

Exposure, power and impact of food marketing on children: Evidence supports strong restrictions

Dr Emma Boyland, University of Liverpool

Dr Mimi Tatlow-Golden, The Open University

Introduction

Restricting food marketing to children is a key policy issue across Europe. Numerous regulatory and self-regulatory approaches exist, but evidence suggests that sustained reductions in food marketing exposure, power or impact have not been consistently achieved by any such action to date. The current article provides a narrative review of the current literature, focusing on whether, how and to what extent children in Europe are affected by marketing (particularly for unhealthy foods) across both traditional broadcast and non-broadcast (digital) media. The evidence indicates that food marketing remains widespread and influential, and that new techniques employed in digital media can increase its power and reach. Despite the research challenges associated with understanding the nature and extent of children's exposure via personalised, targeted digital media marketing, emerging data indicate that strong policy action here is appropriate and warranted, as it is for television. This article seeks to set the context for the rest of this special issue.

The WHO Set of Recommendations [on the Marketing of Foods and Non-alcoholic beverages to Children](#)¹ argue that the effectiveness of marketing (i.e. the *impact* it has) depends upon both the level of *exposure* to marketing (the frequency and reach of promotions) and the *power* of that marketing to influence behaviour (the creative content of the marketing message, including the design, execution and use of persuasive techniques). That framework will be applied here to present the extant evidence base to support strong marketing restrictions, and highlight evidence gaps that may be impeding policy progress.

Marketing Exposure

Non-digital marketing exposure

Television is arguably one of the first avenues through which children will encounter commercial food promotion². UK surveys by the broadcast regulator Ofcom have found that television was the media device that both younger children and adolescents would miss the most³ and weekly hours of TV viewing have increased between 2007 and 2015 for UK children aged 5-7 years, with increases also seen for 3-4 year olds between 2013 and 2014⁴. It should be noted, however, that the practice of TV viewing has changed somewhat in recent years, with tablets rather than TV sets being increasingly used, particularly among younger children^{ibid}. Weekly TV viewing duration has only dipped slightly in the 8-11 and 12-15 year groups since 2007 (remaining at around 15 hours per week), despite large

¹ WHO (2010). Set of recommendations on the marketing of foods and non-alcoholic beverages to children. Geneva: World Health Organization. Accessible from www.who.int/dietphysicalactivity/publications/recsmarketing/en/index.html, accessed 25 January 2017.

² Boyland EJ, Halford JCG (2013). Television advertising and branding. Effects on eating behaviour and food preferences in children. *Appetite*, 62: 236-241.

³ Ofcom (2014). Children and Parents: media use and attitudes report. Available from <https://www.ofcom.org.uk/research-and-data/media-literacy-research/children/children-parents-oct-14>, accessed 24 January 2017.

⁴ Ofcom (2015). Children and Parents: media use and attitudes report 2015. Available from https://www.ofcom.org.uk/data/assets/pdf_file/0024/78513/childrens_parents_nov2015.pdf, accessed 25 January 2017).

concurrent growths in digital media use^{ibid}. Therefore, although many other forms of advertising exposure clearly exist (including digital (see later), event sponsorship, outdoor advertising, magazines, and point of sale in retail environments), research into food advertising prevalence has tended to focus on traditional broadcast media, primarily television, as the chief medium for food and drink advertising globally⁵.

A 2010 global study of television food advertising on the commercial channels most watched by children featured several European countries (the UK, Germany, Italy, Greece, Sweden, and Spain)^{ibid}. Results showed that overall, food advertisements comprised 11-29% of all advertisements broadcast, and of those, between 53-87% were for foods that were high in undesirable nutrients such as fat, sodium or energy. In Germany, these 'non-core' foods accounted for close to 90% of all foods advertised on television. Although this study speaks to children's *potential* rather than *actual* exposure, it was found that non-core food advertisements were more prevalent at times when higher numbers of children would be watching television (so-called 'peak times' based on typical viewing patterns for each country)^{ibid}. The findings of the largest European study of this kind to date (analysing over 5000 hours of commercial programming on channels popular with young people in the UK)⁶ were consistent with this: higher rates of food advertising were found during peak child viewing periods, and the majority of foods advertised were non-core, unhealthy foods. A study of Spanish television in 2012 found that food and beverage advertisements comprised 23.7% of all advertisements shown, and of these, over 60% were for unhealthy products⁷. Similarly, a recent study in Slovenia⁸ found that 96% of food advertisements shown during children's viewing hours (peak times for children aged 4-9 years) should not be permitted according to the WHO Europe profile model⁹. Finally, even in jurisdictions where statutory regulation curbs HFSS television advertising directed at children, children may continue to view substantial amounts of HFSS advertising. For example, in Ireland, HFSS advertising is not permitted during programming determined to be directed at children; however, analysis of advertising shown at children's actual peak viewing times indicated that 72% of food advertising is for products not permitted to be advertised to children, according to WHO recommendations^{24,10}.

Another way of determining likely advertising exposure is to consider how much the food industry is spending on marketing activity. Figures for advertising expenditure are difficult to come by for much of the European Region; however, Western Europe is thought to be the world's third largest advertising market, with estimates suggesting US \$100 billion would be spent in 2016 in this area alone¹¹. Increasing proportions of that spending is accounted for by digital advertising, which will be

⁵ Kelly B, Halford JCG, Boyland EJ et al (2010). Television food advertising to children: a global perspective. *American Journal of Public Health*: 100: 1730–1736.

