**Children’s exposure to food advertising on television: The impact of statutory restrictions**

Rosa Whalen M.Sc.,¹ Joanne AlisonHarrold Ph.D.,¹ Simon Frederick James Child Ph.D.,² Jason Christian Grovenor Halford Ph.D.¹ & Emma Jane Boyland Ph.D.¹

**Author Affiliations:**

¹Department of Psychological Sciences,

University of Liverpool,

Eleanor Rathbone Building,

Bedford Street South,

Liverpool,

L69 7ZA,

UK.

²Cambridge Assessment,

1 Hills Road,

Cambridge,

CB1 2EU,

UK.

**Corresponding author:**

Rosa Whalen

Department of Psychological Sciences,

University of Liverpool,

Eleanor Rathbone Building,

Bedford Street South,

Liverpool,

L69 7ZA,

UK.

Telephone: 044(0)151 794 3056

Email: r.whalen@liverpool.ac.uk

**Introduction**

A rapidly expanding literature demonstrates the effects of food promotion on young people’s consumption of energy dense foods (Boyland, Harrold, Kirkham, Corker, et al., 2011; Halford, Gillespie, Brown, Pontin, & Dovey, 2004; Halford et al., 2008) with researchers highlighting its contribution to rising levels of pediatric obesity worldwide (Ng et al., 2014; for a review see Cairns, Angus, Hastings, & Caraher, 2013). This has compelled the World Health Organisation (WHO) to make responsible food promotion a global priority, publishing documents (WHO, 2010, 2012) to guide Member States in the implementation of policies to limit marketing of foods high in fat, sugar and/or salt (HFSS) to children. They emphasise the importance of adopting a system of monitoring and evaluation to ensure policy objectives (i.e. reductions in children’s unhealthy food marketing exposure) are met.

Despite growth of online marketing (Powell, Harris, & Fox, 2013), television remains the primary medium of food and beverage promotion to youth (Landon, 2013) and constitutes the greatest child-targeted food advertising expenditure in many countries (Federal Trade Commission, 2012). **Psychological models (e.g., Social Cognitive Theory) can be applied to better understand how television food commercials exert an effect on children and adolescents (*see* Harris, Brownell, & Bargh, 2009 for the discussion of various theories in relation to food marketing). An expansive international literature now also quantifies food and beverage advertising on television, where studies either directly record and analyse advertising content broadcast on television or purchase this information from research companies. Food commercials broadcast on television during child-targeted programming predominantly promote HFSS foods (Effertz & Wilcke, 2012; Ng et al., 2014; Romero-Fernández, Royo-Bordonada, & Rodríguez-Artalejo, 2010). Specifically, fast food, sugary drinks and high sugar/low fibre cereals are all food groups frequently advertised to children and adolescents on television (Emond, Sargent, & Gilbert-Diamond, 2015; LoDolce, Harris, & Schwartz, 2013; Yale Rudd Center for Food Policy & Obesity, 2010). Methodological differences across broadcasting samples (e.g., number of channels, times of day, amount of days/months) and food categorisations (e.g., 1) i) core (healthy), ii) non-core (unhealthy), iii) miscellaneous food categories, 2) nutrient profiling systems, 3) food pyramids) can make direct comparisons between studies problematic in this literature.**

In the UK, the broadcast regulator Ofcom imposed media-specific statutory regulation with the aim of reducing exposure for children under the age of 16 years to the advertising of HFSS foods on television (Ofcom, 2006). Phased in during 2007-2009, the regulations banned HFSS commercials on dedicated children’s channels, restricted the broadcast of such commercials around programmes of appeal to 4-15 year olds on any channel (Ofcom, 2010). These restrictions are thought of as "one of the strictest advertising regulatory regimes in the world concerning the foods that can be advertised to children on TV" (Cooper, 2015) and are an example for countries currently relying on self-regulatory pledges from industry to limit food marketing influence on children (Hawkes & Lobstein, 2011). However, there has been limited examination of the impact of these regulations.

