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Abstract

Authoritative and comprehensive reviews of studies on the nature and extent of food marketing to children indicate that children are exposed to high levels of food marketing and that the 'marketed diet' typically comprises energy-dense, micronutrient-poor foods. However, the implication of causality between marketing, product exposures and childhood obesity is not universally accepted. A vigorous discussion rages about appropriate policy responses to children's exposure to food marketing. The advocacy by many health and consumer groups for tighter government restrictions on food marketing is juxtaposed to the views held by many in the food and advertising industries. Pivotal in this debate is the role of evidence in policy decisions and the appropriateness of industry self-regulation versus government intervention in food marketing. This chapter will explore the dietary and health implications of children's exposure to unhealthy food marketing and present arguments for and against regulations to restrict this marketing.

Keywords

marketing, against, directed, towards, children, regulation, food, case

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The case for and against the regulation of food marketing directed towards children

Bridget Kelly,¹ Rohan Miller² and Lesley King¹

Authoritative and comprehensive reviews of studies on the nature and extent of food marketing to children indicate that children are exposed to high levels of food marketing and that the 'marketed diet' typically comprises energy-dense, micronutrient-poor foods. However, the implication of causality between marketing, product exposures and childhood obesity is not universally accepted. A vigorous discussion rages about appropriate policy responses to children's exposure to food marketing. The advocacy by many health and consumer groups for tighter government restrictions on food marketing is juxtaposed to the views held by many in the food and advertising industries. Pivotal in this debate is the role of evidence in policy decisions and the appropriateness of industry self-regulation versus government intervention in food marketing. This chapter will explore the dietary and health implications of children's exposure to unhealthy food marketing and present arguments for and against regulations to restrict this marketing.

Unhealthy food marketing to children has become a highly politicised debate in Australia and internationally. Health and consumer groups cite substantial bodies of research that children's exposure to unhealthy food marketing is a contributing factor in the development of children's food preferences and purchases, and hence plays a role in rising rates of childhood obesity. As such, these groups have called on government to restrict marketing as an obesity prevention initiative. At the same time, the food and advertising industries rebut these claims, and promulgate the relative benefits of industry self-regulatory mechanisms. This chapter presents both public health and marketing perspectives, in the form of a 'head to head' debate presenting arguments for and against regulation of food marketing.

A key driver in this debate comes from psychological research that children are highly vulnerable to advertising promotions and consequently require protection from this form of marketing. One reason for this is because young children, especially those less than five years of age, are unable to distinguish commercial content from non-commercial content [1]. For example, when viewing television, very young children are unable to differentiate

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between a program and an advertisement break. For older children, despite being able to identify advertising, these children still have an impaired ability to interpret marketing messages critically as they lack the necessary cognitive skills and experience. Up until the age of eight years, most children are unable to recognise the persuasive nature of advertising effectively, and tend to accept advertising as truthful, accurate and unbiased [1].

While children's vulnerability to some forms of marketing has been recognised, the effect of marketing and the most appropriate approach to limit children's marketing exposure is contested by health and industry groups. The key points of debate covered in this chapter concern the quality and sufficiency of evidence which underpins any regulatory initiative, the range of media that would need to be covered by any regulation, and the quality and type of foods that are advertised and potentially subject to regulation.

The case FOR regulating food marketing directed towards children

The effect of marketing on children's food choices and habits

There is a large and accumulating body of research to support the association between the marketing of energy-dense nutrient-poor ('unhealthy') foods and beverages, and childhood obesity. This includes at least seven major systematic reviews synthesising the scientific evidence on the impact of food marketing to children [2–8]. Most of these systematic reviews have been commissioned by key health organisations, such as the Institute of Medicine in the US and the World Health Organization, and have been updated regularly to include new evidence. Such reviews take into account the quality of evidence, by considering methodological limitations and consistency between studies.