⁶ Boyland EJ, Harrold JA, Kirkham TC, Halford JCG (2011). The extent of food advertising to children on UK television in 2008. *International Journal of Pediatric Obesity*: 6: 455–461.

⁷ Royo-Bordonada MA, Leon-Flandez K, Damian J, Bosqued-Estefania MJ, Moya-Geromini MA, Lopez-Jurado L (2016). The extent and nature of food advertising to children on Spanish television in 2012 using an international food-based coding system and the UK nutrient profiling model. *Public Health*, 137: 88-94.

⁸ Korosec Z, Pravst I (2016). Television food advertising to children in Slovenia: analyses using a large 12-month advertising dataset. *International Journal of Public Health*, 61(9): 1049-1057.

⁹ WHO. WHO Regional Office for Europe nutrient profile model. Copenhagen 2015. Accessible from <http://www.euro.who.int/en/health-topics/disease-prevention/nutrition/publications/2015/who-regional-office-for-europe-nutrient-profile-model-2015>.

¹⁰ Tatlow-Golden, M., Murrin, C., Bergin, R., Kerr, M. O'Brien, S. & Livingstone, B. (2016). Creating good feelings about unhealthy food: Children's 'advertised diet' on the island of Ireland in a climate of regulation. *Irish Journal of Psychology*, DOI: 10.1080/03033910.2016.1194770

¹¹ Western Europe Digital Ad Spending [online press release]. New York, NY, eMarketer, 22 November, 2016 (<https://www.emarketer.com/Report/Western-Europe-Digital-Ad-Spending-Outlays-Will-Pass-35-Billion-2016-Growth-Slowing/2001906>, accessed 24 January 2017).

discussed in the next section. However, although there is some decline in spending in TV advertising – as a proportion of overall cost, this does not mean that the quantity of advertising has been reduced – rather this is likely to reflect the lower cost of such advertising as a result of proliferation of TV channels¹². Indeed for the UK, TV impacts (one person seeing one advertisement) increased by 21% in four years (from 790 billion in 2006 to 956 billion in 2010) despite falls of over 50% in advertising expenditure across the major categories in that time^{ibid}.

Digital marketing exposure

Advertising and marketing have been transformed by digital technologies, including with the development of increasingly personalised advertising. A “tsunami” of personal online data¹³ such as users’ browsing activity, devices and networks used, geo-locations, “likes” and other activities in digital social networks^{14,15} is gathered by an extensive advertising ecosystem that closely profiles individual users and then targets them with marketing most closely aligned to their demographics, interests and preferences^{ibid,13}. Although the USA’s Children’s Online Privacy Protection Act (COPPA)¹⁶, the de facto rule governing privacy and data collection from children internationally, aims to protect children from such activities, its impact appears weak. Multiple studies, including the EU Kids Online series^{15,17}, report that the Internet platforms children visit most are not child-directed but are those providing content for mixed ages, like Google, Facebook, Instagram and YouTube – meaning that children of most ages are vulnerable to these practices. COPPA requires verifiable parental consent for the collection of personally identifiable information from children under 13 years yet, as one of COPPA’s original author’s notes, this parental safeguard is “increasingly ineffective” (p.780)¹⁸. Children often lie about their age to sign up for digital media services, frequently assisted by parents^{19,20} who “cannot be expected to understand the sophisticated and often opaque operations employed in today’s state-of-the-art digital marketplace, or the risks posed by them”³³ [p. 780]. For example, 78% of 10–13-year-olds in the United Kingdom report having a social media account (49% Facebook; 41% Instagram)²¹, despite the minimum age for these networks (as stated within the platform terms and conditions) being 13 years.

Furthermore, although COPPA, since 2013, does not permit tracking across platforms with persistent identifiers, geo-location or behavioural advertising³¹, data indicate that this is poorly implemented: a

¹² Marketing of foods high in fat, salt and sugar to children: update 2012–2013. Geneva: World Health Organization; 2013 (http://www.euro.who.int/_data/assets/pdf_file/0019/191125/e96859.pdf, accessed 24 January 2017).

¹³ O’Neal S (2016). The personal-data tsunami and the future of marketing. A moments-based marketing approach for the new people-data economy. *Journal of Advertising Research*; 56:136–41.

¹⁴ Online platforms accompanying the document “Communication on online platforms and the digital single market” (Commission Staff Working Document COM (2016) 288). Brussels: European Commission; 2016 (<https://ec.europa.eu/digital-single-market/en/news/commission-staff-working-document-online-platforms>, accessed 6 August 2016).

¹⁵ Arnold R, Hillebrand A, Waldburger M. Personal data and privacy. London: Ofcom; 2015 (http://stakeholders.ofcom.org.uk/binaries/internet/personal-data-and-privacy/Personal_Data_and_Privacy.pdf, accessed 16 April 2016).

¹⁶ Children’s Online Privacy Protection Rule (“COPPA”). 16 CFR Part 312. Washington DC: Federal Trade Commission (www.ftc.gov/enforcement/rules/rulemaking-regulatory-reform-proceedings/childrens-online-privacy-protection-rule).

