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The commercial food landscape: outdoor food advertising around primary schools in Australia

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Abstract

Objective: Food marketing is linked to childhood obesity through its influence on children's food preferences, purchase requests and food consumption. We aimed to describe the volume and nature of outdoor food advertisements and factors associated with outdoor food advertising in the area surrounding Australian primary schools. **Methods:** Forty primary schools in Sydney and Wollongong were selected using random sampling within population density and socio-economic strata. The area within a 500m radius of each school was scanned and advertisements coded according to pre-defined criteria, including: food or non-food product advertisement, distance from the school, size and location. Food advertisements were further categorised as core foods, non-core foods and miscellaneous drinks (tea and coffee). **Results:** The number of advertisements identified was 9,151, of which 2,286 (25%) were for food. The number of non-core food advertisements was 1,834, this accounted for 80% of food advertisements. Soft drinks and alcoholic beverages were the food products most commonly advertised around primary schools (24% and 22% of food advertisements, respectively). Non-core food products were twice as likely to be advertised close to a primary school (95 non-core food advertisements per km² within 250 m vs. 46 advertisements per km² within 250-500 m). **Conclusions:** The density of non-core food advertisements within 500 m of primary schools, and the potential for repeated exposure of children to soft drink and alcoholic beverage advertisements in particular, highlights the need for outdoor food marketing policy intervention. **Implications:** Outdoor advertising is an important food marketing tool that should be considered in future debates on regulation of food marketing to children.

Keywords

advertising, around, primary, schools, australia, commercial, food, landscape, outdoor

Disciplines

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Conclusions: The density of non-core food advertisements within 500 m of primary schools, and the potential for repeated exposure of children to soft drink and alcoholic beverage advertisements in particular, highlights the need for outdoor food marketing policy intervention.

Implications: Outdoor advertising is an important food marketing tool that should be considered in future debates on regulation of food marketing to children.

Key words: public health; marketing; food; child; advertisements

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In Australia, childhood overweight and obesity is emerging as a public health crisis, with its prevalence increasing at an accelerating rate.^{1,2} The most recent data from primary school aged children in New South Wales (NSW) indicates that 25% of boys and 23% of girls are overweight or obese.³

One environmental factor that has been linked with childhood weight gain is the heavy marketing of energy dense, nutrient poor foods. Food marketing has been shown to influence children's food preferences, purchase requests and food consumption.⁴⁻⁷

The majority of research in this field to date has related to television food advertising. While television food advertising is known to contribute the largest proportion of measured industry advertising spend,⁷ the use of other, non-broadcast mediums to target children with food marketing has created an environment in which children are continuously exposed to branded products.⁸ The recently developed International Code on Marketing of Foods and Non-Alcoholic Beverages to Children state that in order to reduce food marketing to children, regulations must incorporate a wide definition of commercial promotion.⁹

It is fundamental to analyse the many forms of food marketing to children in order to understand their nature, reach and intensity.

Outdoor food advertising in the form of billboards and posters is a marketing strategy that, quite literally, has the potential to influence the commercial food landscape of children. Billboards are viewed as a relatively inexpensive method of advertising with high potential impact; people tend to view the same billboards regularly, thereby achieving repeated brand exposure.¹⁰

In Australia, the content of outdoor advertisements must comply with advertising industry codes. These codes do not impose any restrictions on the volume of advertisements that surround schools, nor do they limit the types of food products that can be advertised.¹¹ The NSW Government Department of Planning also has guidelines for advertising on transport corridors, including major roads, but these focus on the preservation of access, amenity and safety.¹² Other outdoor advertisements are regulated by Local Council Development Control Plans, which in general do not contain any provisions relating to the regulation of food advertising.

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The aim of our study was to quantify the volume of and factors associated with food advertisements in an environment where young children are commonly found – the area surrounding primary schools. We also aimed to identify the specific food products that are advertised around primary schools.