Ofcom conducted its own evaluation of the regulations soon after full implementation in 2010, stating that children saw 37% less HFSS advertising on commercial channels after the regulations. However this review comparing 3 months of television in 2005 and 2009 was flawed methodologically (Adams, Tyrrell, Adamson, & White, 2012), due to its short time frame overlooking seasonality of food and drink advertising and failure to monitor long-term trends. Adams et al. (2012) compared 7 days of television recorded 6 months before the regulations to 7 days of television after the full regulations had taken effect and, conversely, found that children were still being exposed to the same amount of unhealthy food advertising as they were pre-regulations.

The most comprehensive study (Boyland, Harrold, Kirkham, Halford, 2011), using the same coding system as the present study, monitored 12 months of UK television during 2008 (over 5,000 hours). At this point the regulations were in the middle phase of implementation (with full implementation of all rules from January 2009). Food advertising comprised 12.8% of advertised content and non-core (unhealthy) foods constituted 56% of all food commercials, core (healthy foods) 18.1% and miscellaneous foods 25.9%. There were a greater proportion of commercials for food during peak children’s viewing hours compared to non-peak (15% vs.12.7%). This study by Boyland and colleagues provides the baseline data for the current study.

Inconsistencies in levels of reported advertising exposure may be explained by the range of outcome variables between studies. Ofcom used their own variable (impact) as measurement of exposure change whereas Adams et al. (2012) focussed on advertising person-minute-views. The present study quantifies core and non-core food commercials and differs from HFSS foods defined by nutrient profiling (Department of Health, 2011) but largely catches the same themes. An example of where these approaches differ is categorising fast food restaurants advertising ‘healthier’ foods as the food product would be defined as healthy by nutrient profiling but coded as non-core in the present study. The current paper builds on existing short-term snapshots to provide comprehensive data on changes to children’s food commercial exposure across two years. The present study is the first to compare a substantial sample of 2010 UK commercial television with equivalent data from 2008 (Boyland, Harrold, Kirkham, Halford, 2011) to explore change in the general food advertising environment and assess the impact of the Ofcom food advertising regulations.

**Method**

Television transmissions on 13 commercial channels popular with children were recorded on one weekday (Tuesday or Thursday) and one weekend day (Saturday or Sunday) during February, April, June, August, October and December 2010. These were grouped into children’s (Nickelodeon, Cartoon Network, Boomerang, CiTV), sport (Sky Sports 1), family (ITV, Channel 4, Channel 5, Sky, E4) and music (4Music, Smash Hits, MTV) channel types.

Channels recorded mirrored those monitored in 2008 (Boyland, Harrold, Kirkham, Halford, 2011) and the criteria for channel selection included channels with the greatest viewing share for children aged 4-15 years and those which appeared in the top five channels watched in the previous week by 5-16 year olds (Childwise, 2007). Television was recorded from 6am-10pm (16 hours), with the exception of CiTV which only broadcasts for 12 hours (6am-6pm). This resulted in a total sample of 1931.5 hours for the study (missing data due to recording errors).

Recorded television was examined for advertised content and coded as described in Boyland et al. (2011). Categories included channel, channel type (family, children’s, music, sports), programme category around which the advertisement was shown (e.g., comedy, soap opera), month of broadcast, time of day of broadcast and product advertised (e.g., food/beverage, toys, toiletries). Peak children’s viewing times were also recorded as 5:30pm-10pm on weekdays and 7pm-9pm at weekends (when children constitute greater than 25% of audience share (Ofcom, 2004). Food/beverage items were further categorised into one of 29 food groups of which all were exclusively core, non-core or miscellaneous items. Core food items were those that are necessary to consume on a daily basis in order to meet nutrient requirements (e.g., fruit and fruit products), non-core food items were those providing an excess of nutrients and/or energy (e.g., fast food restaurants/meals), whilst all other items were categorised as miscellaneous (e.g., generic supermarket adverts). The present analysis followed the exact same coding procedure as previous research (Boyland, Harrold, Kirkham, & Halford, 2011) where programme sponsors were not included.

