



Television advertising of food and drink products to children

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NEW RESEARCH ON ADVERTISING FOODS TO CHILDREN
An Updated Review Of The Literature

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Note

This report provides an update on the earlier report to Ofcom entitled 'Advertising Foods to Children: Understanding promotion in the context of children's daily lives', by Sonia Livingstone and Ellen Helsper, published in May 2004

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Summary

This review updates Livingstone and Helsper's (May 2004) literature review to Ofcom, examining the influence of television advertising on children's food preferences and choices in the context of rising national and international levels of childhood obesity. The following conclusions are drawn:

1. There is a growing consensus that advertising works in its influence on children's food preferences, diet and health. Given that most advertising to children is for products high in salt, sugar and fat, this influence is harmful to children's health.
2. Expert commentators are now convinced that television viewing plays a role in contributing to the problem of children's unhealthy diet.
3. Very little is known about forms of food promotion other than in television advertising. This is a crucial gap as promotional strategies diversify.
4. The experimental evidence suggests that television advertising has a modest direct effect on children's (age 2-11) food preferences by demonstrating that those exposed to particular messages are influenced in their food preferences when compared with those who did not see those messages.
5. Although experiments identify causal relations between advertising and food choice, it remains unclear how these operate along side the complex conditions of daily life at home and school.
6. A growing body of well-conducted national and international surveys show a modest but consistent association between overall television exposure and weight/obesity. This applies among children and teenagers.
7. It remains unclear whether this association reflects the specific influence of exposure to television advertising or whether it is due to increased snacking while viewing or to a sedentary lifestyle with reduced exercise.
8. In both experimental and survey studies, the measured effects of advertising/television on food choices are small. Estimates vary, but some suggest that such exposure accounts for some 2% of the variation in food choice/obesity.
9. Cumulatively, this may make an appreciable difference to the number of children who fall into the 'obese category'. Further, this effect may be larger than the measurable effect of exercise and some other factors.
10. Multiple factors account for childhood obesity. Television viewing/advertising is one among many influences on children's food choices. These other factors include individual, social, environmental and cultural factors, all of which interact in complex ways not yet well understood.
11. Rather than asking simply, does advertising influence children's diet, it is recommended that research and policy instead asks, what are the multiple factors that contribute to children's diet and, within this broader picture, what is the role of food advertising/ promotion?
12. A range of interventions are now being tested, in the concerted effort to improve children's health. Many call for more positive health messages, and for a reduction in the promotion of foods high in sugar, salt and fat, as part of this wider effort.

Aims of the updated review

Following longstanding public concern over the potentially harmful effects of food promotion on children, a literature review for Ofcom entitled 'Advertising foods to children: understanding promotion in the context of children's daily lives' was completed in May 2004 (Livingstone & Helsper, 2004). Together with an earlier report (Livingstone, 2004), research on the effect of food advertising on children's food choice and, ultimately, children's obesity, was examined in the context of the other presumed factors contributing to the explanation for rising levels of obesity.

The present report provides an update on this earlier report, with the following aims:

- (1) to identify and critically review research subsequently published on the effect of television advertising on children's food preferences;¹
- (2) where appropriate, to revise the conclusions reached in the earlier review in the light of new evidence.

Approach

In the UK, Hastings et al (2003) recently conducted a comprehensive and systematic review of the evidence regarding food promotion to children. In the USA, the Institute of Medicine (2005) also published a wide-ranging and substantial review. Both provide detailed summaries of the many empirical studies, together with an evaluation of their strengths and weaknesses.² Consequently, the present review focuses on the most recent research, of which there is fast growing amount, in order to update Livingstone & Helsper (2004); it should be read in conjunction with the previous review.

- The focus is on academic research, primarily empirical, preferably published in high quality, peer-reviewed journals, in the past two years.
- This was identified from a keyword search of electronic data bases in the fields of developmental and social psychology, advertising/marketing, media and communications, health and medicine, nutrition and food sciences. Keywords combined advertising/promotion/television with food/obesity/weight/diet/nutrition and child/adolescence/teenager.
- Several dozen publications dated 2004 or 2005 were identified (c.f. bibliography).
- In addition, some research findings published earlier but not reviewed in Livingstone & Helsper (2004) are incorporated where these substantially support or qualify the earlier conclusions.

¹ The research literature has been concerned with a range of diet or health-related indicators, and these will be distinguished where appropriate in this review. They include: children's food knowledge and beliefs, food preferences, purchase requests to parents, behavioural choices and physical measures of weight (usually, Body-Mass Index or other measures of adiposity) or other aspects of ill/health.