Methods

Local Government Areas (LGAs) from the Sydney and Wollongong Statistical Divisions in NSW were stratified as high (>1,600 people per km²), medium (1,200-1,600 people per km²) or low population density areas (<1,200 people per km²), based on the Comparative Information on NSW Local Government Councils 2004/2005 report.¹³ LGAs were also stratified according to socio-economic status, as measured by the index of relative socio-economic advantage/disadvantage from the Australian Bureau of Statistics Census of Population and Housing: Socio-Economic Indexes for Areas;¹⁴ creating three strata with high (>1,100), medium (1,000-1,100) and low (<1,000) scores. City of Sydney LGA was excluded as this area is known to contain an unusually high density of shopping areas.

A total of 20 LGAs were selected using random sampling within the high and low population density and socio-economic status strata. Four categories of LGAs were created by this process (high density/high socio-economic status, high density/low socio-economic status, low density/high socio-economic status, low density/low socio-economic status), and five LGAs were randomly selected from each category. A list of all state government, Catholic and independent primary schools within the randomly selected LGAs was constructed.^{15,16} Two primary schools were randomly selected from each LGA using computer generated random numbers, providing a total sample of 40 primary schools. This sample selection process was designed to provide a wide mix of geographic locations and adequate sample size, within resource constraints.

Advertisement coding

Criteria were developed to classify outdoor signs as either advertisements or signage. This classification was based on the City of Sydney Signage and Advertising Structures Development Control Plan (2005).¹⁷ Advertisements included standard commercial advertisements (billboards and posters), temporary advertising of special events, advertisements on outdoor furniture, and signs on buildings indicating the name along with additional branded product information. Signage included all signs unaccompanied by additional branded product information, such as signs used for the identification and naming of sites, buildings and building uses (such as parking) that did not contain any other information other than the name or logo of the building, site owner or usage. Signage was excluded from the analysis.

A coding tool was designed to capture advertisement characteristics as follows:

- i) Advertisement type (food or non-food product)
- ii) A description of the product being advertised, including product and brand name

- iii) The distance of the advertisement from the centre of the school grounds (<250 m or 250-500 m from the school)
- iv) The size of the advertisement; small (>21x30 cm and <1.3x1.9 m; approximately A4 size), medium (>1.3x1.9 m and <2.0x2.5 m; approximately the size of a bus shelter poster), or large (>2.0x2.5 m; the size of a typical billboard)
- v) Location of advertisement (shopping area, train station, bus shelter, main or residential street).

Advertisements smaller than 21x30cm (A4 size) were excluded from the study. A street was classified as main or residential according to the New South Wales Roads Act 1993.¹⁸

Food advertisements were further coded and assigned to three major groups – core foods (consumption recommended to meet daily requirements), non-core foods (foods that are surplus to daily requirements) and miscellaneous drinks (tea and coffee) – using a food classification system developed to align with The Australian Guide to Healthy Eating.¹⁹ A very similar classification system has been used in previous research on food marketing to children.²⁰⁻²² The three groups used to classify food products incorporated 25 food sub-groups (Table 1).

Data collection

Three research teams conducted all of the field work. Two of these teams comprised only one person (Teams 1 and 2) and one team consisted of two people (Team 3). A training session was conducted prior to the data collection period. Research teams were then instructed to individually code an identical section of a street with a shopping strip. This street section was also coded by the research co-ordinator (BK). This training data were used to determine inter-rater reliability for the classification of advertisements as food or non-food using the research co-ordinator as the reference (the 'gold standard').

Results of this initial reliability study were varied. Teams 1 and 2 identified and correctly coded 77% and 80% of all advertisements, respectively. Team 3 performed poorly in this initial reliability study and was provided with additional training. Following a repeat reliability assessment, Team 3 identified and correctly coded 96% of all advertisements.

Research teams were provided with maps to navigate school areas. These maps were generated using an Internet based street directory,²³ with two concentric circles marked to indicate the 250 m and 500 m radius from the centre of the school property. Research teams were required to scan the entire area within a 500 m radius of the school grounds (0.79 km²) and record every advertisement according to the pre-defined coding criteria. Data collection was conducted between 24 April and 27 June 2007.