Data from this 2010 analysis were then compared to pre-existing data from 2008 to explore changes in advertising prevalence (a proxy for children’s exposure) between the two time periods when regulatory change occurred. In line with existing monitoring frameworks (Kelly et al., 2013), this study communicates change in television food advertising over time using descriptives (e.g., % change). This allows assessment of change in the post-regulatory environment to be efficiently demonstrated; contributing to a “consistent system for monitoring food promotions nationally, regionally and globally” (p67, Kelly et al., 2013).

To assess reliability of coding between researchers, a random two hour sample of television recording was coded by both researchers (EB, RW). Agreement between coders on product category was 93% and food product type classification was 92.9%. Due to differences in sample size (12 months of data for 2008 and 6 months for 2010) comparisons are made on the basis of proportional data (percentages and rates per hour) rather than number of occurrences. To confirm that 6 months of 2010 television recording was representative of 12 months of television (as analysed in 2008), we found a less than a 1% change in each proportion of food advertised (core foods (+0.4%) non-core foods (-0.8%) and miscellaneous items 197 (+0.5%)) between the 12 month published data of 2008 compared to 6 months.

**Results**

**OVERALL PREVALENCE OF FOOD COMMERCIALS**

The recorded study time for 2010 was 1931.5 hours within which there were 56,162 advertisements, at a rate of 29.1 ads per hour. Food and drinks were the third most frequently advertised product type (11.9% of all advertised products), showing an overall decrease in food advertising prevalence from 2008 of 0.9%. See Table 1 for a comprehensive list of the food types advertised in 2010 compared to 2008. There were a total of 6,664 food and beverage commercials throughout the study period, broadcast at an average rate of 3.5 per hour with non-core food adverts being broadcast most frequently (at an average rate of 1.9 per hour). 2010 saw a 4.3% reduction in food advertising (as a percentage of all adverts broadcast) on dedicated children’s channels (Nickelodeon, CiTV, Cartoon Network, Boomerang) from 8.2% in 2008 to 3.9% in 2010. However, increases in food advertising prevalence were seen across all other channel types monitored: family channels (+0.3%), music channels (+3.0%) and the sports channel (+4.3%).

[INSERT TABLE 1 ABOUT HERE]

**CORE, NON-CORE AND MISCELLANEOUS FOOD ADVERTISED**

Non-core foods made up 53.8% of food adverts broadcast in the 2010 sample, core foods 18.6%, and miscellaneous foods 27.5% (see Figure 1). Compared to 2008, there were few changes in these proportions; with a reduction in non-core food adverts (-2.1%) and an increase in core food adverts (+0.5%). Music channels broadcast the greatest proportion of non-core food advertisements (59.4%, an increase of 7.6% from 2008) followed by the family channels (54.0%). For family channels this represented 3.6% rise from 2008. On children’s channels an average of 51.2% of commercials showed non-core foods, a reduction of 8.6% from 2008 levels (59.8%). However, CiTV broadcasted the largest proportion of non-core food commercials of all 13 channels studied (68.8%, mostly comprising fast food restaurants (58.4%) and sugar sweetened beverages (25.9%). Finally, the sports channel broadcast the lowest proportion of non-core foods (48.2%) in contrast to 2008 findings where they showed the greatest proportion of all the channel types (78.3%). Children’s channels broadcast the highest proportion of core food advertising (28.2%); however the majority of food advertisements on these channels were still for non-core products (see above, and Figure 2).