² See also Coon & Tucker (2002), Eagle, Bulmer, De Bruin, & Kitchen (2004). Ebbeling, Pawlak, & Ludwig (2002), French, Story, & Jeffery (2001), Gunter, Oates, & Blades (2005), Kaiser-Foundation (2004), Kunkel et al. (2004), Livingstone (2004), Livingstone & Helsper (2004), Morrill & Chinn (2004), Prentice & Jebb (1995), Story, Neumark-Sztainer, & French (2002), Valkenburg (2004), and Young (2003).

Recent UK research

The British Medical Association, responding to the Government's White Paper of November 2004, recommends an outright ban on advertising foods to children in the UK (see British Medical Association, 2005; see also National Family Planning Institute, 2003).³ They particularly point to the power of celebrity endorsements, and call on the industry instead to promote healthy diets to children.⁴

Halford (2005) argued, in a review article, that “*major changes in the home life of many of our children need to take place*” and that “*TV adverts do influence children's behaviour and, critically, their intake*” (p.286).⁵

The British Birth Cohort, followed up at age 5, 10 and 30 (N=11,261), revealed that the amount of weekend television viewing in early childhood continues to influence BMI in adulthood (Viner & Cole, 2005).

Pursuing the growing concern over product placement, Auty and Lewis (2004) conducted an experiment in which 105 6-7 and 11-12 year olds were shown a scene from the film, *Home Alone*, in which Pepsi Cola was spilled, while a control group saw the same clip with no branded product. The experimental group were significantly more likely to select Pepsi rather than Coke afterwards, which the researchers interpret as showing that product placement serves as a reminder about previously established product preferences.⁶

³ Note that the White Paper, *Choosing Health: Making Healthier Choices easier*, suggests a voluntary period of modification of advertising foods to children, giving food advertisers until 2007 before reconsidering the question of a ban.

⁴ The BMA report does not explicitly discuss the empirical research findings on which they base this recommendation. Internationally too, paediatric and nutritionist organisations are calling for restrictions on food promotion to children, calls that are equally widely resisted by the food and advertising industries. In advancing this call, some point to the success of restrictions on advertising tobacco (Chopra & Darnton-Hill, 2004; Davey & Stanton, 2004; Daynard, 2004), though reductions in tobacco use must be recognised also as the result of a multi-faceted approach (Mercer et al., 2003).

⁵ In his research, reported in the previous review, 42 children aged 9-11 were shown advertisements for either food or non-food items. All the children ate significantly more after exposure to the food advertisements, and the obese and overweight children in the sample were particularly likely to remember the food advertisements (Halford, Gillespie, Brown, Pontin, & Dovey, 2004).

⁶ Note that relatively little work examines just what aspects of the advertisements influence children, though it is likely that different persuasive appeals are effective for children and teens. Valkenburg (2004) offers a standard summary of the empirical literature when she points to the following characteristics that evidence has shown to increase advertising effects: (1) repetition of the advertisement, (2) the use of peer-popularity appeal, (3) offering a premium (gift), (4) celebrity endorsement, (5) host selling, and (6) visual cues on packaging. For the range of promotional strategies used, see also Linn (2004), McNeal (1992); see also Moore (2004) and Moore & Lutz (2000). As Achenreiner and John (2003) show in their experiment, by the age of 12, children are highly aware of, and make use of, brand names as a cue in consumer judgements.

Recent international research

(A) The USA's Institute of Medicine's recent report

The USA's Institute of Medicine's (IOM) Committee on Food Marketing and the Diets of Children and Youth published a major report in December 2005.⁷ Key points include:

- Obesity among 6-19 year olds in the USA has tripled over the past four decades, to 16% in 1999-2002. The incidence of type 2 diabetes has doubled in the past decade, with notable increases also in the risk of heart disease, stroke, circulatory problems, some cancers, osteoporosis and blindness.⁸
- Adult healthy eating patterns are established in childhood, but the diet of children and young people departs substantially from that recommended, putting them at risk. Children's diets *"result from the interplay of many factors... all of which, apart from genetic predispositions, have undergone significant transformations over the past three decades"* (p.ES-3).
- One factor is food and beverage marketing, with \$11 billion spent on advertising in 2004, including \$5 billion on television advertising, in addition to the much larger amounts spent on other marketing investments (product placement, character licensing, in-school activities, advergames, etc).
- Of all the research published, 123 of the strongest and most pertinent articles examining the influence of food and beverage marketing on the diets and health of US children and youth were systematically coded in order to assess the nature of the available evidence.⁹ Since nearly all of these concern television advertising, it remains the case that virtually no scientific research has examined the influence of marketing campaigns on other platforms, including new media and multiple media venues.
- The key conclusion is that, *"among many other factors, food and beverage marketing influences the preferences and purchase requests of children, influences consumption at least in the short term, is a likely contributor to less healthful diets, and may contribute to negative diet-related health outcomes and risks among children and youth"* (p.ES-9). This is then broken down by age, dependent measure, and strength of the evidence, thus:¹⁰