Data analysis

All data was analysed using SPSS Version 14.0 for Windows (SPSS Inc., Chicago, Illinois) and SAS Version 9.13 (SAS Institute Inc., Cary, NC). The total numbers of advertisements and number of food advertisements in each LGA, by distance from schools (<250 m and ≥250 m from school) and location of advertisement was determined. Individual hypotheses were tested with linear

comparisons of the negative binomial regression model. The linear comparisons were tested with a score statistic (instead of likelihood ratio test) due to the use of a GEE. A Poisson regression model was used to model the proportion of advertisements that were for food products (number of food advertisements as outcome, with total number of advertisements as offset variable). A generalised estimating equation with an exchangeable correlation structure was used to obtain estimates of standard error corrected for the sampling design clustered within LGAs. The parameter estimates and 95% confidence intervals were used to provide relative risk for the proportion of food advertising associated with each factor investigated.

Initially, all variables were included in the model without interactions. The next iteration of the model included interactions between potential explanatory variables (variables with initial $p < 0.10$). Only one first order interaction (between socio-economic status and proximity to school) was identified. All other potential interactions showed no evidence of importance ($p > 0.50$) and were dropped from the model. The final model included socio-economic

status, population density, location of advertisements (shopping or non-shopping area), proximity to the school ($< 250\text{m}$ or $\geq 250\text{m}$), and the interaction between socio-economic status and proximity to the school. The overall model fit was assessed by the dispersion parameters (parameter/df) for deviance and Pearson's χ^2 , and a likelihood ratio test relative to the null model (intercept only).

Results

Overall advertising density

Overall, 9,151 advertisements were identified in the area surrounding 40 metropolitan and suburban primary schools; 25% (2,286/9,151) of these advertisements were for food. Of the food advertisements, significantly more advertisements were for non-core foods ($p < 0.01$); 80% (1,834/2,286) were for non-core foods, 15% (338/2,286) were for tea or coffee and 5% (114/2,286) were for core foods. The most frequently advertised food products were soft drink (24% of all food advertisements), alcoholic beverages (22%), coffee (15%) and ice cream and iced confection (14%).

Table 1: The number of food advertisements per square km, by distance from primary schools.

Food group	Rate ^a of advertisements <250m from school	Rate of advertisements $\geq 250\text{m}$ and <500m from school
Core and healthy food categories	3.7	3.6
Bottled water	1.8	1.0
Low sugar/high fibre breakfast cereals (<20 g/100 g sugar and >5 g/100 g dietary fibre), bread, rice, pasta and noodles	0.5	0.8
Reduced fat dairy (includes cheese <15 g/100 g fat; 50% reduced fat cheddar, ricotta and cottage) and alternatives (includes probiotic drinks)	0.5	0.3
Sandwiches and salads; includes sandwiches, mixed salads, frozen meals (<10 g/serve fat), soups (<2 g/100 g fat, excludes dehydrated), and low fat savoury sauces (<5 g/100 g fat)	0.3	1.2
Meat and meat alternatives (not crumbed or battered) (includes fish, legumes, eggs, nuts and nut products, including peanut butter, excluding sugar coated or salted nuts)	0.1	0.3
Fruits and fruit products, and vegetables and vegetable products without added sugar	0.0	0.1
Baby foods (excluding milk formulae)	0.0	0.0
Non-core and unhealthy food categories	94.7	46.3
Alcoholic beverages	25.0	12.8
Sugar sweetened drinks including soft drinks, cordials, electrolyte drinks and flavour additions	22.3	15.7
Ice cream and iced confection	16.4	8.2
Full cream dairy and alternatives (includes dairy desserts)	13.0	3.3
Chocolate and confectionery (including chewing gum)	9.0	2.7
Fast food restaurants/meals (including general pizza, burgers, salads from fast food restaurants, Subway)	3.6	1.3
Fruit juice and fruit drinks	2.2	0.5
Cakes, muffins, sweet biscuits, muesli bars, snack bars, high fat savoury biscuits, pies and pastries	1.2	1.5
Snack foods, including chips, savoury crisps, extruded snacks, popcorn, sugar sweetened fruit and vegetable products, and sugar coated and salted nuts	1.0	0.2
High fat/sugar/salt spread spreads (excluding peanut butter), oils, high fat savoury sauces (>5 g/100 g fat), meal helpers (including stocks, tomato paste) and soups (>2 g/100 g fat tinned and all dehydrated)	0.6	0.0
Frozen/fried potato products (excluding packet crisps)	0.5	0.0
Crumbed or battered meat and meat alternatives and high fat frozen meals (>10 g/serve fat)	0.0	0.0
High sugar/low fibre breakfast cereals (>20 g/100 g or <5 g/100 g dietary fibre)	0.0	0.0
Baby and toddler milk formulae	0.00	0.0
Miscellaneous drinks – tea and coffee	16.4	8.9
Coffee	16.0	8.8
Tea	0.4	0.0