The most recent systematic review, commissioned by the World Health Organization in 2008, found that food advertising has a modest impact on children's nutrition knowledge, their food preferences and their consumption patterns, with subsequent implications for weight gain and obesity [8]. In particular, research indicated that children are able to recall a high number of food advertisements and that these advertisements were enjoyed and discussed amongst their peers [9–11]. Further, advertisements created a desire in children to purchase food products, and the majority of children either purchased these products themselves or asked their parents to buy these products for them [12–14].

Importantly, food marketing is thought to operate at both the brand and the food category level [8], thereby influencing not only the particular product brands that children choose but also their broader consumption patterns. For example, advertisements for a particular brand of confectionery will not only generate a desire for that brand but also for confectionery in general [8].

Contribution of food marketing to childhood obesity

The causes of obesity are many and complex, comprising an array of sociological, environmental and genetic influences. Unhealthy food marketing is only one such environmental factor that contributes to the obesity-promoting environment. Other factors,

such as family and peer networks, engagement in physical activity, and socioeconomic status also influence children's food choices and risk of weight gain and obesity [5].

In the context of the full range of contributing factors, the specific contribution that television food advertising makes to childhood obesity is estimated to be small to moderate in size, with some studies estimating that 2% of the variation in food choice and obesity is attributed to this advertising [15]. However, even small effects in statistical terms can have an appreciable effect when they influence a large population and are ongoing. These estimated effects are based on the contribution of television food advertising alone, and may be increased when marketing from other forms of media are included [5]. Given that the majority of advertised foods are energy dense and nutrient poor, this advertising encourages additional consumption of these food types that are already consumed in excess by Australian children [16]. Data from the 1995 National Nutrition Survey identified that energy-dense, nutrient-poor foods contribute 41% of children's daily energy intake, while dietary recommendations allow for between 5%–20% of energy from these discretionary foods [16]. In addition, the act of television viewing itself contributes to sedentary lifestyles and obesity, independent of the effects of food advertising [17].

Researchers have predicted that the magnitude of the specific effect of food advertising on food behaviours and weight is at least the same as that of many other determinants of obesity, including family and parents, peers and socioeconomic status [8]. Therefore, food marketing has as much impact on obesity as these other factors and is amenable to intervention, making it one of a number of potential levers for change.

Nature and scope of food marketing to children

Evidence on the effect of food marketing on children's food preferences and consumption is concerning as the majority of advertised foods are high in fat, sugar and/or salt. Indeed, the top products that are advertised to children internationally on television are sugar-sweetened breakfast cereals, soft drinks, confectionery and high-fat savoury snacks, while the promotion of healthy food choices, including fruit, vegetables, whole grains and milk is virtually non-existent [8]. The frequency of advertisements for fast food restaurants is also increasing [8]. One study from Australia identified that even during a A\$5 million government campaign promoting fruit and vegetable consumption, television advertisements for healthy foods only contributed to 5% of all food advertisements across the whole study period, while 82% were for high-fat/high-sugar foods [18]. The heavy and ubiquitous marketing of these unhealthy food and beverage products assists in promoting these products as normal and desirable.

Most of the research and attention on children's exposure to food marketing has been directed to television food advertising. However, it is widely acknowledged that food marketing encompasses a range of different media platforms and food marketing campaigns are increasingly integrating these different marketing channels to more widely promote their messages [19].

These marketing channels include: *broadcast media* (eg television, cinema and radio); *new technology* (eg the internet and SMS/text messaging); *print media* (eg magazines and newspapers); *promotions* (eg premium offers, celebrity endorsements, cartoon characters, health and nutrient claims and product placements); *places* (eg school canteens and vending machines, sporting events and supermarkets); *price* where products are sold at cheaper prices to make them more available and appealing to children; *packaging* that is appealing to children; *product expansion* by selling multiple variations of a product; and *public relations* by sponsoring television programs, sporting events, fundraising and establishing or donating money to charity.

Data on industry marketing expenditure can be used to assess the spread of media used by food marketers. While available Australian information is limited, data from the UK indicate that between 2003 and 2007 there was a 19% increase in industry expenditure on food and beverage advertising, from £704m to £838m [20]. Over the same time period, expenditure on print advertising increased the most, with an increase of 159% or £107m. By comparison, expenditure on television food advertising increased by only 6% or £34m [20]. From this expenditure information, it appears that food marketers are shifting away from traditionally used advertising modes, such as television. Of concern is that these other forms of media are often used by children without parental supervision, making them more difficult for parents to monitor and control.