¹⁷ Livingstone S, Haddon L, Görzig A, Ólafsson K. Risks and safety on the internet: the perspective of European children. Full findings. London: London School of Economics, EU Kids Online; 2011

¹⁸ Montgomery K (2015). Youth and surveillance in the Facebook era: policy interventions and social implications. *Telecommunications Policy*; 39:771–86.

¹⁹ Sweney M. Facebook admits it is powerless to stop young users setting up profiles. *The Guardian*, 23 January 2013 (<http://www.theguardian.com/technology/2013/jan/23/facebook-admits-powerless-young-users>)

²⁰ Sweney M. More than 80% of children lie about their age to use sites like Facebook. *The Guardian*, 26 July 2013 (<http://www.theguardian.com/media/2013/jul/26/children-lie-age-facebook-asa>)

²¹ Coughlan S. Safer Internet Day: Young ignore “social media age limit”. *BBC*, 9 February 2016 (<http://www.bbc.com/news/education-35524429>)

2015 worldwide study of nearly 1500 websites and apps “targeted at, or popular with” children conducted by 29 Data Protection Authorities for the Global Privacy Enforcement Network (GPEN)²² found that 66% of sites and apps collected personal information without offering children or their parents adequate means to limit the use and disclosure of such information, or to delete accounts simply and permanently, and for 40% of the sites reviewed, GPEN raised concern about the nature of the data being collected. Finally, a major omission is that COPPA does not protect children 13 years and over from tracking and targeting, despite the Federal Trade Commission’s stated concern about this issue²³.

Assessing the extent of digital HFSS marketing viewed by children of all ages is a major challenge for researchers external to digital platforms because proprietary data are not published, and other currently available methods do not readily allow access to these data¹³. However, early indications are that substantial HFSS advertising reaches children in digital media. In Ireland, of 113 most popular retail and Facebook food and soft drink brands, the 18 that Facebook estimated had the greatest “reach” among users aged 13 or 14 years all featured sugar-sweetened carbonated drinks, fast foods, savoury snacks, sweets, chocolate and ice-cream²⁴. As many under-13s join Facebook with false dates of birth, they will also be exposed to such marketing. Similarly, of the most popular food and beverage Facebook brand pages in Australia, the five that were most popular with users aged 13–17 years featured sugar-sweetened drinks, ice-creams, chocolate and fast food²⁵. Consistent with this, a study in the USA found that two hypothetical child profiles who “liked” brands that produce HFSS items (henceforth, “HFSS brands”) on Facebook received approximately 130 HFSS messages weekly over 2 weeks²⁶, and young adult researchers in New Zealand who “liked” 20 food brands on Facebook received 78 promotions weekly over 6 weeks²⁷.

Furthermore, HFSS advertising is likely to reach young Internet users not only directly through online brand promotions but also via peer networks in social media. In an exploratory study of user-generated content in the social media application Instagram in Sweden²⁸, 85% of young adolescent users shared images with food items: over two thirds were unhealthy, about half had clearly visible brand imagery – and many were clearly influenced by major food marketing campaigns.

Overall, therefore, despite the need for more evidence, there are strong indications that marketing of HFSS items in digital media continues to reach adolescents and younger children both directly from brand marketing as well as through peer networks.

²² Global Privacy Enforcement Network privacy sweep 2015. Concerns over children’s apps and websites. Portarlington, Laois: Data Protection Commissioner; 2015 (<https://www.dataprotection.ie/docs/04-09-2015-Concerns-over-childrens-apps-and-websites-1485.htm>).

²³ FTC (2015). Complying with COPPA: Frequently Asked Questions. A guide for business and parents and small entity compliance guide (Question 11) <https://www.ftc.gov/tips-advice/business-center/guidance/complying-coppa-frequently-asked-questions> (Accessed 17 Feb 2017)

²⁴ Tatlow-Golden M, Tracey L, Dolphin L. Who’s feeding the kids online? Dublin: Irish Heart Foundation; 2016.

²⁵ Freeman B, Kelly B, Baur L, Chapman K, Chapman S, Gill T, et al (2014). Digital junk: food and beverage marketing on Facebook. *Am J Public Health*, 104: e56–64.

²⁶ Harris JL, Heard A, Kunkel D. *Marketing unhealthy foods to children on Facebook. Social policy and public health concerns*. In: Dimofte CV, Haugtvedt CP, Yalch RF, editors. *Consumer psychology in a social media world*. New York, NY: Routledge; 2016:239–53.

²⁷ Jenkin G, Signal L, Smith M. In your face: food marketing to children on Facebook. In: *Food, children and youth: What’s eating?* Lisbon: Institute of Social Sciences, University of Lisbon; 2014 (<https://foodchildrenandyouth.wordpress.com/programme-3/>).

²⁸ Holmberg C, Chaplin JE, Hillman T, Berg C (2016). Adolescents’ presentation of food in social media: an explorative study. *Appetite*; 99:121–9.

Marketing Power

The power of non-digital marketing

Promotional techniques employed in food advertising are based on extensive market research, carried out over several decades by the food and drink industry and their advertising partners, with the aim of discerning children's interests, motivations, values and beliefs²⁹. Such information can then be used to make the advertising ever more targeted, salient and effective with the target demographic. Typical techniques found in television food advertising include the use of promotional characters, premium offers, persuasive appeals, and other attributes such as website promotion³⁰. A 2011 UK study found that the television food advertising likely to be seen by children made widespread use of promotional characters, celebrity endorsers and premium offers, and that these techniques were more frequently used to promote unhealthy than healthy foods, even on dedicated children's channels³¹.

