advertised to children across this time period (39). This analysis showed that while exposure to unhealthy food and beverage product promotions fell, exposure to fast food advertisements actually increased such that overall there was no notable improvement in the nutritional content of advertisements viewed by children. A more recent study by the same authors notes that the situation had not substantially improved by 2013 (40) despite the intervening emergence of the Children’s Food and Beverage Advertising Initiative (CFBAI; <http://www.bbb.org/council/the-national-partner-program/national-advertising-review-services/childrens-food-and-beverage-advertising-initiative/>) in which several leading consumables companies pledged to market their products to children responsibly.

However, food advertising is now far more than just ‘spot ads’ on television. The term ‘new media’ refers to digital technologies, including the Internet and mobile devices, that are ever-changing and expanding (41). Recent years have seen children and young people becoming increasingly competent and consistent users of the Internet and other digital media (42) and food and beverage companies have taken advantage of this trend. Child-targeted food marketing has firmly established itself amongst commercial websites, third-party Internet advertising (i.e., placement of banner advertising on other companies’ websites), online videos, social media, and advergames (advertising embedded within online games) (43). On Facebook, for example, estimates of the biggest advertising expenditures in 2013 included several major global food and beverage companies (such as Nestle, Coca-Cola, and Starbucks) (44). In a recent study, Kelly and colleagues (45) analysed the marketing techniques used by the most popular food and beverage brand Facebook pages in Australia (including Subway and Coca-Cola). They found that many were unique to social media in that they could directly increase consumer interaction and engagement (and in some instances, even facilitate product purchase directly), with adolescents amongst those seemingly most receptive to this type of content.

Other content analyses of online food and beverage marketing to children have also noted the pervasiveness of the promotion of energy dense, nutrient poor foods by a range of persuasive methods. In a

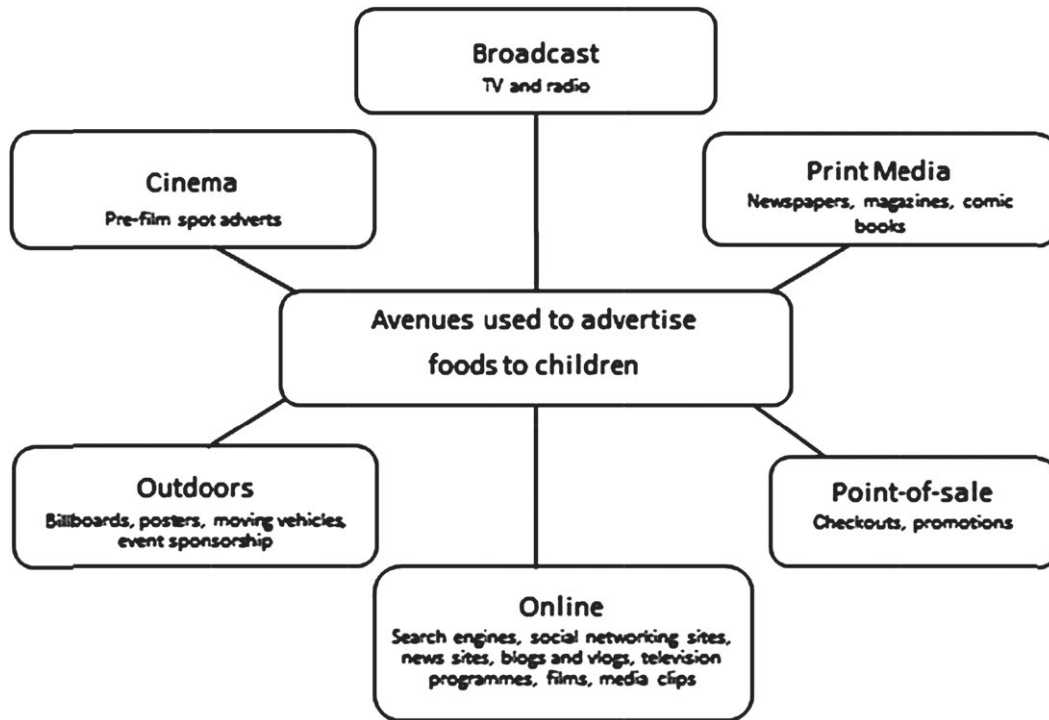


Fig. 1. A representation of some of the main avenues through which children are exposed to food advertising.