Some examples of integrated marketing campaigns by food companies promoting products high in fat, sugar, and/or salt have included the Nestle Smarties 8 Colours of Fun campaign (www.smarties-australia.com.au, accessed 20 June 2011). This campaign involved the creation of multi-media clips featuring eight young children teamed up with musicians, sculptors, dancers, photographers and installation artists to create an artwork inspired by each of the eight different Smarties colours. These clips were then broadcast through the Smarties website and online social networking sites, including YouTube and Facebook, as well as through television, press and in-store promotions. The Streets Paddle Pop Elemagika Lick-a-Prize campaign is a further example of integrated marketing (www.paddlepop.com.au, accessed 20 June 2011). This campaign incorporated a short film starring the Paddle Pop Lion, a website featuring branded games, a Facebook page, and a competition requiring the purchase of Paddle Pop ice-creams to uncover prize codes listed on ice-cream sticks. Additional codes for prizes could be found in television and magazine advertisements.

The power of pestering

The *raison d'être* of marketing is to create a desire for advertised products. In the case of children, marketing can influence their own food purchases, as well as the purchase behaviour of parents [21]. Children's purchase requests, often referred to as 'pester power' or 'purchase influence attempts', can create tension in child–parent relationships and result in the purchase of these products despite parents' awareness of their poor nutritional quality [22]. As such, advertising commentators have claimed that 'by advertising to children, companies are encouraging the child to nag their parents into buying something that is

not good for them, they don't need or the parent cannot afford' [23]. This phenomenon of children 'nagging' for advertised products has been repeatedly reported by parents [8].

In the supermarket setting, children employ various techniques to encourage parents to purchase food items. For example, in a qualitative study from the UK, children reported that they kept on requesting products until their parents conceded. This is typified in the response from one child, who was reported as saying 'you just keep saying please mum, please mum, please mum, and then she gets it' [24].

Research also indicates that children's purchase requests often result in actual product purchases. In a review of studies on the effect of children's purchase requests on parents' purchasing responses, children were found to request products an average of 15 times per supermarket visit (around one request for every two minutes spent in the supermarket), and around half of all children's requests were successful [22]. Further, children's exposure to food marketing increased their purchase requests for advertised foods [22].

Parents' responses to children's purchase requests are also likely to be influenced by their socioeconomic status. In interviews conducted with over 1000 parents and their children in the UK, the most socially disadvantaged parents were more open to persuasion by children and were more likely to agree to the statement 'I buy what the children want', compared to less disadvantaged parents [25].

As such, the marketing of unhealthy food to children impedes the ability of parents to promote and support healthy eating. This appears to be particularly the case for socially disadvantaged families, who are also the most vulnerable to excessive weight gain and obesity [26]. In the face of exceedingly sophisticated and integrated food marketing campaigns, spanning multiple media platforms, parents' ability to subjugate children's purchase requests are likely to be further diminished.

The role of industry self-regulation in minimising harm to children from unhealthy food marketing

In recent times, there has been vigorous discussion regarding appropriate policy responses to the issue of children's high and diversifying exposure to the marketing of unhealthy food and beverages. In particular, there has been significant advocacy from health and consumer groups calling for government restrictions to protect children from these promotional messages. Meanwhile, the food and advertising industries have been actively involved in promoting self-regulatory approaches to limit this marketing. These may be seen as good corporate responsibility, or more likely, as a means of diverting criticism and impeding government regulations.

In an analysis of available regulations to restrict unhealthy food marketing to children across 73 countries between 2004 and 2006, most new regulations came from the food and advertising industries [27]. The number of countries with industry self-regulations increased from 11 in 2004 to 23 by the end of 2006, including the revision and extension of industry codes in Australia, Canada and the US [27]. These regulatory codes are typically overseen by an industry body and participation by individual food companies is voluntary.