A recent systematic narrative review identified 38 articles examining persuasive marketing techniques to promote unhealthy food to children³². The most frequently reported techniques were: premium offers (21 studies), promotional characters (21 studies), nutritional and health claims (20 studies), the theme of 'taste' (17 studies) and the emotional appeal of 'fun' (17 studies). Across studies, premium offers (e.g. offers of a free gift, competitions, and vouchers) were used in between 6% and 35% of food advertisements, although in one study, 54% of television food advertisements in Switzerland were found to use such offers³³. Premium offers were often used in association with unhealthy food promotion in particular⁴⁷. Promotional characters (inclusive of brand equity characters such as Tony the Tiger; licensed characters such as Sponge Bob Square Pants; unlicensed characters such as unknown cartoons; and celebrities) are also a common technique for promoting foods to children, and were also found to be used more frequently in the promotion of unhealthy foods than healthy^{ibid}. Fun, an emotional appeal capturing concepts of happiness and pleasure, is another common theme in television food advertising to children. Of studies conducted in Europe, fun was found to be particularly prevalent in Switzerland (46% of food advertisements)⁴⁸ and Bulgaria (half of all food advertisements)³⁴.

The nature or power of food advertising is relatively under-researched, particularly in non-US contexts as studies have tended to analyse the product itself, rather than the nature of the message promoting it³⁵. In terms of regulation, this has meant that the advertising codes and regulations used in several countries have focused solely on limiting the quantity of unhealthy food advertising without an equivalent focus on reducing the impact of the persuasive content of the marketing⁴⁷. Exceptions include regulations in the UK, Australia and Ireland which incorporate limits on the use of promotional

²⁹ Hastings G, Stead M, McDermott L, Forsyth A, MacKintosh AM, Rayner M (2003). *Review of research on the effects of food promotion to children* (prepared for the Food Standards Agency). Centre for Social Marketing, The University of Strathclyde.

³⁰ Gantz W, Schwartz N, Angelini JR, Rideout V (2007). Food for thought. Television food advertising to children in the United States. The Kaiser Family Foundation.

³¹ Boyland EJ, Harrold JA, Kirkham TC, Halford JCG (2011). Persuasive techniques used in television advertisements to market foods to UK children. *Appetite*, 58: 658-664.

³² Jenkin G, Madhvani N, Signal L, Bowers S (2014). A systematic review of persuasive marketing techniques to promote food to children on television. *Obesity Reviews*, 15: 281-293.

³³ Keller SK, Schulz PJ (2011). Distorted food pyramid in kids programs: a content analysis of television advertising watched in Switzerland. *European Journal of Public Health*, 21: 300-305.

³⁴ Galcheva SV, Iotova VM, Stratev VK (2008). Television food advertising directed towards Bulgarian children. *Archives of Disease in Childhood*, 93: 857-861.

³⁵ Schor JB, Ford M (2007). From tastes great to cool. Children's food marketing and the rise of the symbolic. *Journal of Law, Medicine & Ethics*, 25: 10-21.

or premium offers, promotional characters/celebrities and nutritional health claims in television food advertising aimed at children – demonstrating that it is a realistic and achievable policy option^{ibid}.

The power of digital marketing

As is the case for the *extent* of digital marketing, the evidence base for the *power* of HFSS digital marketing is still in its infancy. However, digital media offer many well-documented means by which creative marketing power – its design, execution and use of persuasive techniques – can be amplified, and studies have begun to analyse these techniques as employed by HFSS marketing.

“Stealth” marketing techniques in digital media take advantage of its novel capabilities. These include immersive techniques such as extensive HFSS-themed game applications (or “apps”); social media content created by users themselves; word-of-mouth social media communication, such as “liking”, sharing and commenting on marketing; and paid partnerships with vloggers popular with children.

In social media, brands seek word-of-mouth effects as people are thought to trust friends, or video bloggers (vloggers) more than brands or advertisers^{36,37,38,39}. The UK Advertising Standards Agency (ASA) ruled against widespread promotion of Oreo biscuits on vloggers’ personal channels^{40,41}, warning that commercial relations with companies must be clearly signposted, yet over a third of UK marketers report not adhering to these standards because of lack of awareness or reluctance to be transparent⁴². As the ASA acts only on complaints made by viewers, its capacity to act on such activities is limited.

Digital marketers are now able to fine-tune the power of their messages during the creative process with digital analytics that can pin-point consumer responses in much greater detail than previously. For example, in-device cameras and software record facial responses and conduct immediate, millisecond-by-millisecond analysis to identify “micro-emotions” and millisecond-level responses to marketing content,^{43,44} allowing marketers to adjust creative content and increase its power. The power of digital marketing can be amplified still further by matching advertising delivery to consumers’ moment-by-moment moods⁴⁵, or to weather- or mood-linked food consumption patterns²⁸.

A small number of recent studies has examined the persuasive tactics of HFSS digital marketing in social media. Ads for HFSS brands with the greatest reach among 13-14 year olds in Ireland were

³⁶ Turow J. *The daily you. How the new advertising industry is defining your identity and your worth.* New Haven, CT: Yale University Press; 2011

³⁷ Kozinets RV, de Valck K, Wojnicki AC, Wilner SJS. Networked narratives: understanding word-of-mouth marketing in online communities. *J Mark* 2010;74:71–89.