 [INSERT FIGURE 1 AROUND HERE]

**PEAK AND NON-PEAK CHILD VIEWING TIMES**

During peak children’s viewing times, 17.0% of all commercials in 2010 were for foods, an increase of 4.7% from non-peak children’s viewing times (12.3%) and an increase of 1.7% from the equivalent times in 2008. A higher proportion of food adverts were shown during peak child viewing times on sports channels (+3.4%), family channels (+1.6%) and music channels (+13.2%), compared to non-peak children’s viewing times. Total proportion of core, non-core and miscellaneous foods differed across peak and non-peak viewing times, there were fewer core (-0.9%) and more non-core (+0.5%) foods advertised during peak child viewing times. Non-core foods were more heavily advertised during peak times on music channels (+11.6%) and the sports channel (+7.7%) than during non-peak broadcasting.

[INSERT FIGURE 2 AROUND HERE]

**FOOD TYPES ADVERTISED**

Fast food items were the most heavily advertised foods (15.4%) across the whole sample of 2010 television, a 3.5% increase from 2008 (Boyland, Harrold, Kirkham, & Halford, 2011a; see Figure 3). Of these, 28.3% were for ‘healthy’ meal bundles and 71.7% were traditional fast food adverts in 2010, where ‘healthy’ adverts decreased 10.5% from 2008 levels (38.8%) and traditional adverts increased 10.4% (61.3%). The second most frequently advertised food type was generic supermarket adverts (10.7%) which decreased 1.6% from 2008. Sugar sweetened drinks was the third most frequently advertised food product type (7.7%) showing the biggest increase from the 2008 data (4.9%; see Table 1).

[INSERT FIGURE 3 AROUND HERE]

The largest percentage increases from 2008 were seen for sugar sweetened drinks (+ 4.9%), full fat dairy products (+3.8%) and fast food restaurants (+3.5%). The largest percentage decreases were seen for high sugar/low fibre breakfast cereals (-6.1%), supermarkets advertising mostly core foods (-3.6%), and low fat dairy products (-2.2%). Fruit and vegetable advertising increased, albeit modestly (2.2% and 2.4% respectively).

**SEASONAL VARIATION**

Analysis of advertising patterns per month across all channels showed a marked increase in the proportion of non-core food commercials broadcast during August (when UK schools are closed for summer vacation for the entirety of the month). During August, 64.3% of foods advertised were for non-core items, with 10.9% of commercials representing core foods. This is notably different from June (outside of school holidays) where non-core and core products constituted 46.9% and 26.1% of food commercials respectively. Considering dedicated children’s channels, a doubling of the proportion of non-core food advertising was seen during August (64%) relative to June (32.3%), with core food commercials representing 54.8% of advertising during term time and 18.1% during the school holiday. Seasonality found in August 2010 differs from August 2008, where non-core food adverts were 18.5% lower than August 2010 (45.8%) and core food adverts were 19.7% higher (30.5%), implying a decline in the nutritional quality of television food adverts within the school holidays between 2008 and 2010.

**Discussion**

The WHO advocates systematic monitoring and evaluation of national policies restricting food advertising, to determine the most effective means of protecting children from HFSS food promotion (WHO, 2012). To our knowledge, this study presents the most comprehensive study of changes in food commercial exposure during and after full implementation of statutory food advertising regulations, using the UK as an example. As in 2008 (Boyland, Harrold, Kirkham, Halford, 2011), food was the third most frequently advertised product category in 2010. Comparisons reveal that overall food advertising decreased 0.9% from 2008, to account for 11.9% of all adverts shown in 2010. This study illustrates that this regulatory approach to television food commercial restriction had very little impact in decreasing overall food advertising between 2008 and 2010 on the channels most watched by children. A strength of this study is the longitudinal comparison with similarly extensive baseline data (Boyland, Harrold, Kirkham, Halford, 2011), covering programming actually watched by children. Thus this data is a better proxy for real-life exposure to food advertising than studies focused solely on dedicated children’s channels. **Likely explanations of why results reported in the present study differ from the Ofcom findings (Ofcom, 2010) include differences in outcome metrics employed (Ofcom used ‘impacts’ (defined as ad spots by airtime category and channel groups) whereas the present study quantified food commercials as frequency of core, non-core etc) and broadcast sample size and breadth (more channels were monitored over a longer timeframe in the current study).**