In Australia, the Australian Food and Grocery Council, the national body representing food and grocery manufacturers, introduced the Responsible Children's Marketing Initiative in 2009, which aims to 'provide a framework for food and beverage companies to promote healthy dietary choices and lifestyles to Australian children' [28]. As well, the Australian Association of National Advertisers introduced a similar initiative in 2009 relating to the quick service (fast food) industry [29].

Independently conducted evaluations of the Australian Food and Grocery Council code have compared the amount of television advertising from companies participating in this self-regulatory initiative before and after its introduction [30]. These evaluations show that overall unhealthy food advertising did not decrease following the introduction of the codes, despite a reduction in television advertisements for unhealthy food items by participating companies. The main reason for the ineffectiveness of this self-regulation was the limited participation in these codes by food companies [30]. As at May 2011, only 17 food companies had signed up to this initiative.

As well, in an analysis of the nutrition criteria used to define foods as appropriate to be marketed to children, industry-developed nutrition criteria vary between companies and tended to be more permissive than independently developed standards [31]. Of the 52 food products that were assessed, only 38% were considered healthy by independent criteria, although 83% were deemed appropriate using industry standards including items such as chocolate, confectionery, sugary drinks and ice-cream [31].

The findings of these evaluations indicate that self-regulatory initiatives, in their current form, are insufficient to curb the amount of unhealthy food marketing that children are exposed to and the effect of this marketing. By comparing successful and less successful self-regulatory initiatives across a range of industries, including tobacco, alcohol, fisheries and forestry industries, Sharma and colleagues proposed eight standards that should be met if self-regulation is to be effective [32]. These included input from all stakeholders, transparency, meaningful objectives, objective evaluation and public reporting, and oversight [32]. In the case of food and beverage marketing, self-regulatory initiatives would require: the input of health and consumer groups as well as government and the food and advertising industries; transparency in developing standards on how breaches can be reported; be targeted towards reducing children's exposure to unhealthy food marketing and the persuasiveness of this marketing; be regularly evaluated for their effectiveness; involve public reporting on industry's adherence to regulations; and be overseen by an appropriate regulatory or health body.

The role of government in creating real and sustainable change in children's exposure to unhealthy food marketing

Governments have a clear leadership role, particularly in relation to the protection of children, protecting public health, overseeing broadcast and non-broadcast information environments and balancing the operation of free markets in the public interest. In the case of food marketing to children, government can provide leadership through statutory regulation or through co-regulation with industry. Statutory regulation has been most

commonly called for by health and consumer advocates, as this has the benefit of being independent, having greater accountability, ensuring unilateral compliance across all industry groups and of operating within the public interest.

In 2010, the World Health Organization released a set of recommendations for limiting the marketing of foods and non-alcoholic beverages to children [33]. One recommendation was that government should play a lead role in developing, monitoring and evaluating regulations to limit children's exposure to unhealthy food marketing.

Evidence of the effectiveness of statutory regulations to reduce children's exposure to unhealthy food marketing

Government restriction on television advertising to children has been a longstanding policy in Sweden (since 1991), Norway (since 1992), and across all media in Quebec, Canada (since 1980). While no systematic evaluations of the effectiveness of these regulations have been conducted, there is a small amount of research to indicate that these regulations have been effective in reducing children's exposure to unhealthy food advertising and the effect of this marketing.

One study from Quebec examined household purchases of breakfast cereals between English-speaking children, exposed to American television, and French-speaking children who tended to watch more French-language television. At the time of this research, French-language television channels banned advertisements targeting children whereas television broadcast from the US was not subject to these restrictions. Findings from this study indicate that English-speaking children, who had a higher exposure to advertisements for children's cereals, had significantly higher household purchases of advertised cereals compared to French-speaking children [34]. Research also indicates that children in Quebec have the lowest prevalence of obesity across all Canadian provinces, and the second lowest prevalence of overweight [35].