³⁸ Kim AJ, Johnson KKP. Power of consumers using social media: examining the influences of brand-related user-generated content on Facebook. *Comput Human Behav* 2016;58:98–108 (10.1016/j.chb.2015.12.047)

³⁹ Childwise 2016. *New Childwise report reveals children’s favourite internet vloggers*, Norwich, Norfolk: Childwise; 2016 (http://www.childwise.co.uk/uploads/3/1/6/5/31656353/childwise_press_release_-_vloggers_2016.pdf).

⁴⁰ ASA ruling on Mondelez UK Ltd. London: Advertising Standards Authority; 2014

(https://www.asa.org.uk/Rulings/Adjudications/2014/11/Mondelez-UK-Ltd/SHP_ADJ_275018.aspx#.V3pOVVaED_R).

⁴¹ Harley N. Hidden advertising by vloggers under the spotlight. *The Daily Telegraph*, online version, 26 November 2014 (<http://www.telegraph.co.uk/news/uknews/law-and-order/11255077/Hidden-advertising-by-vloggers-under-the-spotlight.html>).

⁴² Roderick L. Brands reluctant to be transparent about influencers as many fail to apply ad industry code. *Marketing Week*, 4 July 2016 (<https://www.marketingweek.com/2016/04/07/brands-still-reluctant-to-be-transparent-around-influencers-and-failing-to-adhereto-ad-industry-code/>).

⁴³ Venkatraman V, Clithero JA, Fitzsimons GJ, Huettel SA. New scanner data for brand marketers: how neuroscience can help better understand differences in brand preferences. *J Consumer Psychol* 2012;22:143–53.

⁴⁴ Affectiva. *Emotion recognition software* (<http://www.affectiva.com/>).

⁴⁵ Daykin J. Five brands that got social media right in 2015. *The Guardian*, 16 December 2015 (<https://www.theguardian.com/media-network/2015/dec/16/brands-social-media-best-2015>).

found to use tactics of peer engagement, emotion and entertainment³⁹. Most frequently employed – more so even than displaying a brand’s logo, packaging or the advertised item itself – were prompts to interact with ads (invitations to “like”, comment and share, and hashtags), indicating brands’ attempts to encourage children to spread marketing through their networks. Brands also employed competitions, humour, bold graphics, and links to entertainment events and eventful “special days”³⁹. The effectiveness of such approaches is underpinned by research that found humorous, brand “personality” advertising in Facebook to be more effective than informative content⁴⁶ and research with children that found that humour was the most liked advertising tactic⁴⁷. Similarly, Australian Facebook pages, some of which were among the most popular with 13-17 year olds, employed marketing techniques, often unique to social media, that could increase consumer interaction and engagement and even facilitate direct product purchase⁴⁰.

Finally, the power of food marketing in the digital sphere is also indicated by viewers’ engagement with it. Although studies indicate that parents of adolescents are largely unaware of digital food marketing^{39,48,49,50}, adolescents themselves engage with and enjoy digital marketing. In the UK, 73% of 1000 13–17-year-olds reported following brands they like in social media, with 62% clicking on ads and 57% making in-app or in-game purchases⁵¹. Nielsen data suggest that over half of adolescents in the USA “always” or “sometimes” look at mobile ads⁵², and a qualitative study of ad avoidance by Australian adolescents on the MySpace social media site found that some ads, perceived as annoying, were avoided but ads involving interaction (e.g., games) or receiving (e.g., ring tones) were positively received⁵³.

Marketing Impact

The impact of non-digital marketing

An increasing body of scientific evidence demonstrates the effects of exposure to non-digital food advertising on children’s food preferences⁵⁴, brand preferences⁵⁵, product requests⁵⁶, food

⁴⁶ Lee D, Hosanagar K, Nair HS. Advertising content and consumer engagement on social media: evidence from Facebook. Stanford, CA: Stanford Graduate School of Business; 2015 (<https://www.gsb.stanford.edu/gsb-cmis/gsb-cmis-download-auth/363976>)

⁴⁷ Federal Trade Commission (FTC) (2012). A review of food marketing to children and adolescents. Follow-up report, December 2012. <https://www.ftc.gov/sites/default/files/documents/reports/review-food-marketing-children-and-adolescents-follow-report/121221foodmarketingreport.pdf> Accessed 17 February 2017

⁴⁸ Spiteri-Cornish L. “Mum, can I play on the internet?”. *Int J Advertising* 2014;33:437–73.

⁴⁹ Newman N, Oates CJ. Parental mediation of food marketing communications aimed at children. *Int J Advertising* 2014;33:579–98.

⁵⁰ Ustjanauskas AE, Eckman B, Harris JL, Goren A, Schwartz MB, Brownell KD. Rudd report. Focus groups with parents: What do they think about food marketing to their kids? New Haven, CT: Rudd Center for Food Policy and Obesity, Yale University; 2010 (http://www.uconnruddcenter.org/files/Pdfs/RuddReport_FocusGroupsParents_5_10.pdf).

⁵¹ The age of digital enlightenment. Realtime generation report 2016. Slough, Berkshire: Logicalis; 2016 (<http://www.uk.logicalis.com/globalassets/united-kingdom/microsites/real-time-generation/realtime-generation-2016-report.pdf>)

⁵² Gibs J, Bruich S. Advertising effectiveness: understanding the value of a social media impression. A Nielsen/Facebook report. New York, NY; 2010 (<http://www.nielsen.com/us/en/insights/news/2010/nielsenfacebook-ad-report.html>).