Note: (a) Number of advertisements per square kilometre

The number of food advertisements varied substantially both between and within LGAs; there was a difference of more than 400 food advertisements between the school area with the highest number of food advertisements and the school area with the lowest number of food advertisements both between different LGAs and within the same LGA. Only one area within 500m of a primary school did not contain any advertisements, while five areas did not contain any food advertisements.

The majority (72%) of food advertisements were classified as small; 83% of which were for non-core foods. The majority of medium and large advertisements were also for non-core foods (75% and 54% of respectively). The most frequently recorded food type appearing in small advertisements was sugar-sweetened drinks (24% of all small advertisements); alcoholic beverages in medium sized advertisements (29%); and coffee in large advertisements (46%).

Overall, 85% of all food advertisements were identified in shopping areas. The proportion of food advertisements for non-core foods differed by location, ranging from 68% (in main streets) to 90% (at train stations). Seventy per cent of all food advertisements at bus shelters were for non-core foods.

Figure 1: The total number of food and non-core food advertisements by population density and socio-economic status (SES).

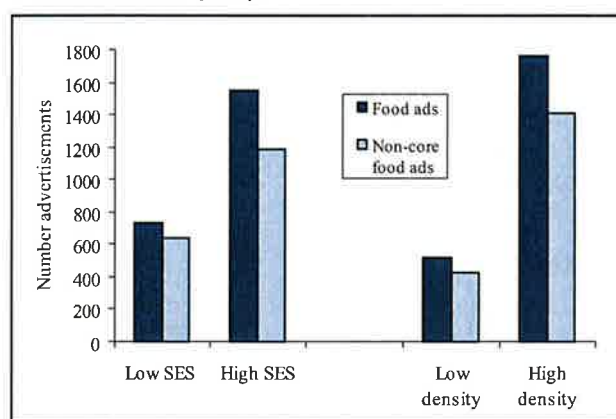


Table 2: Poisson regression model estimates for factors associated with the proportion of advertising for food products around primary schools.

Factor	Estimate	95% Confidence Interval	p-value
Socio-economic status			
Low	Reference		
High	2.21	1.81-2.72	<0.001
Proximity to school			
Between 250 and 500 m from school	Reference		
<250 m from school	2.04	1.44-2.88	<0.001
Population density			
Low density	Reference		
High density	1.37	0.99-1.89	0.051
Location			
Not a shopping area	Reference		
Shopping area	2.29	1.53-3.21	<0.001
Interaction between socio-economic status and proximity to school			
High socio-economic status and close to school (within 250 m)	0.62	0.39-0.98	0.043

Distance of advertisements from schools

There were 115 food advertisements per km² in the area closest to primary schools (≤ 250 m radius), compared to 59 per km² in the area further from the schools (>250 m and ≤ 500 m radius); that is, almost two fold higher in the area closest to schools (Table 1). Similarly, the density of non-core food advertisements was twice as high in the area closest to schools, compared with the area further from schools (95 vs. 46 advertisements per km²). The main food groups contributing to this difference included full cream dairy (16 vs. 9 advertisements per km²), chocolate and confectionery (9 vs. 3 per km²), alcoholic beverages (25 vs. 13 per km²), ice cream and iced confection (16 vs. 8 per km²) and coffee (16 vs. 9 per km²).