Additionally, in 2008 the Office of Communications in the UK introduced restrictions on the scheduling of television advertising of food and drink products to children. Under these regulations, advertisements for unhealthy food and beverage products were precluded from being shown in or around programs specifically designed for children or of appeal to children less than 16 years of age, and on dedicated children's channels. An evaluation of the impact of these regulations on children's exposure to unhealthy food advertising found that, compared to 2005, children saw around 34% fewer unhealthy food advertisements in the year following the introduction of regulations [36]. As such, these government regulations have been effective in reducing children's exposure to unhealthy food and beverage advertising and reducing the effect of this marketing on food purchases.

The case AGAINST regulating food marketing directed towards children

A complex array of rules and regulations already exists governing food marketing across multiple tiers of government. Social contract theory has long acknowledged the need for common rules in order for people to protect themselves and one another from harm. That

food marketing should be regulated is not an issue; however, questions need to be asked about the veracity and standard of evidence that justify changes to the existing legislation and self-regulation frameworks, how the outcomes of the new laws will be measured, what will happen if the new laws don't have the desired effect, and what other implications will additional regulations present to our market economy. Any proposed change to the regulation of food marketing should be realistic and likely to be effective in behavioural change. Considerable doubt exists that even the most extreme restrictions to the existing level of Australia's commercial speech will render the desired behavioural change.

What is marketing: now and in the immediate future?

The overwhelming body of academic literature discussing food marketing is embedded in the era of television dominated mass marketing characterised by the *Mad Men* television series (see www.amctv.com/shows/mad-men). However, television advertising is no longer omnipotent; marketing professionals, regulators and consumers face increasingly fragmented media. Experience is king. Companies seek to engage with consumers by offering elements of emotions, logic and general thought processes to connect with the consumer. Pushing a message is passé: consumers are the recipients of thousands of commercial marketing messages, each day. There is no way that consumers can react to all of the advertising or marketing communications they receive and they have become expert at filtering out unwanted messages.

In the *Mad Men* era of mass media primacy it was commonly assumed there was a linear relationship called a purchase funnel that was also encapsulated in hierarchical advertising models. These simple advertising models generalised that brand awareness led to familiarity with the brand, then to consideration for purchase, the act of purchase, and thereafter, repeated purchase. However, as categories and brands matured, new empirically based behavioural models of consumer behaviour were proposed suggesting habits were a major consideration in stable markets [37].

Consistent with the behavioural models, streetwise marketers sought to influence purchase decisions at or immediately before the point of purchase; in effect, to encourage brand switching. This shift largely explains the ascent of marketing techniques such as sampling, premiums, coupons, discounts, in-store radio, signs, and shelf space (slotting) in the marketing mix in order to influence short-term purchase behaviour, and ideally leading to repeat purchase or habit. It also provides historical context to the contemporary view that consumers undertake an increasingly sophisticated and technologically driven journey along many brand touch-points rather than being causally influenced by single or multiple forms of media. These marketing tactics, however, are not always successful, nor do they typically deliver long-term behavioural change [38].

Causality: silver or rusting bullet?

The case for regulating food marketing to children is based on assumptions that food advertising has a causal influence on children's food choices and that this contributes to rising rates of childhood obesity. It is also assumed that regulatory restrictions or bans

on food advertising will reduce rates of obesity and associated health problems. These assumptions appear to be unwarranted due to a lack of evidence and the continued evolution of communications practice. Holland et al. comment that the perceived threat of obesity is deemed to be so great that efforts to contain it may be subjected to less scrutiny than they warrant [39]. Suggested remedies based on incorrect assumptions are likely to be ineffective [40].

There are a number of possible causal relationships between television viewing and obesity. Critics of food advertising assume that more television viewing leads to more exposure to food advertising which in turn leads to purchase requests and hence increased consumption of unhealthy advertised foods. Television viewing might also lead to increased snacking and reduced family meal times. Increased television viewing may also be associated with a more sedentary lifestyle and hence reduced physical activity. Research linking television viewing with obesity and health outcomes generally do not attempt to distinguish between these three possible explanations of the relationship [5].