study linking television and Internet marketing [as is increasingly the case in marketing strategies, with shifts towards more integrated marketing communication frameworks (46)], Culp et al conducted a content analysis of websites that had been advertised on Cartoon Network and Nickelodeon (47). They examined 290 web pages across 19 Internet sites and found that games, appearing on 81% of websites, were the most predominant promotion strategy used and all games had at least one brand identifier (e.g., a logo). In addition, their analysis found that a child would be exposed to an average of just one ‘healthful’ message for every 45 exposures to brand identifiers (47). In another study, it was found that of the 24 purposively sampled websites (sponsored by 10 companies that promote products to children), over 80% targeted children below the age of 12 (48). The marketing techniques used included free website membership (63% of sites), leaderboards (encouraging prolonged and repeated visits, as well as peer competition, 50%), advergaming (79%), and branded downloadable content (76%). The websites evaluated all belonged to companies who were signatories of the aforementioned self-regulatory initiative (CFBAI). Another study also found that there were no statistically significant differences in the presence of marketing features or the number of those features on websites that were or were not covered by a similar Canadian initiative (although signatory company sites had more healthy lifestyle messages and child protection features than the non-signatory sites) (49).

Of course, new media varies from traditional forms of marketing in many respects (41). Indeed research demonstrates that new media marketing facilitates peer endorsement of, and personal relationships with food and beverage brands (50). These qualities are extremely effective at strengthening brand awareness and encouraging product purchases (51). Additionally, children have been found to have far lower recognition of advertisements on webpages than they would for identifying television advertisements at the same age (52) while advergaming further increase difficulty in recognising advertising messages.

Food marketing and media: power to influence food intake

Research exploring the impact of food marketing on children has tended to focus on responsiveness to television advertisements or to food brand sponsored Internet advergaming. The differences between the two are readily apparent. Advergaming offers much greater interactivity and is immersive, whereas television is not, but the games are also typically very simple and 2D in nature so television advertising could be argued to make up for the lack of interactivity by virtue of the sophisticated and realistic virtual worlds that can be created on screen (53). A recent study found that both approaches improved brand attitudes to a similar degree and therefore that the two could be considered as equals in terms of persuasive effect (53).

The impact of television food advertising on food intake in children has been the focus of several experimental research papers over the last four decades, from the earliest papers of Gorn and Goldberg (54) and Jeffrey et al. (55) to a renewed interest nearly 25 yr later with Halford et al's series of studies (56–58). In the 5-yr time frame of particular interest to this article, three relevant studies have been published, each demonstrating that exposure to television food advertising increased food intake in children.

In a US study (59) a total of 118 children (across two studies, 7–11 yr, 62 male) were shown a cartoon that either included food advertising or other (non-food) advertising. Children were given a snack while watching, and those who viewed the food advertising consumed 45% more of the snack than those who saw the non-food advertising. Following this, Dovey et al. (60) exposed 66 children (5–7 yr, 34 male) to unhealthy food advertisements, healthy food advertisements, and toy (control) advertisements in a within-subjects design. Children were additionally categorised as either high or low on a food neophobia scale (measuring their 'reluctance to eat, or avoidance of, new foods', p. 441). Food advert exposure (whether it was for unhealthy or healthy products) increased highly neophobic children's intake of foods at a subsequent *ad libitum* snack opportunity by 11% (47 kcal), whereas low neophobic children ate 14% more following the unhealthy adverts only (relative to control). Healthy food adverts did not increase children's consumption of healthy foods but low neophobic children did eat less chocolate in this condition.