- (1) there is *strong evidence* that television advertising influences the food and beverage preferences, the purchase requests, and the short-term consumption, of children aged 2-11;
- (2) there is *moderate evidence* that television advertising influences the food and beverage beliefs of children aged 2-11, and that it influences the 'usual dietary intake' of children aged 2-5, with weaker evidence for 6-11 year olds;

⁷ This has attracted widespread attention for the range of reforms it calls for in food promotion to children. See, for example, <http://www.nytimes.com/2005/12/16/business/16food.html> and <http://www.washingtonpost.com/wp-dyn/content/article/2005/12/06/AR2005120600671.html>. The study itself can be found at <http://www.iom.edu/report.asp?id=31330>

⁸ Strauss (2002) reviews the range of negative physical consequences of obesity.

⁹ This represents a considerably larger number of articles than the 55 identified and coded by Hastings et al (2003), though the authors remain concerned at the paucity of carefully designed studies addressing this important issue.

¹⁰ Note that the terms 'strong' and 'moderate' in what follows refer to the amount, quality and consistency of the evidence, not to the measured size or importance of the effect. See later discussion on the size of advertising effects.

- (3) *“it can be concluded that television advertising influences children to prefer and request high-calorie and low-nutrient foods and beverages”* (ES-10); for each of these points (1-3), the evidence regarding teenagers is judged inconclusive;¹¹
- (4) *“there is strong evidence that exposure to television advertising is associated with adiposity in children ages 2-11 years and teens ages 12-18 years”* but that the causal relations involved have not been determined.¹²

The report concludes with a range of recommendations that aim to improve the diets and the health of children and young people. These include calling for marketing resources to promote healthy diets, improving food labelling systems, conducting new research especially on promotion using new media platforms, and developing explicit industry self-regulatory guidelines for new forms of marketing communications.

It also recommends that, *“if voluntary efforts related to advertising during children’s television programming are unsuccessful in shifting the emphasis away from high-calorie and low-nutrient foods and beverages to the advertising of healthful foods and beverages, Congress should engage legislation mandating the shift on both broadcast and cable television”* (ES-20).

¹¹ A recent review has noted that very few experiments have been conducted on teenagers, making it difficult to go beyond the observation that television exposure is associated with unhealthy diets or obesity for this age group (Livingstone & Helsper, in press).

¹² Here the report bases its conclusion on large-scale survey findings that consistently show a correlation between obesity and hours spent viewing television. Since few if any experiments have been conducted with teenagers, it is not possible to determine the causal relations among the factors. Hence, the direction of causality could be either from obesity → viewing or from viewing → obesity. Most likely, the causal relation is bi-directional. Further, to the extent that viewing → obesity, the underlying mechanism remains unclear.

As noted in Livingstone and Helsper (2004), at least three mechanisms have been hypothesised: (a) viewing → increased exposure to food advertisements, (b) viewing → increased snacking while viewing and reduced family meal times, and (c) viewing → reduced exercise and a more sedentary lifestyle. It could be added that, while many of the survey reports do not explicitly address these three options, most associate television viewing with increased snacking and reduced exercise, without specifying also whether they consider that television advertisements result in increased snacking of high-calorie, low nutrient foods (e.g., Graf et al., 2004). Little research has, as yet, attempted to disentangle these explanations empirically, and it is possible that support could be found for any or all of them.

Interestingly, the growing literature on the possible link between obesity and computer games could help here, since finding such a link would favour the sedentary over the advertising hypothesis (since there is little advertising in computer games); not finding it would favour the advertising hypothesis. At present, findings are mixed, with some finding an association between obesity and playing computer games (Stettler, Signer, & Suter, 2004), some finding no association (Janssen et al., 2005) and others finding more mixed patterns (Vandewater, Shim, & Caplovitz, 2004).

What is the evidence base identified in the IOM report?¹³ A summary of the modal research characteristics of the 155 results identified within the 123 published reports is as follows:¹⁴

Research focus and characteristics	Links marketing/ advertising to precursors of diet¹⁵	Links marketing/ advertising to behaviour/diet	Links marketing/ advertising to health
When research published?	Mostly 1980s	1990s+	Mostly 2000+
Typical research design	Mostly experiments	Mostly surveys	Mostly surveys
Age group	Mostly children 2-11 years	More older children 6-11 years	Older children + teenagers
Marketing variable	Mainly exposure to TV advertisements	General TV viewing (incl. adverts)	General TV viewing (incl. adverts)
Type of outcome	Mainly preferences	Mainly usual dietary intake	Mainly adiposity
Quality of measures	Mainly medium	Variable	Mainly low
Causal inference validity	Mainly medium	Mainly low	Mainly low
Ecological validity	Mainly medium	Mainly high	Mainly high