Correlational studies do not show causation

It is a fallacy of logic that correlational studies can show a causal relationship between marketing or advertising and obesity. Most of the reviews alleging that food advertising causes obesity have been largely based on correlational studies examining television viewing. For example, the US Institute of Medicine Committee on Food Marketing and the Diets of Children and Youth published a report cited by Livingstone [5] concluding, on the basis of 123 studies, that television advertising influences the food and drink preferences, purchase requests, and short-term consumption of children aged two to 11 years.

Livingstone [5] noted that the typical research designs linking marketing to behaviour/diet and to health outcomes were mostly surveys with low quality measures and low causal inference validity. Ecological validity was mostly high as these surveys considered real world behaviour. Most of these studies assessed exposure to advertisements through assessing general television viewing. Livingstone noted that only five findings from four published studies combined high causal inference validity and high ecological validity. None of these four studies demonstrated that exposure to advertising causes obesity. One study using a quasi-experimental design found that advertising exposure produced more favourable evaluations of products compared to non-exposure, but this did not affect purchasing decisions [41].

Much recent research on the link between advertising and obesity has largely been correlational in design because researchers have assumed that there is sufficient evidence of a causal link between the two [5]. However, this assumption seems inappropriate as research has not been able to disentangle confounding factors, such as lack of physical activity, or parental factors, that could plausibly have much larger effects on obesity. For example, there is research suggesting that higher levels of television watching are associated with permissive parenting styles that may be associated with less parental control over children's dietary behaviours [42]. The relevance of this causal assumption must also be

questioned with the decline in television viewing and the proliferation of other 'screens' increasingly used by children, adolescents and adults.

Mass media impact: going down

Technology evolves constantly, and rapidly. Moore's law predicts technological changes will occur at an exponential rate (approximately). Marketing communications are at the cutting edge of the technological development, often underpinning the commercial business model for change. Moreover, internet-based communications are increasingly integrated with other media, other forms of promotion, and even product offerings. From a research perspective, the rapid evolution of technologically based innovations in marketing makes their impact hard to assess, especially in a timely way, and also suggests evidence-based regulations will lag considerably behind marketing practice.

If advertising causes obesity through its influence on consumption of unhealthy foods then it would be reasonable to assume that rising rates of obesity would be accompanied by a rise in children's exposure to advertising and an increase in consumption of advertised foods [42]. Conclusions that advertising leads to obesity have been based largely on studies of television advertising [1–8]. However, children's television viewing has declined rather than increased over the last two decades [42]. Furthermore, due to the widespread diffusion of cable television, an increasing number of children spend more time watching channels with little or no outside product advertising than watching broadcast television programs.

Expenditure on television advertising for food is only one indicator of possible advertising influence and should not be assumed a measure of behavioural change. Moreover, advertising expenditure needs to be considered against changes in the cost for advertising, real dollar changes and declining audience levels (implying higher costs for a consistent level of reach and frequency). This means it costs considerably more in real dollars to have the same reach and frequency in 2012 than in 1992. Data from the UK suggest that food advertising on television declined from 34% of advertising in 1982 to 18% in 2002 [43].

Technological innovations have also reduced how much attention children pay to advertising. For example, the use of remote controls encourage channel surfing, and the introduction of video recorders, themselves largely rendered obsolete by the digital innovations TiVo and Foxtel, mean that viewers can record then zip (fast forward) or zap (switch to another channel) with minimal advertising exposure. In fairness, however, television ratings in Australia suggest only a very small percentage of viewers presently do this. As digital television broadcasting increases, the percentage of viewers who pre-record shows for later watching will likely increase, further leading to declining levels of advertising impact.