Although designed to explore the influence of a celebrity endorser over intake of a particular endorsed brand of food, in a recent study we also demonstrated the impact of television food advertising on intake (61). A total of 181 children (8–11 yr, 90 male) viewed one of the following videos embedded within the same cartoon: (i) an advertisement for the endorsed brand of crisps (potato chips), (ii) an advertisement for another snack item, (iii) television footage of the celebrity endorser in a non-promotional context, or (iv) a non-food advertisement. Subsequently children were invited to eat *ad libitum* from two bowls of crisps, one labelled as the endorsed brand and the other 'supermarket brand' (in fact, both bowls contained the same crisps, the endorsed brand). In both the food advertisement conditions (endorsed crisp and other snack food advertisement), mean intake was greater than for the non-food advertisement group (although for the non-endorsed snack item this difference was not statistically significant).

The evidence base regarding the effects of advergames on actual food intake is still in its infancy, but some papers have emerged in recent years that begin to shed light on the impact of this form of

marketing. Harris et al. (62) exposed 152 US children (7–12 yr; 80 male) to either unhealthy, healthy, or non-food computer games in a randomised between-subjects design and then presented the participants with healthy, moderately healthy, and unhealthy snack foods for *ad libitum* consumption. After playing the unhealthy advergame, children increased their intake by 56% (77 kcal) compared with the healthy advergame and 16% (25 kcal) compared with the non-food control game. The authors noted that while playing the healthy game did increase fruit and vegetable consumption, only one website in their prior content analysis actually promoted healthy foods. Folkvord et al. (63) used a similar approach to study 270 Dutch children (8–10 yr; 139 male) and found that, like Harris et al., playing an unhealthy food advergame increased children's food intake compared with the healthy game (7.1% or 13 kcal) and the non-food game (53.0% or 68 kcal). However, in their study, playing the healthy advergame also increased total energy intake relative to control (by 42.8% or 55 kcal), with no significant increase in fruit consumption, indicating that children simply responded to the food cues regardless of the advertised brand or product type (63).

More recent research has sought to identify mechanisms through which advergames may increase consumption and it has been postulated that the personality construct impulsivity ('the tendency to control, think and plan insufficiently' p. 1008) may play a role (64). A sample of 261 Dutch children (7–10 yr; 131 male) categorised as either high or low on impulsivity were exposed to an advergame promoting either energy-dense snacks or non-food products. In an additional manipulation, half of the children in each group were rewarded to refrain from eating (an inhibition task) while the others were not. In this study, food intake was greater following the food advergame and rewarding children to refrain from eating did decrease caloric intake – except in highly impulsive children who had played the food advergame. The authors interpret this as demonstrating that the promotional influence of advergames is strong enough to overrule attempts at inhibition, suggesting that even children who consciously seek to maintain healthy behaviours may struggle to resist these impacts.

Summary and conclusions

The evidence base demonstrating that food advertising (and more widely, marketing) impacts upon children's eating behaviour is sizeable and growing. This article has reviewed evidence from just the preceding 5 yr, with a focus solely on children's exposure to food advertising via television and the Internet and analyses of the impact of exposure on food intake only. Even within this limited scope, the volume of research discussed

demonstrates that this is very much an active research area and it is evidently producing broadly consistent patterns across the world. Despite the introduction of various voluntary ‘self-regulatory’ regimes as well as statutory legislation in some territories (a discussion of which was beyond the remit of this article), it is evident that current approaches are not adequately tackling the ‘obesogenic food environment’. Food advertising still predominantly promotes the consumption of unhealthy foods. It is persuasive and engaging as it does so, and perhaps unsurprisingly, children respond accordingly. Food advertising can even act to overwhelm children’s ability to control themselves. The factors that influence children’s food selections and eating behaviours can have profound effects on diet both at critical stages of development and more generally across the lifespan, and therefore they play a crucial role in lifelong health and well-being. Policymakers need to consider how to effect real meaningful change in our food environment, including the culture of pervasively marketing unhealthy foods to minors, so that long overdue inroads into tackling the obesity pandemic can finally be made.