Advertising by population density

The frequency of overall food advertisements in high population density areas was greater than in low density areas (1,763 vs. 523, Figure 1). Non-core food products were consistently the most frequently advertised; contributing 80% of food advertisements in high population density areas and 82% in low density areas.

Advertising by socio-economic status

Higher socio-economic status areas had a greater number of food advertisements in the area surrounding primary schools than lower socio-economic status areas (1,551 vs. 735, Figure 1). However, the proportion of all food advertisements that were for non-core foods was higher in lower socio-economic areas; 87% in low vs 77% in high socio-economic status areas. This variation was primarily due to a higher proportion of advertisements for coffee in high socio-economic areas (19% in high vs. 7% in low socio-economic areas). After removing coffee advertisements from the comparison, there was no difference in the proportion of advertisements for non-core foods by socio-economic status.

The multivariate Poisson regression model indicated that the proportion of advertisements for food products was higher in the area closer to primary schools, in high socio-economic areas, and in shopping areas (Table 2, $p < 0.001$). Although there was a higher percentage of advertisements for food in high socio-economic areas, there was a lower proportion of advertisements for foods

in close proximity to schools in these areas than in low socio-economic areas (Table 2, interaction term, $p=0.043$). This indicates that the proportion of advertising for food in close proximity to schools is relatively higher in low socio-economic areas than high socio-economic areas. The model showed a good overall fit (likelihood ratio test $\chi^2=50.23$, $p<0.001$) with acceptable levels of dispersion (Deviance/df=1.07 Pearson's χ^2 /df=1.09).

Discussion

This study indicates that outdoor advertising is a pervasive form of food marketing, and that the majority of these food advertisements are for non-core products. The overall number of food advertisements in the area surrounding primary schools was high, with a total of 2,289 food advertisements observed in the immediate proximity of 40 school areas; 1,835 of which were for non-core foods. The high volume of outdoor advertising surrounding schools means that some advertisements may have been unintentionally missed, despite quality control procedures to minimise this problem. However, this is unlikely to change the overall proportions of advertisements for food groups reported here, as advertisements for all products would have been non-differentially omitted. The absolute numbers of food advertisements may in fact be even higher.

The concentration of outdoor food advertisements close to primary schools, whether intentionally or inadvertently through the placement of shopping areas with their high density of advertisements near schools, means that young children are heavily exposed to these advertisements. The types of food products being promoted are contrary to national nutrition guidelines.¹⁹ Considering that advertised food products are known to influence children's food choice^{6,7} these advertisements act to challenge healthy-eating messages and potentially contribute to poor diets. Given the efforts to promote healthy eating education and limit exposure to unhealthy foods in schools,²⁴ the immediate and repeated exposure to outdoor food advertising is counter-productive.

Perhaps even more concerning is the rate of advertisements for alcoholic beverages, with 25 advertisements per square kilometre – the single most advertised food product in the area within a 250 m radius of primary schools. This alcohol advertising may be especially influential because of children's repetitive exposure to these advertisements.²⁵

While the frequency of outdoor food advertisements varied substantially by school, there was a significant trend for more food advertising in both high population density and high socio-economic status areas. Clearly there is value in advertising in high density areas, where a larger number of people are in contact with the branded product, thereby increasing overall brand exposure.

The benefit of advertising in high socio-economic status areas is less clear, although a number of hypotheses are offered here. Residents living in high socio-economic status areas generally have higher household incomes and thus can afford to spend more on food and beverages than those with lower incomes.²⁶

However, people with lower incomes consume a higher amount of cheap energy dense, nutrient poor foods, such as sugar sweetened drinks and chocolate and confectionery,²⁷ the food products that were frequently advertised. We did not include indoor shopping complexes within the scope of data collection, as children would not necessarily be exposed to advertisements in these complexes on their travel to and from school. Similar to other shopping areas, these complexes are likely to contain high levels of food advertisements. While there is no published data available relating to the placement of indoor compared to outdoor shopping complexes in different socio-economic areas, anecdotally there appeared to be more outdoor shopping strips in the higher socio-economic areas included in this study. Therefore, the study design may have excluded a significant proportion of food advertising in and lower socio-economic areas where there may be more indoor shopping complexes. This higher food advertising frequency in higher socio-economic status areas supports previous research from New Zealand, which also found the highest number of food advertisements in more advantaged areas.²⁸