Technology is shifting traditional free-to-air television from omnipotence to a background media (similar to the audience shift from radio following the introduction of television). Accompanying the decline in television viewing led by younger demographics, there appears to be an increase in non-television 'screen time', such as computer use, videos, DVDs and video games [42]. Time playing video games is positively associated with risk of

obesity [42] as is computer usage time [44], and yet video games are largely advertisement free and what advertising they have is not usually food related. There has also been an increase in media multi-tasking (such as computer, iPad, SMS or Facebook use) during television viewing times, meaning that children pay less attention to commercials [42]. Additionally, studies of television suggest viewing might also conflate time spent watching videos and DVDs with time watching commercial television [7]. These factors together suggest that children's exposure and susceptibility to food advertising, and particularly televised advertising, has significantly decreased while obesity rates are claimed to be increasing. None of these moderating developments have been factored into research based in the *Mad Men* era.

It is also largely unexplained why television is claimed to lead to a causal relationship when other media do not. For example, a study on magazine advertisements for healthy and less-healthy foods found no effects on hunger or food preferences in pre-adolescent children [45]. Clearly more research on non-television food marketing is required in order to make informed decisions as to why regulation should occur primarily in one form of media rather than all media, and why advertisements on television are assumed to be problematic yet those in other media are ignored.

The advertising–obesity causality argument also ignores culturally based consumption habits. For example, in New Zealand, demand for fish and chips, an unadvertised product, is substantially larger than demand for heavily advertised fast foods such as hamburgers [40]. It is also argued that demand for a product can be primarily influenced by price and consumer wealth [40]. Reductions in advertising may lead to cost-based competition that could be passed on to consumers through price reductions and can have the effect of increasing consumption. Therefore, restricting food advertising could actually increase consumption of unhealthy foods, unless measures to increase the price, such as a 'sin tax' were introduced.

Obesity: evolving, but not necessarily growing

Research from the UK suggests that dietary energy intake has declined between 1983 and 1999 [43]. Similarly, US data show that Americans decreased their consumption of fat between 1965 and 1995 [40]. If advertising caused obesity due to increased consumption of unhealthy foods there would logically only be evidence of increased energy consumption. The findings that energy consumption has decreased while obesity has risen suggest the cause of obesity is not necessarily increased energy input. Rather, there may be an under-addressed issue related to decreasing energy output, that is, decreased physical activity and lifestyle.

The importance of decreased physical activity needs to be considered when interpreting findings that exposure to television advertising is modestly correlated with obesity. Cross-sectional studies have found that children's television viewing is positively associated with increased consumption of fat, sweet and salty snacks and carbonated beverages. Researchers assume that television exposure affects food consumption via advertising

and consequent purchase requests to parents [46]. Studies finding a correlation between television watching and obesity/health outcomes often understate other potential explanatory variables, including the nature of any assumed causal relationship [5]. Excess television watching might be a symptom, rather than a cause, of a sedentary lifestyle leading to obesity [45]. Obesity might cause a sedentary lifestyle in a reciprocal manner. Most studies do not distinguish between whether it is hours of watching television, or amount of advertising seen, that leads to unhealthy eating behaviour [5], although the 1983 study by Bolton [15] is a notable exception. Bolton found that exposure to food advertising had a significant although small effect on snacking (explaining 2% of the variance) but did not have a significant direct effect on energy intake. Bolton found that the influence of parental snacking frequency was stronger than that of food advertising. Food advertising did not have a significant effect on nutrient balance (deviation from percentage of Recommended Daily Intake) for specific nutrients. Parent nutrient balance explained 9% of the variance in nutrient balance.

Interestingly, an intervention to reduce time spent viewing television and playing video games was successful in reducing these behaviours and participants did have a reduction in body mass index (BMI) compared to a control group [47]. However, there was no reduction in high-fat foods or daily servings of highly advertised foods in the diet of the experimental group. Therefore, reducing exposure to television advertising did not appear to have an impact on diet. The authors suggested that decreases in BMI associated with reduced television viewing were due to increases in low-intensity physical activity. One of these studies did find that advertising affected consumption of orange juice (but not of unhealthy foods), but another of these studies found no effect of advertising on purchasing behaviour. Furthermore, reducing television viewing, and presumably exposure to food advertising, did not produce dietary changes but may have increased physical activity. Therefore, the apparent link between food advertising and obesity might be due largely to the associated sedentary lifestyle, a finding supported by Wong et al. [48]. Additionally, the correlation between television viewing and obesity might also be due to unobserved confounding factors [40]. For example, parents who restrict children's hours of television viewing might also encourage healthier diets and lifestyles.