⁵³ Kelly L, Kerr G, Drennan J. Avoidance of advertising in social networking sites: the teenage perspective. *J Interactive Advertising* 2010;10:12.

⁵⁴ Boyland, E.J., et al., *Food Commercials Increase Preference for Energy-Dense Foods, Particularly in Children Who Watch More Television*. *Pediatrics*, 2011. 128(1): p. e93-e100.

⁵⁵ Borzekowski, D.L.G. and T.N. Robinson, *The 30-second effect: an experiment revealing the impact of television commercials on food preferences of pre-schoolers*. *Journal of the American Dietetic Association*, 2001. 101: p. 42-46.

⁵⁶ Buijzen, M. and P.M. Valkenburg, *The effects of television advertising on materialism, parent–child conflict and unhappiness: A review of research*. *Journal of Applied Developmental Psychology*, 2003. 24: p. 437-456.

consumption⁵⁷, overall caloric intake⁵⁸, reduced intake of fruits and vegetables longitudinally⁵⁹ and modelled higher rates of obesity⁶⁰. There is also robust evidence that persuasive techniques in television food advertising are associated with greater recall and enjoyment of the advertising, as well as increased purchase-requests, food preferences and consumption behaviour in children⁶¹.

The most notable criticism of current evidence from governments and industry bodies has centred on the lack of data to demonstrate a direct link between HFSS marketing exposure and unhealthy changes in childhood body weight⁶². Therefore, it is important in any discussion of food marketing impact, but particularly in the context of informing regulatory action, to note that current evidence supports a logical sequence or 'hierarchy of effects' linking food promotion exposure to individual-level weight outcomes⁶³. There is considerable evidence for effects in the earlier steps of the chain (effects of marketing exposure on brand awareness, food preferences and consumption behaviours) but less at the more distal end, which seeks to establish the impact on behaviour and weight outcomes. This does not necessarily indicate the lack of an effect on body weight, but rather reflects the fact that these studies are difficult to conduct as weight gain is gradual, and most children in western cultures are exposed to high volumes of unhealthy food promotion limiting the within-culture variability that can be explored^{ibid}.

Nevertheless, a recent systematic review and quantitative meta-analysis of the effects of acute exposure to unhealthy food advertising (via television or the Internet) across 18 studies found a significant, moderate effect for children, whereby food advertising exposure was associated with greater food intake⁷². In one study (included in the systematic review but not the meta-analysis due to a lack of relevant statistics available), adolescents (13-18 years) exposed to television food advertising also significantly increased their food intake relative to non-food advertisements⁶⁴. Similarly, another meta-analysis explored 17 studies of dietary preference and 9 of dietary intake and found that in children exposed to unhealthy dietary marketing, intake significantly increased during or shortly after exposure, and children exposed to the unhealthy dietary marketing had a higher risk of selecting the advertised foods or beverages⁶⁵. Furthermore, a meta-analysis studying 45 published reports (representing data from 3,292 participants) found that food cue exposure significantly

⁵⁷ Boyland, E.J., et al., *Advertising as a cue to consume: a systematic review and meta-analysis of the effects of acute exposure to unhealthy food and nonalcoholic beverage advertising on intake in children and adults*. The American Journal of Clinical Nutrition, 2016. 103: p. 519-533.

⁵⁸ Epstein, L.H., et al., *A randomized trial of the effects of reducing television viewing and computer use on body mass index in young children*. Archives of Pediatrics and Adolescent Medicine, 2008. 162: p. 239-245.

⁵⁹ Barr-Anderson, D.J., et al., *Does television viewing predict dietary intake five years later in high school students and young adults?* International Journal of Behavioral Nutrition and Physical Activity, 2009. 6: p. 7.

⁶⁰ Chou, S.Y., I. Rashad, and M. Grossman, *Fast-Food Restaurant Advertising on Television and Its Influence on Childhood Obesity*. The Journal of Law and Economics, 2008. 51: p. 599-618.

⁶¹ Cairns G, Angus K, Hastings G, Caraher M (2013). Systematic reviews of the evidence of the nature, extent and effects of food marketing to children. A retrospective summary. *Appetite*, 62: 209-215.

⁶² Clarke, B. and S. Svanaes (2014). *Literature review of research on online food and beverage marketing to children*. London: Family Kids & Youth Market Research and Consultancy. Accessible from <https://www.cap.org.uk/News-reports/~media/Files/CAP/Reports%20and%20surveys/Family%20Kids%20and%20Youth%20Literature%20Review%20of%20Research%20on%20Online%20Food%20and%20Beverage%20Marketing%20to%20Children.ashx>.

⁶³ Kelly, B., et al., *A Hierarchy of Unhealthy Food Promotion Effects: Identifying Methodological Approaches and Knowledge Gaps*. American Journal of Public Health, 2015. 105(4): p. e86-e95.

⁶⁴ Falciiglia GA, Gussow JD (1980). Television commercials and eating behaviour of obese and normal weight women. *Journal of Nutrition Education*, 12: 196-199.