As the selected schools were only drawn from the Sydney and Wollongong statistical divisions, one limitation of this study is that findings are not necessarily generalisable across the country. However, our results are supported by other research from New Zealand, from 2005,²⁸ which found that 61% of all outdoor advertisements in the area surrounding secondary schools were for food, with an average of 27 food advertisements per km² in this area. Similarly, the majority of advertised foods were considered to be for 'unhealthy' foods (over 70%). Our findings also extend previous research that describes other forms of food marketing to children in Australia, including on television,²⁰⁻²² on the Internet,²⁹ and in children's magazines.³⁰ This research has consistently found that non-core or unhealthy foods comprise the majority of all food advertisements to children; however the proportion of all advertisements that were for core foods was substantially lower for outdoor advertising, compared to these other forms of media, which typically comprise between 25 to 30% of advertisements for core foods. Interestingly, food advertisements make up a relatively consistent proportion of advertisements in all forms of advertising; that is, approximately 25% to 30%.^{20,21,29,30}

While there is limited research available investigating the effect of outdoor food advertising specifically on children's food choices and preferences, previous research in the US examining the effect of outdoor alcohol advertising on children's beliefs and attitudes towards alcohol have identified significant positive associations between children's exposure to outdoor alcohol advertisements near schools and their alcohol beliefs and intention to consume.²⁵ This effect remained significant after controlling for other confounding factors, including exposure to other forms of alcohol advertising.

It is recognised that these findings may be difficult to translate into practical policy recommendations. Unlike tobacco products, which under the Tobacco Advertising Prohibition Act 1992 are prohibited from being advertised in outdoor areas in Australia,³¹ food and beverages do not pose the same unequivocal health risks. Further, although tobacco advertising restrictions in place in the

US preclude tobacco advertising within 300 metres of schools and public playgrounds,³² research from the US found a higher proportion of billboards containing tobacco advertisements in the restricted zone around schools.^{10,33,34}

As the majority of food advertisements in our study were located in shopping areas, any restriction on outdoor food advertising is likely to meet with opposition from retailers, who would be expected to endorse the promotion of the products that they sell. In addition, food companies commonly provide functional promotional materials, including branded umbrellas, dividers, fridges and street signs to retail businesses. This was particularly evident for restaurants and cafes, with coffee company branded promotional materials. Nevertheless, such restrictions on unhealthy outdoor food advertising are possible, as evidenced by recent advocacy efforts in Boston, US, after research identified a high number of advertisements for unhealthy products, including alcohol, confectionery and tobacco products, outside convenience stores.³⁵ As a result of this research, Boston City Council has agreed to establish a working party to rewrite advertising codes for outdoor advertising.³⁵ In another example, the Korea Food and Drug Administration has recently introduced a ban against energy dense, nutrient poor foods from being sold within a 200 metre 'green-zone' radius from schools.³⁶

Further research investigating outdoor food advertising to children should specifically investigate advertisements at train stations and bus shelters. In this study, train stations were found to display the highest proportion of non-core food advertisements of all locations studied. However, only a small number of train stations fell within the sampled area. As advertisements displayed at train stations and bus shelters are commonly under state government control, opportunities exist for restricting the types of food products that can be advertised at these venues. However, comprehensive national regulation limiting the marketing of energy dense foods, similar to the Tobacco Advertising Prohibition Act for tobacco marketing, would over-ride the need for local and state government regulations.

The high frequency of non-core food advertisements concentrated particularly in the areas immediately surrounding primary schools, together with children's recurring exposure to these advertisements as they travel to and from school, point to the need for policy intervention to restrict this form of food marketing to children. Similar to policy development in the US, these restrictions may take the form of local council regulations, emphasising the need for local area research, or may take the form of state controlled legislation. In either case, outdoor food advertising appears to be an important mechanism for food marketers to target children, and should be considered in future debates on food marketing to children.

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