This table illustrates the difficulty of achieving high quality research studies across all criteria, particularly encompassing both high causal inference and high ecological validity. The IOM report points to 5 findings (in 4 published studies) that they consider to achieve this high standard of research (French, Jeffrey, et al., 2001; Gorn & Goldberg, 1982; Greenberg & Brand, 1993; Robinson, 1999).¹⁶ These are summarised below:

¹³ Each available study is carefully and clearly described. Each was coded on multiple variables including, 'causal inference validity' (how well the study supports an inference regarding a causal relation between marketing and the outcome measure, rather than just a statistical association), 'measure quality rating' (how well the study measures what it claims to measure) and an 'ecological validity rating' (how well the findings observed in the study may be generalised to everyday life). As Hearold (1986) showed, studies strong on causal inference validity and measure quality tend to be weak on ecological validity, and vice versa, posing a problem for designing and interpreting empirical research (see also Livingstone, 1996; Livingstone, 2005). Beyond observing this perennial difficulty, it is intriguing that the IOM report, like many other studies of media effects from the American/ psychological/ experimental tradition, pays little attention to the many critiques of such studies, these being particularly prominent in the UK (Barker & Petley, 2001; Cumberbatch & Howitt, 1989; Gauntlett, 1998); see Millwood Hargrave & Livingstone (2006) for a broader discussion of these debates.

¹⁴ This table presents my summary of the more detailed evidence tables provided in the IOM report. In each cell, I have indicated the modal (i.e. most common or typical) characteristic only. Note that the number of studies included is approximately twice that included in Hastings et al, largely because the IOM report has included far more large-scale surveys relating television exposure to children's diet/health measures.

¹⁵ By this, the researchers mean food and beverage-related knowledge, beliefs, preferences, purchase requests, etc – the factors that temporally precede actual food choices and intake.

¹⁶ Note that the first two were included in the Hastings Review (Hastings et al., 2003), the third was not, and the fourth was identified too late for inclusion. In terms of the 'best' studies, therefore, the UK and US reviews are

- Gorn and Goldberg (1982) reported a naturalistic experiment conducted over two weeks with 5-8 year olds at a summer camp in Quebec (n=288), found that showing adverts for fruit resulted in children drinking more orange juice, while adverts for sweets resulted in them drinking less orange juice.
- French et al (2001) conducted a field experiment on food promotion (here, signs on vending machines), finding that while the effect of the signs ('low fat') was statistically significant, it was small, particularly by comparison with the effect of reducing the price of the healthy food choice (see also Hannan, French, Story, & Fulkerson, 2002).
- Greenberg and Brand (1993) administered a survey to 15-16 year old pupils in both 'Channel One' schools and matched schools which did not receive Channel One.¹⁷ They found that viewers of 'Channel One' evaluated products advertised on the channel more favourably than did nonviewers and that they named more of the advertised brands as products they intended to buy, although actual purchases did not differ between viewers and nonviewers.¹⁸
- Robinson (1999) provided a range of school-based interventions to 3rd and 4th grade children (approx. 7-8 years) to reduce their television viewing and videogame playing over a six month period. Compared with the control group, the experimental group not only reduced their television viewing but also showed reduced BMI and adiposity (though there was no reduction in high-fat foods, snacking or highly advertised foods in the diet of the experimental group).¹⁹

drawing on rather different sources of evidence, with the US review encompassing a greater number of studies (123 vs. 55), especially surveys.

¹⁷ In the US, 'Channel One' integrates 10 minutes of news and 2 minutes of advertising to teenagers. It is provided to schools who agree to show it to 90% of their pupils daily. The controversy, resulting in some schools taking the programming and others refusing, has been over the deal struck between original news content tailored to teens and the comparatively high rate of advertising, not otherwise permitted in many schools.

¹⁸ The comparison also revealed that student viewers of 'Channel One' knew more about news events broadcast on the programme than did nonviewers, though they did not have greater general knowledge of news and public affairs. In short, the study suggests that television has effects that may both benefit and harm children, depending on the content viewed.

¹⁹ This study is widely lauded as a successful intervention (e.g., Strasburger, 2001) as, in terms of reducing BMI, indeed it is. Yet it must be acknowledged that the explanation remains unclear, since it appears not the case that reduced exposure to advertising → reduced unhealthy diet → reduced BMI.

(B) Other recent international research

Content analyses continue to show the considerable discrepancy between the kinds of foods advertised to children and the recommended diet (Lewis & Hill, 1998; Neville, Thomas, & Bauman, 2005). Further, a literature review conducted for the American Psychological Association (Kunkel et al., 2004, p.12) argues that *“it is well documented that such ads [for candy, snacks and fast food] are typically effective in persuading children to like and request the product”*.