⁶⁵ Sadeghirad B, Duhaney T, Motaghipisheh S, Campbell NRC, Johnston BC (2016). Influence of unhealthy food and beverage marketing on children's dietary intake and preference: a systematic review and meta-analysis of randomized trials. *Obesity Reviews*, 17(10): 945-959.

influenced eating behaviour and weight gain, with visual food cues (e.g. pictures and videos as typically form part of food advertising) associated with a similar effect size as real food exposure⁶⁶.

The impact of digital marketing

Research on the impact of HFSS digital media marketing on children is – as other areas of research in this field – still nascent. However, early studies clearly indicate that the well-established impact in broadcast media is likely to transfer to digital media.

The impact of exposure to Internet “advergaming” on children’s food choices and consumption has been most thoroughly studied to date. In a set of studies in the Netherlands, Folkvord et al.,^{67,68,69} demonstrated that food-based advergames increased children’s food intake, with an effect size similar to that of television commercials in equivalent research⁷².

It can be argued that as the number of children engaging in food-related advergaming is likely to be small, its impact might not be meaningful. However, very large numbers of children are known to engage with social media platforms (including, as noted above, those who are officially under-age for access to these). In social media, the platforms and marketers themselves report that digital marketing amplifies broadcast marketing effects, increasing target audience reach, ad memorability, brand linkage and likeability⁷⁰. Notably, these effects are achieved at much less cost than for broadcast marketing. Online Coca-Cola and Cadbury campaigns in France and the USA report returns on investment about four times greater than for television; e.g. in a Coca-Cola campaign in France, Facebook accounted for 2% of marketing cost but 27% of incremental sales⁷¹. Facebook ads in 14 campaigns generated nearly triple the ad recall as compared with control groups⁷², and econometric analysis of fast-moving consumer goods brand marketing (including food and drinks) in Europe found that combining online marketing with other media magnified returns on television (by 70%) and on cinema (by 71%)⁸⁶. Nielsen Media found that members of users’ online social networks affect their engagement with advertising: exposure to Facebook “homepage ads” (those that appear at the side of the main feed on desktop/laptop computers) not only increased ad recall, brand awareness and purchase intent, but these effects were further enhanced if a social media friend had engaged with the brand⁶⁷.

The case for adolescent vulnerability to marketing for unhealthy food

Most HFSS advertising restrictions, including the US COPPA rule, apply only to children up to 12 years. These reflect dated, cognitive-focused developmental models of marketing persuasion that argue that children achieve ‘advertising literacy’ in early adolescence, as at this time they can clearly recognize an ad, understand that it has persuasive intent and thus defend against its effects⁴¹. However, cognitive models do not account for the emotional, implicit (unconscious) and social effects of advertising. To counter food marketing effects, individuals require conscious awareness of it, and the

⁶⁶ Boswell RG, Kober H (2016). Food cue reactivity and craving predict eating and weight gain: a meta-analytic review. *Obesity Reviews*, 17: 159-177.

⁶⁷ Folkvord F, Anshütz 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* 2013;97:239–45.;

⁶⁸ Folkvord F, Anshütz DJ, Nederkoorn C, Westerk H, Buijzen M. Impulsivity, “advergames”, and food intake. *Pediatrics* 2014;133:1007–12.;

⁶⁹ Folkvord F, Anshütz DJ, Wiers RW, Buijzen M. The role of attentional bias in the effect of food advertising on actual food intake among children. *Appetite* 2015;84:251–8.

⁷⁰ Brand awareness optimisation. In: Introducing new ways to buy, optimise and measure ads for a mobile world. Facebook website post, 30 September 2015 (<https://en-gb.facebook.com/business/news/Ad-Week-UK>).

⁷¹ Exploring digital ROI for FMCG brands. Microsoft; 2013 (<http://tinyurl.com/ozekqyv>).

⁷² Introducing new ways to buy, optimise and measure ads for a mobile world. Facebook for Business. 30 September 2015. (<https://www.facebook.com/business/news/Ad-Week-UK>).

ability as well as the *motivation* to resist^{73,74}. In fact, *emotional* advertising was found to be most effective in a study of over 800 advertising campaigns⁷⁵, and modern psychological models predict that non-conscious (implicit) processing of advertising influences beliefs and behaviour^{41,76}. In digital media, where marketing is often less recognizable, advertising is much more likely to be processed implicitly. On webpages, children aged 10-12 years could not consistently recognize simple static advertisements⁷⁷, and in social media the boundaries between marketing and other content are increasingly blurred, driven by alterations to platform algorithms that favour advertising that is less explicitly promotional¹³. These findings indicate that advertising operates effectively through emotional, unconscious routes and that this may apply especially to digital media.

Although HFSS brands argue it is ethical to advertise to adolescents (see e.g. marketing codes of Mars and Coca-Cola^{78,79}), neurological, hormonal, and social developmental factors in fact may cause them to be particularly susceptible to HFSS advertising despite increasing cognitive ability⁸⁰. Neurological and hormonal changes mean they may be more impulsive^{ibid}. Young adolescents aged 12–14 years are more likely to heed the behaviour of peers regarding risky activities⁸¹. Furthermore, adolescents typically have independent spending money and, in countries such as Cyprus, Ireland and the UK, use “fast” and “junk” foods as a marker of adolescent identity^{82,83,84,85,86}.