References

1. WHO. Marketing of food and non-alcoholic beverages to children. 2006. (available from <http://www.who.int/dietphysicalactivity/publications/Oslo%20meeting%20layout%2027%20NOVEMBER.pdf>)
2. BROWNELL KD, HORGAN KB. Food Fight: The Inside Story of the Food Industry, America’s Obesity Crisis, and What We Can Do About It. New York: The McGraw-Hill Companies, 2004.
3. IOM. Food Marketing to Children and Youth: Threat or Opportunity? Washington, DC: The National Academies Press, 2006.
4. World Obesity. Obesity Data Portal 2014 [20/01/2015] (available from http://www.worldobesity.org/site_media/library/resource_images/Childhood__Overweight__Obesity_by_Region_and_age_WO.pdf).
5. REILLY JJ, WILSON D. Childhood obesity. *Br Med J* 2006; 333: 1207–1210.
6. CRAIG R and SHELTON N (eds) (2009) Health Survey for England 2007. London: The Information Centre.
7. LINN SE. Food marketing to children in the context of a marketing maelstrom. *J Public Health Policy* 2004; 25: 24–35.
8. STORY M, FRENCH S. Food advertising and marketing directed at children and adolescents in the US. *Int J Behav Nutr Phys Act* 2004; 1: 3–19.
9. CHANG HH, LIU YM. The impact of brand equity on brand preference and purchase intentions in the service industries. *Serv Ind J* 2009; 29: 1687–1706.
10. CONNOR SM. Food-related advertising on preschool television: building brand recognition in young viewers. *Pediatrics* 2006; 118: 1478–1485.
11. HEATH R. Emotional engagement: how television builds big brands at low attention. *J Advert Res* 2009; 49: 62–73.

12. ALRECK PL. Strategies for building consumer brand preference. *J Prod Brand Manage* 1999; 8: 130–144.
13. CAIRNS G, ANGUS K, HASTINGS G. The extent, nature and effects of food promotion to children: a review of the evidence to December 2008. Prepared for the World Health Organisation. Institute for Social Marketing, University of Stirling & the Open University. Geneva, Switzerland: WHO Press, 2009.
14. SWINBURN B, EGGER G, RAZA F. Dissecting obesogenic environments: the development and application of a framework for identifying and prioritizing environmental interventions for obesity. *Prev Med* 1999; 29 (6 Pt 1): 563–570.
15. SWINBURN BA, SACKS G, HALL KD et al. The global obesity pandemic: shaped by global drivers and local environments. *Lancet* 2011; 378: 804–814.
16. SWINBURN BA, SACKS G, LO SK et al. Estimating the changes in energy flux that characterise the rise in obesity prevalence. *Am J Clin Nutr* 2009; 89: 1723–1728.
17. Office TSUC. Food: An Analysis of the Issues. Cabinet Office of the UK: London, 2008.
18. BURGOINE T, LAKE AA, STAMP E, ALVANIDES S, MATHERS JC, ADAMSON AJ. Changing foodscapes 1980–2000, using the ASH30 Study. *Appetite* 2009; 53: 157–165.
19. BURGOINE T, FOROUHI NG, GRIFFIN SJ, WAREHAM NJ, MONSIVAIS P. Associations between exposure to takeaway food outlets, takeaway food consumption, and body weight in Cambridgeshire, UK: population based, cross sectional study. *Br Med J* 2014; 348: g1464.
20. HÉROUX M, IANNOTTI RJ, CURRIE D, PICKETT W, JANSSEN I. The food retail environment in school neighborhoods and its relation to lunchtime eating behaviors in youth from three countries. *Health Place* 2012; 18: 1240–1247.
21. WILLIAMS J, SCARBOROUGH P, MATTHEWS A et al. A systematic review of the influence of the retail food environment around schools on obesity-related outcomes. *Obes Rev* 2014; 15: 359–374.
22. FLEISCHHACKER SE, EVENSON KR, RODRIGUEZ DA, AMMERMAN AS. A systematic review of fast food access studies. *Obes Rev* 2011; 12: e460–e471.
23. CASPI CE, SORENSEN G, SUBRAMANIAN SV, KAWACHI I. The local food environment and diet: a systematic review. *Health Place* 2012; 18: 1172–1187.
24. MORLAND KB, EVENSON KR. Obesity prevalence and the local food environment. *Health Place* 2009; 15: 491–495.
25. MORLAND K, DIEZ ROUX AV, WING S. Supermarkets, other food stores, and obesity. *Am J Prev Med* 2006; 30: 333–339.
26. AUCHINCLOSS AH, RIOLO RL, BROWN DG, COOK J, DIEZ ROUX AV. An agent-based model of income inequalities in diet in the context of residential segregation. *Am J Prev Med* 2011; 40: 303–311.
27. DURAN AC, DIEZ ROUX AV, LATORRE MDO R, JAIME PC. Neighborhood socioeconomic characteristics and differences in the availability of healthy food stores and restaurants in Sao Paulo, Brazil. *Health Place* 2013; 23: 39–47.
28. EGGERTON J. Food-marketing debate heats up; Congress to join FCC and FTC in pressing for action: Broadcasting and Cable; 2007 [20/01/2015] (available from <http://www.broadcastingcable.com/article/CA6444875.html>).