Survey studies continue to identify television viewing as one of a broader array of factors contributing to the explanation of overweight/obesity. These include:

- A 34-nation study of 10-16 year olds in 2001-2 found that, in 22 of the 34 countries (including the UK, where obesity figures are relatively high), there is a significant positive relationship between BMI classification and television viewing time (Janssen et al., 2005). A 10 nation study found a significant association between the proportion of children overweight and the numbers of advertisements per hour on children’s television (Lobstein & Dobb, 2005).
- An 8-year longitudinal study in Australia with over 1400 children found that BMI by the age of 8 years was significantly predicted by birth weight, mother’s BMI, and hours spent watching television when 6 years old (Burke et al., 2004).
- A cross-sectional survey of 9356 children aged 4-16 in urban China reported a correlation between prevalence of obesity and hours spent watching television, such that each extra hour spent watching television was associated with a 1-2% increase in the prevalence of obesity (Ma, Li, Hu, Ma, & Wu, 2002).
- National US research on over 4000 children aged 8-16 has shown that those who watch more television have more body fat and a greater BMI than lower viewers (Andersen, Crespo, Bartlett, Cheskin, & Pratt, 1998). Eating in front of the television is associated with eating more, for teenage girls (Francis, Lee, & Birch, 2003)²⁰ and with a higher fat diet (Woodward et al., 1997), while reducing television viewing is followed by reduced weight gain (Robinson, 1999). A cohort study of over 10,000 9-14 year olds in the USA found that those who spent more time with television/videos/games showed larger BMI increases a year later (Berkey et al., 2000); these effects were stronger for those who are already overweight, suggesting a cumulative effect over time (Berkey, Rockett, Gillman, & Colditz, 2003).
- A cross-sectional survey of 2762 parents with children found that the odds ratio of having a BMI>85th percentile was 1.06 for each additional hour of TV/video viewing per day, this increasing to 1.31 for those with a TB in their bedroom (after controlling for child age, child sex, maternal BMI, maternal education, ethnicity, etc) (Dennison, Erb, & Jenkins, 2002). There are, indeed, a good many large-scale, well-conducted national surveys, mainly but not only in the USA, that find an association between hours spent watching television and the likelihood of being overweight among children and teens.²¹

²⁰ Indeed, the literature contains scattered evidence that the effect of advertising on children is greater for girls (see also Hancox & Poulton, 2005), though this seems to be regarded as too tentative to feature as a general conclusion in the published reviews. A US survey of 9th grade (14 year old) girls reported a correlation between hours watching music videos and concerns over appearance and weight (Borzekowski, Robinson, & Killen, 2000).

²¹ See, among others, Dowda, Ainsworth, Addy, Saunders, & Riner (2001), Eisenmann (Bartee, & Wang, 2002), Giammattei, Blix, Marshak, Wollitzer, & Pettitt (2003), Gordon-Larsen, Adair, & Popkin (2002), Graf et al. (2004) and Guillaume, Lapidus, Bjorntorp, & Lambert (1997). One exception is a US survey of 2389 10-16 year olds, in

- A New Zealand survey of parents (sample size unspecified) reminds us of the well-known finding, little cited in this research field, that (greater) amount of television viewing is strongly associated with (lower) socioeconomic status (Eagle et al., 2004) – relevant here since obesity is also related to socioeconomic status; yet frequently, this latter variable is not measured in major surveys. In addition, this survey revealed parental beliefs that television advertising has a persuasive effect on their children.

which the effects of low socioeconomic status and African American ethnicity overshadowed any direct effect of television/video viewing (McMurray et al., 2000); for girls, these factors also overshadowed any positive effect of physical activity (see also Robinson et al., 1993). The specific effects of ethnicity are attracting increased attention (see also Dwyer et al., 1998; Gordon-Larsen et al., 2002), and may reduce the applicability of US-based research to the UK context.

Key conclusions

The present review, combined with the previous (May 2004) review, permits the following overall conclusions to be drawn.

(A) Growing consensus that advertising works

Since 2000, considerable – indeed, increased - research efforts have been devoted to the hypothesised relation between food promotion (mainly television/ television advertising) and children's food preferences, diet and health. Nearly all research published in the past few years supports the hypothesis that food promotion, especially television advertising, contributes to the unhealthy food preferences, poor diet and, consequently, growing obesity among children in Western societies. Systematic and substantial reviews of the best quality empirical investigations concur that these effects exist and that, since the vast majority of advertising is for high-calorie, low-nutrient foods and beverages, the result is harmful to children's health.²²

- The experimental evidence suggests that television advertising has a *modest, direct* effect on children's food choices. The advantage of the experiment is that it permits causal inferences. Thus experiments demonstrate that those who are exposed to particular messages are influenced in their food preferences and choices (as exhibited in the experimental situation), compared with those who did not see those messages.
- Since experiments isolate the particular influence of television advertising, they cannot reveal how advertising contributes to the overall explanation of obesity among children in real-life circumstances; hence, some continue to doubt the applicability of such findings to everyday life²³ Relatively few experiments are now being conducted, though a few more – mainly American - are published each year, perhaps because the researcher community considers the available evidence to be sufficient to conclude that advertising influences food preferences and choices. In recent research, few have questioned the claim that marketing/advertising is part of the problem,²⁴ and, as argued in Livingstone (2005), it must be recognised that there can be no definite proof, no ideal experiment to resolve matters for once and for all. Hence, policy decisions must be based on the balance of probabilities.