Both statutory policy and industry self-regulation have, to date, focused on protecting young children from television advertising that is consciously, cognitively processed. These approaches have been eclipsed by technological and commercial innovation in digital marketing⁸⁷, by insight into the effect of emotional and unconsciously processed advertising, and by growing insight into the susceptibility of adolescents. Therefore, policy deliberations should take into account that it is not only children

⁷³ Rozendaal E, Buijzen M, Valkenburg P. Children’s understanding of advertisers’ persuasive techniques. *Int J Advertising* 2011;30:329–50.

⁷⁴ Harris JL, Brownell KD, Bargh JA (2009). The food marketing defense model: Integrating psychological research to protect youth and inform public policy. *Soc Issues Policy Rev*, 3(1): 211-271.

⁷⁵ Binet L, Field P. Empirical generalizations about advertising campaign success. *J Advertising Res* 2009;49:130–3.

⁷⁶ Bargh JA, Ferguson MJ. Beyond behaviorism: the automaticity of higher mental processes. *Psychol Bull* 2000;126:925–45.

⁷⁷ 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.

⁷⁸ Marketing our brands responsibly. Our marketing code. McLean, VA: Mars, Inc; undated (<http://www.mars.com/global/about-mars/mars-pia/our-brands/communicating-responsibly/marketing-our-brands-responsibly.aspx>).

⁷⁹ [Coca-Cola Great Britain Responsible Marketing Charter - A Refreshed Approach](https://www.coca-cola.co.uk/content/dam/journey/gb/en/hidden/corporate-responsibility/marketing-charter-pdfs/Responsible_Marketing_Charter_full_version.pdf) (https://www.coca-cola.co.uk/content/dam/journey/gb/en/hidden/corporate-responsibility/marketing-charter-pdfs/Responsible_Marketing_Charter_full_version.pdf) (Accessed 17 February 2017)

⁸⁰ Pechmann C, Levine L, Loughlin S, Leslie F. Impulsive and self-conscious: adolescents’ vulnerability to advertising and promotion. *J Public Policy Mark* 2005;24:202–21.

⁸¹ Knoll LJ, Magis-Weinberg L, Speekenbrink M, Blakemore SJ. Social influence on risk perception during adolescence. *Psychol Sci* 2015;26:583–92.

⁸² Trew K, Barnett J, Stevenson C, Muldoon O, Breakwell G, Brown K, et al. Young people and food: adolescent dietary beliefs and understandings. Dublin: Safefood; 2005 (<http://www.safefood.eu/Publications/Research-reports/Young-People-and-Food--Adolescent-Dietary-Beliefs.aspx>)

⁸³ Ionannou S. “Eating beans ... that is a ‘no-no’ for our times”: Young Cypriots’ consumer meanings of “healthy” and “fast” food. *Health Educ J* 2009;68:186–95.

⁸⁴ Fitzgerald A, Heary C, Nixon E, Kelly C. Factors influencing the food choices of Irish children and adolescents: a qualitative investigation. *Health Promot Int* 2010;25:289–98

⁸⁵ Stead M, McDermott L, MacKintosh AM, Adamson A. Why healthy eating is bad for young people’s health: identity, belonging and food. *Soc Sci Med* 2011;72:1131–9

⁸⁶ Fitzgerald A, Heary C, Nixon E, Kelly C, Shevlin M. Self-efficacy for healthy eating and peer support for unhealthy eating are associated with adolescents’ food intake patterns. *Appetite* 2013;63:48–58.

⁸⁷ Montgomery K, Chester J. Digital food marketing to children and adolescents: problematic practices and policy interventions. Oakland, CA: National Policy and Legal Analysis Network to Prevent Childhood Obesity; 2011 (http://www.foodpolitics.com/wp-content/uploads/DigitalMarketingReport_FINAL_web_20111017.pdf).

below 12 years who are influenced by food marketing, and older children require equal, if not more, protection in the new digital age.

Discussion and eConclusions

The research findings summarised here show that food marketing is both prevalent and powerful in its influence over the eating behaviours of young people, including adolescents. Television viewing remains a popular leisure activity for youths across Europe, and despite the introduction of a number of statutory restrictions and industry self-regulatory pledges that purport to restrict broadcast food marketing of unhealthy foods to children, evidence suggests that regulation is weak and advertising activity remains widespread. Advertising is demonstrably influential, and recent studies have shown effects of food marketing exposure on multiple eating-related outcomes including food intake. Particularly worthy of note from the evidence presented here is our growing understanding of food marketing within the digital sphere, whereby known effects from television are likely to be amplified due to the immersive, interactive and personalised nature of behaviourally targeted promotional messages.

The extant evidence continues to support strong restrictions of the marketing of HFSS foods and beverages to young people. This narrative review, focusing on empirical findings from Europe to best inform European policy deliberations, provides an up to date summary of what is known ~~with regard to~~ about children's *exposure* to food marketing via both digital and traditional broadcast routes, the *power* of that exposure to influence behaviour and actual *impact* on eating-related outcomes.

Clearly, there are many research challenges presented by digital food marketing, and the evidence base here is still in its infancy relative to that for television. Nevertheless, the existence of statutory regulations for broadcast media in many countries shows that policymakers acknowledge that advertising plays a role in children's diets. The rise of commercial food marketing via digital avenues presents fresh and stark challenges to regulators, who are now tasked with creating regulation that is media-neutral and robust. The 2010 WHO Recommendations and the 2016 WHO Commission on Ending Childhood Obesity specifically call on governments to act on food marketing to children and adolescents as a key policy issue. The evidence supports an immediate and tough response.