29. LINN S, NOVOSAT C. Calories for sale: food marketing to children in the twenty-first century. *Ann Am Acad Pol Soc Sci* 2008; 615: 133–155.
30. CLARK M, BROWNELL R. The Obesity Games. 2012. Sustain and the Children's Food Campaign (available from <http://www.sustainweb.org/publications/?id=237>)
31. BHARGAVA M, DONTU N. Sales response to outdoor advertising. *J Advert Res* 1999; 39: 7–18.
32. JONES SC, GREGORY P, KERVIN L. Branded food references in children's magazines: 'advertisements' are the tip of the iceberg. *Pediatr Obes* 2012; 7: 220–229.
33. NO E, KELLY B, DEVI A, SWINBURN B, VANDEVIJVERE S. Food references and marketing in popular magazines for children and adolescents in New Zealand: a content analysis. *Appetite* 2014; 83: 75–81.
34. CHAPMAN K, NICHOLAS P, BANOVIC D, SUPRAMANIAM R. The extent and nature of food promotion directed to children in Australian supermarkets. *Health Promot Int* 2006; 21: 331–339.
35. BOYLAND EJ, HALFORD JC. Television advertising and branding. Effects on eating behaviour and food preferences in children. *Appetite* 2013; 62: 236–241.
36. Ofcom. Children and Parents: media use and attitudes report. 2014 (available from <http://stakeholders.ofcom.org.uk/binaries/research/media-literacy/october-2013/research07Oct2013.pdf>).
37. KELLY B, HALFORD JCG, BOYLAND EJ et al. Television food advertising to children: a global perspective. *Am J Public Health* 2010; 100: 1730–1736.
38. BOYLAND EJ, HARROLD JA, KIRKHAM TC, HALFORD JCG. The extent of food advertising to children on UK television in 2008. *Int J Pediatr Obes* 2011; 6: 455–461.
39. POWELL LM, SCHERMBECK RM, SZCZYPKA G, CHALOUKKA FJ, BRAUNSCHWEIG CL. Trends in the nutritional content of television food advertisements seen by children in the United States. *Arch Pediatr Adolesc Med* 2011; 165: 1078–1086.
40. POWELL LM, SCHERMBECK RM, CHALOUKKA FJ. Nutritional content of food and beverage products in television advertisements seen on children's programming. *Child Obes* 2013; 9: 524–531.
41. KELLY B, VANDEVIJVERE S, FREEMAN B, JENKIN G. New media but same old tricks: food marketing to children in the digital age. *Curr Obes Rep* 2015; 4: 37–45.
42. RIDEOUT VJ, FOEHR UG, ROBERTS DF. Generation M2: media in the lives of 8–18 year olds. 2010 (available from <http://www.kff.org/entmedia/upload/8010.pdf>).
43. FABER RJ, LEE M, NAN X. Advertising and the consumer information environment online. *Am Behav Sci* 2004; 48: 447–466.
44. Edwards J. These are the 35 biggest advertisers on Facebook. 2013 [20/01/2015] (available from <http://www.businessinsider.com.au/top-advertisers-on-facebook-2013-11>).
45. FREEMAN B, KELLY B, BAUR LA et al. Digital junk: food and beverage marketing on Facebook. *AJPH* (2014); 104: e56–e64.
46. SHIMP TA, ANDREWS JC. Advertising, Promotion, and Other Aspects of Integrated Marketing Communications. Mason, Ohio: South-Western Cengage Learning, 2013.
47. CULP J, BELL RA, CASSADY D. Characteristics of food industry websites and "advergaming" targeting children. *J Nutr Educ Behav* 2010; 42: 197–201.