²² It is important to note here that the media effects identified in this research concern social and cognitive processes of persuasion which are neutral as to the outcome. In other words, the same persuasive processes could, if the products promoted were very different, equally well work to encourage healthier diets. The thought experiment – imagine a world in which all television advertising promoted fruit and vegetables – immediately points up how advertising is part of the problem but only part of the problem. For this alternative world to have a sufficient effect on children's diet, many other factors would have to change also – pricing, in-store promotions, parental choices, school meals, etc.

²³ See Ashton (2004), Gauntlett (1998) and Paliwoda & Crawford (2003). For discussion of these methodological debates, see Hill (2002), Livingstone (2005) and Millwood Hargrave & Livingstone (2006).

²⁴ This statement refers to the apparently growing consensus as expressed within peer-reviewed academic publications, these spanning the social and medical sciences. In other fora, counter views exist, of course. Taking a freedom of speech approach to the proposed restrictions on advertising, Zuwicki, Hold and Olhauen (2004) claim that the evidence does not show that food advertising affects food choices. Their primary grounds are that, (a) advertising cannot result in increased consumption without parents purchasing this for their children, and (b) if advertising causes obesity, then children's exposure to advertising must have risen in recent decades to account for the increase in obesity, which – they seek to show - it has not. They also identify a range of social and economic data regarding lifestyle trends in recent decades, this contributing to growing obesity rates (here they rely heavily on Cutler, Glaeser, & Shapiro, 2003).

- Recent research efforts have shifted from experimental to national survey methods, taking the causal hypothesis to have been established and turning to investigate the range of factors influencing children's diet and health. Large scale studies are needed here because many of these causal factors – including television advertising - exert a fairly small influence. Similarly, longitudinal research must track relatively small year-on-year changes, though cumulative findings over the past years or decades are now emerging and will continue to report in the next few years. Thus the body of survey evidence appears to be growing substantially. National surveys on children's health increasingly and routinely include a simple measure of exposure to television.
- Survey research shows a modest but consistent correlation between amount of television viewing and children and teenagers' weight/obesity. These surveys are generally well-funded nationally-representative surveys, conducted across the age range of children and teenagers, and conducted in range of countries. The evidence base is becoming more sophisticated as more longitudinal studies report effects over time, increasingly able to examine whether viewing at time 1 influences health at time 2. Since these surveys can include many potential factors simultaneously, and since the statistical analyses permit controlling for other factors when isolating the role of television viewing, surveys come closer to children's real-life circumstances.
- Unfortunately, a similar sophistication has not yet been applied to the measure used for television exposure - generally a simple estimate of hours per week. As presently conducted, surveys do not distinguish among three possible explanations for the observed association between television exposure and diet/health/obesity: (a) viewing → increased exposure to food advertisements, (b) viewing → increased snacking while viewing and reduced family meal times, and (c) viewing → reduced exercise and a more sedentary lifestyle. Many researchers suggest that all three factors operate, but further research is required to disentangle the direction of causality, the range of other causal factors operating, and the interactions among these factors.

Thus far, our understanding relies almost entirely on research conducted in relation to the effects of television rather than other forms of media/promotion. Important gaps in the research evidence base remain, these including:

- Effects on teenagers, where research is less clear, but which is important if the long-term effects on children are to be tracked through their development to adulthood.²⁵
- The influence of forms of promotion other than television advertising, this including both established and new forms and technologies, both of which are important because the indications are that expenditure on new forms of promotion greatly exceed those on television advertising. As the forms of promotion to children change, it is imperative the research keeps track of the consequences.

²⁵ The previous report concluded that evidence for effects was fairly similar across the age range from toddlers to teenagers, contrary to the common assumption that younger children are more vulnerable because they are less 'advertising literate' (Livingstone & Helsper, 2004, in press). Unfortunately, few if any experimental studies have been conducted on teenagers, so survey evidence relating overall television exposure to diet/weight is the main source of evidence; this limitation on the evidence base led the American Institute of Medicine report to observe that evidence of effects is stronger for children than it is for adolescents. Certainly, it seems likely that the underlying process of persuasion varies across the age range, with more sophisticated advertising directed at the more advertising-literate teens.