Additional support for the role of lifestyle factors relating to lack of physical activity on obesity is drawn from findings from New Zealand that television viewing was inversely correlated with parental socioeconomic status (SES) [40]. The authors suggested that higher SES families could afford more after-school activities, such as sports electives to keep children occupied. Low SES families often left children unsupervised during after-school hours as it was common for both parents to be working. Children might therefore have tended to occupy their time watching television rather than engaging in outdoor activities. Fear of 'stranger danger' for children playing with little or no supervision, and other possible physical harm through participation in sports, reinforces the view that a sedentary lifestyle may be safer than a more physical lifestyle.

Critics of food advertising have argued that even though the amount of variance in BMI explained by exposure to food advertising appears to be small, the cumulative effects

are sufficiently important to warrant restricting or banning food advertising aimed at children. Implementing such restrictive policies might be misguided. Sweden introduced a comprehensive ban on all television advertising aimed at children in 1991 and childhood obesity rates in that country continued to rise [49].

Is the problem too much food, or only the wrong food?

It has been argued that imposing restrictions on advertising of unhealthy foods would be unfair because unhealthy foods have not been clearly defined [50]. Critics of food advertising complain that advertised foods do not match 'recommended diets' [7], yet there is a lack of expert consensus about what constitutes a healthy diet [49]. Proponents of the traditional 'food pyramid' recommend that people derive most of their energy from carbohydrates, yet an increasingly popular alternative view is that energy should be obtained mostly from protein and fat [49].

Developing guidelines for 'acceptable' foods to be advertised would appear to be highly complicated. It is clear that research is continually evolving: perfect knowledge about the perfect diet does not yet exist. Therefore a simpler alternative would be to ban all food advertising altogether. However, banning all food advertising would make it impossible to use television and other media to promote healthy food choices. An experimental study comparing the effects of advertisements for either healthy or junk foods found that, contrary to expectations, advertisements for junk foods did not enhance attitudes or intentions to these foods. On the other hand, advertisements for healthy foods actually did enhance attitudes and intentions to these foods in children who had seen these ads compared to children not exposed to them. This experiment suggests that advertising of healthy foods could actually have a beneficial impact on children's dietary habits [51].

Evidence that advertising of healthy foods can have a beneficial impact on diet was shown by research into the advertising of high-fibre cereals. Advertising containing information that high-fibre foods can reduce the risk of cancer was followed by an increase in market share for these products [42]. Regulations may prohibit certain truthful claims about foods that might be useful to consumers, eg calorie reductions can only be advertised if they are greater than 25% compared to a reference food. Producers might therefore lack incentives to reduce calorie content if they cannot meet this threshold.

Conclusion

The debate about the appropriateness and efficacy of any additional regulation of advertising of unhealthy foods to children centres around key themes: the definition of 'unhealthy' foods, the range of media that would be encompassed by any regulation, and importantly, the interpretation of available evidence. Public health, and food and marketing industries draw from overlapping bodies of evidence regarding the impact of food marketing on children's food consumption and obesity patterns, but draw different conclusions. The complexities of defining both the unhealthy foods and range of media (including new social media) to be covered by any regulation are widely recognised.

The potential of regulatory initiatives to reduce children's exposure to food marketing to some extent is also widely recognised, with debate focused on who should control such regulations. The further impact of this on children's diets and obesity levels is more uncertain, given the broader obesity-promoting environment in which we live. There is scope for the debate to broaden, for example, to introduce regulation to encourage the marketing of healthier foods and improve food product formulation. Or to foster a new approach to self-regulation which has full industry participation and consistent standards for defining unhealthy foods. Future work in this area should focus on estimating the actual impact of food marketing on children's food consumption patterns and obesity, and the development of transparent and meaningful regulations (either statutory or self-regulatory) which truly seek to improve the healthiness of the marketing environment for children.

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