48. BRADY J, MENDELSON R, FARRELL A, WONG S. Online marketing of food and beverages to children: a content analysis. *Can J Diet Pract Res* 2010; 71: 166–171.
49. POTVIN KENT M, DUBOIS L, KENT EA, WANLESS AJ. Internet marketing directed at children on food and restaurant websites in two policy environments. *Pediatr Obes* 2013; 21: 800–807.
50. MANGOLD WG, FAULDS DJ. Social media: the new hybrid element of the promotion mix. *Bus Horiz* 2009; 52: 357–365.
51. SPROTT D, CZELLAR S, SPANGENBERG E. The importance of a general measure of brand engagement on market behavior: development and validation of a scale. *J Mark Res* 2009; 46: 92–104.
52. ALI M, BLADES M, OATES C, BLUMBERG F. Young children's ability to recognize advertisements in web page designs. *Br J Dev Psychol* 2009; 27: 71–83.
53. BELLMAN S, KEMP A, HADDAD H, VARAN D. The effectiveness of advergames compared to television commercials and interactive commercials featuring advergames. *Comput Human Behav* 2014; 32: 276–283.
54. GORN GJ, GOLDBERG ME. Children's responses to repetitive television commercials. *J Consum Res* 1980; 6: 421–424.
55. JEFFREY DB, McLELLARN RW, FOX DT. The development of children's eating habits: the role of television commercials. *Health Educ Q* 1982; 9: 174–189.
56. HALFORD JCG, GILLESPIE J, BROWN V, PONTIN EE, DOVEY TM. Effect of television advertisements for foods on food consumption in children. *Appetite* 2004; 42: 221–225.
57. HALFORD JCG, BOYLAND EJ, HUGHES GM, OLIVEIRA LP, DOVEY TM. Beyond-brand effect of television (TV) food advertisements/commercials on caloric intake and food choice of 5-7-year-old children. *Appetite* 2007; 49: 263–267.
58. HALFORD JCG, BOYLAND EJ, HUGHES GM, STACEY L, MCKEAN S, DOVEY TM. Beyond-brand effect of television food advertisements on food choice in children: the effects of weight status. *Public Health Nutr* 2008; 11: 897–904.
59. HARRIS JL, BARGH JA, BROWNELL KD. Priming effects of television food advertising on eating behavior. *Health Psychol* 2009; 28: 404–413.
60. DOVEY TM, TAYLOR L, STOW R, BOYLAND EJ, HALFORD JCG. Responsiveness to healthy television (TV) food advertisements/commercials is only evident in children under the age of seven with low food neophobia. *Appetite* 2011; 56: 440–446.
61. BOYLAND E, HARROLD JA, DOVEY TM et al. Food choice and overconsumption: effect of a premium sports celebrity endorser. *J Pediatr* 2013; 163: 339–343.
62. HARRIS JL, SPEERS SE, SCHWARTZ MB, BROWNELL KD. US food company branded advergames on the Internet: children's exposure and effects on snack consumption. *J Child Media* 2012; 6: 51–68.
63. FOLKVORD F, ANSCHUTZ DJ, BUIJZEN M, VALKENBURG PM. The effect of playing advergames that promote energy-dense snacks or fruit on actual food intake among children. *Am J Clin Nutr* 2012; 97: 239–245.
64. FOLKVORD F, ANSCHUTZ DJ, NEDERKOORN C, WESTERIK H, BUIJZEN M. Implusivity, "advergaming" and food intake. *Pediatrics* 2014; 133: 1007–1012.