(B) Advertising effects are small

The size of the effect of television advertising – the relative contribution of television advertising by comparison with all the other factors that influence children’s food choice and health – remains little discussed and difficult to determine.

- Bolton (1983) had found that, among in the broad array of factors that influence eating habits, food advertising independently contributes 2% to the variance explained. Some research suggests that this is a small effect especially by comparison with findings of greater influence of parental diet, product price, family meal habits or exercise (Ashton, 2004; French, 2003), though it is consistent with findings in other areas of media effect (Emmers-Sommer & Allen, 1999; Hearold, 1986; Kline, 2003; Livingstone, 1996).
- Hancox and Poulton (2005), analysing a longitudinal panel survey of 1037 children from birth to 15 years in New Zealand,²⁶ note that “*correlation coefficients of this magnitude [between 0.05 and 0.12] are generally regarded as indicating a small effect size and suggests that television viewing explains little of the variance in BMI*” (p.3-4).²⁷ They add that the correlations between viewing and BMI are greater than those observed between levels of physical exercise and BMI, and between dietary intake and BMI (though the relation between energy consumed and expended must, in theory, account for BMI). Hence, they recommend interventions aimed at reducing television viewing.
- The IOM report briefly considers the size of the effect in the research it reviews, noting that “*the research examined typically explained a small rather than large amount of the overall variability in adiposity*” (p.5-91). It cites one national survey in the USA which found that even when diet, age, gender, race/ethnicity, socioeconomic status and television viewing are all taken into account, only 8.5% of the variability in children’s adiposity, and 11.4% of the variability in teens’ adiposity, can be explained (Storey et al., 2003).
- Storey et al estimated that, for every additional hour of daily television viewing, BMI could increase by 0.2. For this increase in viewing, Dietz and Gortmaker (1985) estimated that the prevalence of teenage obesity could increase by 2% - not such a small figure when, in the USA, this is estimated at an additional 1.5 million young people falling into the ‘obese’ category (McGinnis et al., 2005, p. 5-92).
- A prospective longitudinal study (with 548 11-12 year olds over 19 months) found that, for each additional hour of television viewing per day, fruit and vegetable servings decreased (-0.14) (Boynton-Jarrett et al., 2003). In the US Youth Risk Behavior Survey (of 15143 high school students), “*boys and girls were ~20% to 25% less likely to be classified as overweight if they reported 2 to 3 hours of TV per day and ~40% less likely to be classified as overweight if they reported ≤1 hour of TV per day compared with those who watched ≥4 hours of TV*” (Eisenmann et al., 2002, p.379).

²⁶ Hancox & Poulton (2005) found a significant association between television viewing and BMI, even after controlling for sex (though results are stronger for girls; c.f. Robinson et al., 1993), socio-economic status, mother’s and father’s BMI and, for those aged 15, own BMI at age 5. They conclude that these findings point to “*a cause-and-effect association between television viewing and overweight*” (p.3).

²⁷ They also point to a range of measurement difficulties affecting surveys, especially longitudinal surveys, which reduces the strength of the association; the ‘true’ association between viewing and overweight, they therefore propose to be greater.

In sum, the indications are that the effect size of television/advertising is small to medium.²⁸ This is the case for both experiments (generally, on television advertising) and for surveys (generally, on overall television exposure). However, although this is generally acknowledged (Royal College of Physicians, 2004), many researchers are concerned to stress that 'small' effects in statistical terms add up to a large number of children in absolute terms, and the cumulative effects over the period of a child's development are much more sizeable, as some longitudinal research is beginning to show (e.g., Hancox & Poulton, 2005).

(C) Multiple factors combine to account for obesity

Obesity is caused by multiple factors. Consequently, food promotion must be understood within the larger web of causality underlying children's food choice, health and obesity. Research reviewed in Livingstone and Helsper (2004) suggests that exercise levels (of both parents and children), meal habits (of both parents and children) and exposure to advertising each make an independent contribution to accounting for variation in children's food choice, health and obesity, and further that they interact with each other, indirectly affecting children's health. Food knowledge also matters, though it does not always translate into food behaviour. Declining levels of exercise are also part of the explanation for rising obesity levels.

- These multiple factors work at several distinct levels in affecting children's food choice: (1) Individual (intrapersonal) - psychosocial, biological and behavioural factors; (2) Social environmental (interpersonal) - family, friends and peer networks; (3) Physical environment (community) – accessibility, school food policy and local facilities; (4) Macrosystem (societal) - mass media and advertising, social and cultural norms, production and distribution systems and pricing policies (Story et al., 2002).
- Multiple factors work indirectly as well as directly. It is too simple to posit that each plays a separate role in accounting for variation in food choice. Rather, these factors (including television/advertising/promotion) interact with each other, *indirectly* as well as directly affecting children's food choice. A range of mediating factors thus operate between advertising and children's food choice, including gender, cost, birth order, cultural meanings of food, obesity levels, family eating habits, parental regulation of media, parental mediation of advertising, peer norms, pro-health messages and pester power.
- These multiple factors vary not only in the extent of their influence but also in their susceptibility to intervention and change. Expert commentators are agreed that a multi-stranded intervention, in which the media form one strand, is more likely to succeed than interventions based on any single factor.