The balance of foods advertised (core, non-core and miscellaneous) remained relatively static between the two time points, with non-core food advertising exposure reducing 2.2% to 53.8%. These figures parallel countries where the food industry self-regulates its marketing activity or where no regulation exists (Kelly et al., 2010). Core foods gained 0.5% more exposure after the regulations with some small increases in fruit and vegetable advertising (3.5% and 2.9% respectively). However only one core food item featured in the top 10 most advertised food products (low fat dairy items). Mirroring 2008 analysis (Boyland, Harrold, Kirkham, Halford, 2011), six non-core food items made the top 10 (fast food, sugar sweetened drinks, full fat dairy, chocolate and confectionary, high fat/sugar/salt spreads and alcohol) with sugar sweetened cereals and snack foods being replaced by sugar sweetened drinks and full fat dairy in 2010. Since the restrictions were designed to reduce the ‘opportunities to persuade children to demand and consume HFSS products’(Ofcom, 2008) the lack of change in both prevalence and types of foods advertised goes against the stated aims and demonstrates their inadequacy.

Monitoring commercials broadcast during peak children’s viewing times demonstrated an increase in amounts of foods advertised (as a percentage of all adverts during peak times) of 2.4% from 2008. Fewer core and more non-core foods were advertised during peak child viewing times illustrating a shift in scheduling rather than a tangible reduction in non-core food advertising. This is a concern as 67% of children’s total television viewing takes place outside children’s viewing time; something that has remained consistent since 2005 (Ofcom, 2008). Basing restrictions on the proportions of child viewers rather than actual viewing numbers means these regulations fail to protect children during peak children’s viewing hours where we have found non-core food advertising to increase; something highlighted by a leading UK consumer group during pre-regulation consultations (Ofcom, 2006).

Due to an increase in prevalence, fast food commercials became the most frequently advertised food item in 2010. This is in line with reports that the UK fast food market has been growing steadily in recent years (Roach & Burnett, 2012), mirroring the US (Powell et al., 2013). There was a decrease in adverts for ‘healthier’ fast food options from 2008 to 2010; however these still constituted 28.3% of all fast food adverts in 2010. This practice allows companies to sidestep the restrictions on HFSS food commercials by advertising healthier products to ensure air-time for their brands on children’s channels. A recent study found that children exposed to commercials for ‘healthy’ McDonalds meal bundles (consisting of fish fingers, a fruit bag and a bottle of mineral water) increased their liking of fast food but did not make healthier choices (Boyland, Kavanagh-Safran, & Halford, 2015). Therefore, there is a need for informed debate around this particular issue to determine whether legislation should restrict this practice.

Analysis of the seasonal trends in food advertising on these child-popular channels also demonstrated that during the month of August, when UK children are off school and therefore theoretically have greater free time available for watching television, the proportion of food advertisements for non-core products rose sharply relative to previous and subsequent months. This pattern was observed both overall and for child-dedicated channels specifically, suggesting that this may be the result of strategic targeting of child consumers by the food marketers to facilitate the greatest exposure for their promotions.

In sum, the present study indicates little change in the general food advertising landscape and implies that the UK regulatory regime has had minimal impact on children’s exposure to HFSS food advertising on television. Without dismissing the small number of positive changes (increases in fruit and vegetable advertising and decreases in sugar sweetened cereals), the present study provides further evidence that this avenue of regulation has simply shifted non-core food advertising away from children’s channels onto family channels. On these grounds, policymakers must carefully scrutinise the specific detail when designing food advertising regulation to ensure they will be effective in reducing children’s exposure to unhealthy food advertising on television, as advocated by WHO (WHO, 2010, 2012). Continued monitoring to examine the long-term impact of the regulations and highlight policy gaps is critical. To increase exposure to healthier options policymakers should consider the merits of a ban on non-core food advertising pre-watershed (before 9pm). This has potential to affect airtime when large numbers of children are watching, making a stronger impact on children’s exposure.

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