Given the complex array of factors apparently contributing to the rise in childhood obesity, a different approach is recommended. If research and policy continues to ask simply, 'does food promotion affect children's food preferences, knowledge and behaviour?', the debate will continue to be polarised, with calls for new and better research followed by unresolved methodological dispute.

Alternatively, one can ask what factors affect children's food preferences, knowledge and behaviour? This requires a refocusing on a probabilistic assessment of range of risks to children's health and should take us into a broader and potentially more productive

²⁸ Note that the term 'effect size' refers to a statistical index of magnitude; similarly 'small' and 'medium' refer to a particular range of magnitudes of association. See Cohen, J. (1988). *Statistical Power Analysis for the Behavioral Sciences* (2nd ed.). Hillsdale, NJ: Lawrence Erlbaum Associates.

discussion of the range of factors involved in children's food choice (Livingstone, 2005; Millwood Hargrave & Livingstone, 2006).

(D) Range of interventions identified

A growing body of research is devoted to seeking fruitful and practical strategies by which to intervene in the problem of growing obesity among children (and adults), many of which were noted in Livingstone and Helsper (2004) (see also Kaiser-Foundation, 2004; Strauss, 2002; Sutcliffe et al., 2003).

Many do not focus on television, or television advertising, though there is a growing perception that, while acknowledging the importance of a multi-factor, multi-stakeholder approach, it may be that reducing children's exposure to television can provide an effective and practical means of intervention. By this means, one may reduce energy intake, reduce exposure to advertising, and increase exercise.²⁹

The literature also contains a good number of reports on successful interventions, taking a range of approaches. Examples include:

- In the USA, Hindin, Contento and Gussow (2004) showed that a media literacy nutrition education curriculum, delivered to 35 underprivileged parents, can significantly increase parents' understanding of the persuasive nature of advertisements as well as of food labels. In this, they add their voice to the many calling for a media literacy approach (e.g., Irving & Neumark-Sztainer, 2002).
- In a longitudinal study in the USA, a large-scale advertising campaign lasting one year and targeted at 9-13 year olds and their parents was shown to increase the amount of free-time physical activity in a sample of over 3000 children (Huhman et al., 2005).
- A longitudinal study in Germany, following 2440 5-7 year olds for several years, monitored the effect of a thorough school intervention strategy encompassing nutrition education and health promotion to the children, their parents and teachers. The intervention messages included advice to decrease TV viewing to less than one hour per day, in addition to advice on healthy eating, exercise, etc. Three months after the end of the interventions, the research appeared successful on a range of indicators (Müller, Asbeck, Mast, Langnäse, & Grund, 2001).
- Lobstein and Dobb (2005) review international evidence that increasing the number of pro-health advertising messages is weakly associated with fewer overweight children in the population, while Gassin (2001) provides an example of how the food industry can use its promotional skills "*in helping consumers to achieve a balanced diet*" as part of "*the successful implementation of public health nutrition strategies*".
- Licence (2004) reviews the range of interventions that have, or could yet, prove successful in the UK. Other research reviews highlights a range of factors that could and should also contribute to a coordinated attempt to improve health and reduce obesity, including the importance of school meals (Gross & Cinelli, 2004).

Too often, however, conclusions regarding the effectiveness of a range of policy interventions (including advertising bans to children, increasing media literacy levels, reducing children's exposure to television, promoting healthy diets, etc) are inconsistent or unclear. For example, Kunkel et al. (2004) concluded their substantial literature review by

²⁹ See also Caroli, Argentieri, Cardone, & Masi (2004), Dietz & Gortmaker (2001), Ebbeling et al. (2002), Gordon-Larsen et al. (2002) and Wadden, Brownell, & Foster (2002).

noting that they could find no study that examined the statistical relation between children's understanding of advertising's persuasive intent and the impact of advertising and that, *"there is little evidence that media literacy interventions can effectively counteract the impact of advertising on children of any age, much less the younger ones who are most vulnerable to its influence"* (p. 21).

Further research is needed if an evidence-based approach to policy is to emerge that can hope to reduce levels of obesity among children. All commentators appear agreed, however, that as a multi-factor problem, a multi-factor solution is required, with all stakeholders working together to address this challenge. The Institute of Medicine (2005) report identifies a wide-ranging set of initiatives that, together, could prove effective. Among these they stress, as do many other researchers, the importance of changing the approach, content and regulation of food promotion to children.

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