

The extent of food advertising to children on Greek television: focus on foods potentially detrimental to oral health

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Objectives: To investigate the extent and nature of food advertising to children on Greek television, focusing on the adverts for foods with potential harmful effects on oral health, and to examine the persuasive marketing techniques used to promote food products. **Methods:** Advertisements broadcast on six TV-channels during children's peak viewing times on two weekdays and two weekend days in the period May-June 2010 were recorded (166.7 hours). Each advertisement was coded according to: date, day, length, type of program in which the ad appeared, type of product advertised and promotional technique used. Food advertisements were subdivided according to their sugar and/or acid content as potentially harmful or non-harmful to teeth. **Results:** Food advertisements had an average frequency of 8.0 per hour during children's peak viewing times with highest frequency (11.4 per hour) on weekends during child-focused programs. Of all advertisements, 1330 (26.7%) were for foods, and 595 (44.7%) of these deemed to be potentially harmful to teeth. The most commonly advertised food product during children's programs was confectionery, 80 (27.7%). Of food advertisements, 199 (15.0%) used at least one of the promotional techniques likely to appeal to children. Advertisements for foods potentially harmful for teeth were more likely to be shown during child-focused programs (OR 2.92, 95%CI 2.04-4.16) and to promise a free gift with purchase (OR 35.43, 95%CI 10.83-115.88). **Conclusion:** Children in Greece are exposed to a large volume of advertisements for unhealthy foods and drinks, which intensively use persuasive techniques proved to affect children's food preferences and consumption. Our study provides evidence that could support advocacy and interventions for the regulation of food advertising.

Key words: *food and beverages, advertisements, persuasive communication, children, oral health*

Introduction

Dental caries and dental erosion are two of the most common oral diseases worldwide (Petersen *et al.*, 2005). The causes of these diseases are multi-factorial with behavioural and environmental factors as their main determinants. Lifestyle behaviours such as fewer meals eaten as a family, increased snacking between meals and increased television viewing leading to unhealthy eating are possibly associated with both of these oral health conditions (Institute of Medicine of the National Academies, 2006).

Television viewing exposes children to advertisements promoting foods with high sugar and acid content and encourages the consumption of these foods (Cairns *et al.*, 2009). Overconsumption of sweetened and acidic foods was historically linked to increasing prevalence of dental caries and dental erosion (Sheiham, 2001).

Children, and particularly those under eight years old, are especially vulnerable to television advertising of food products since they cannot fully understand the persuasive intent of advertisements and tend to accept them as truthful and accurate (Bjurström, 2000). Systematic reviews have found that food and beverage marketing influences the preferences, purchase requests and consumption patterns of children (Cairns *et al.*, 2009; Institute of Medicine of the National Academies, 2006).

Although food marketers have used multiple media platforms to target children, television currently remains the dominant medium, certainly in terms of expenditure (Cairns *et al.*, 2009; Federal Trade Commission, 2008), and it is viewed as being the most influential on children (Roberts *et al.*, 2005). It has been estimated that US 2-11 year-olds spend on average 3 hours a day watching television – more time than with any other medium – and are exposed to about 5,500 food advertisements per year (Federal Trade Commission, 2008; Gantz *et al.*, 2007), with figures for British children being similar (Rodd and Patel, 2005). In Australia, 5-14 year-olds spend on average 1.2 hours per day on watching TV and DVD (Australian Bureau of Statistics, 2010). In Greece, 11-15 year olds were found to watch television on an average of 2.6 hours per day with about 25% of them viewing for more than 4 hours per day (Vereecken *et al.*, 2006; Yannakoulia *et al.*, 2004).

The World Health Organization has acknowledged marketing of energy dense, nutrient poor foods as a probable causal factor in children being overweight, and recommended to member states that “*the overall policy objective should be to reduce both the exposure of children to, and power of, marketing of foods high in saturated fats, trans-fatty acids, free sugars, or salt*” (WHO, 2010). Most countries, have statutory or self-regulations to protect children against misleading and deceptive

marketing, and many of them have particular restrictions on food advertising, which tend to focus on ensuring truthful advertising claims and avoiding the promotion of over-consumption (Hawkes, 2006). However, only a few countries, such as the UK, US, and Australia have further introduced mandatory or voluntary restrictions for particular foods, based on nutrient profiles (Adams *et al.*, 2012; King *et al.*, 2012; Kunkel *et al.*, 2009).

According to the Eurobarometer on Health and Food (European Commission, 2006), more than 80% of Europeans believe that children's eating habits are considerably influenced by food advertising and promotion, and 16% that restrictions on advertising of high sugar/salt/fat foods during children's television programs, are the most effective measure, among others, to improve their diets. Despite this, food marketing aimed at children has increased dramatically over the last two decades. In studies conducted in UK and US it was found that a significantly greater proportion of food advertisements are broadcast during children's programs than during other programs (Bell *et al.*, 2009; Boyland *et al.*, 2012; Chestnutt and Ashraf, 2002). Furthermore, it has been shown that food marketers use persuasive marketing techniques mostly in advertisements for unhealthy food products and during children's peak viewing times (Boyland *et al.*, 2012; Kelly *et al.*, 2008; 2010).

Many European, American and South Pacific studies have investigated television food advertising, in relation to the nutritional value of the foods advertised, some also examined the promotional techniques used by food advertisers (Batada *et al.*, 2008; Boyland *et al.*, 2012; Kelly *et al.*, 2008; 2010; Morton *et al.*, 2005; Neville *et al.*, 2005). However, few studies (Chestnutt and Ashraf, 2002; Morgan *et al.*, 2009; Rodd and Patel, 2005), none in Greece, have investigated how detrimental to dental health these promoted food products could be.

The aim of this study was to investigate the extent and nature of food advertising in a cross-sectional sample of Greek television programs during children's peak viewing times with an emphasis on three features: the type of program during which food advertisements were broadcast, the potential harmful effect of the foods advertised on oral health and the type of persuasive marketing techniques used to promote food products that are likely to appeal to children.

Methods

Using the official yearly audience measurement data for the region of Attica, provided by AGB Nielsen Media Research, six free-to-air television channels with the highest viewing shares at age group 4-14 years (MEGA, ANT-1, STAR, ALPHA and the national broadcasting channels ET-1 and NET), were selected. Timeslots where relatively significant numbers of 4-14 year-olds are likely to watch TV were defined (Consumers International, 2011), using the ranked distribution of the audiences, separately for weekdays and weekend days. The timeslots that were in the upper tertile of the distributions were defined as peak viewing times. Two peak periods were detected on weekdays (15:00-17:00 and 21:00-23:00), where over 17% of the reference population of 370,430 4-14 year-olds were watching TV, and three peak periods were detected

on Saturdays and Sundays (9:00-13:00, 15:00-17:00 and 21:00-23:00), where over 21% and 20% of the children respectively were watching TV. To investigate a typical week of television programming that children are most likely to watch, a composite day sampling design was used, comprising of two weekdays and both weekend days for every chosen channel in the period May-June 2010. All programs transmitted on the children's peak viewing timeslots were digitally recorded, giving a total of 166.7 hours of programs and advertisements. Both programs and advertisements were timed to the nearest second.

The unit of analysis was any advertisement running within the recorded period. Promotions for upcoming television programs and newsbreaks were not categorised as advertisements and were excluded from analysis. Each advertisement was coded for the following features: date, day (weekday/weekend day), length (in seconds), type of program in which the advertisement appeared, type of product advertised and promotional technique used. Programs were coded according to their type as children's programs (cartoons and movies suitable for all ages, that display the green sign, according to the Greek Television program classification system set with the Ministerial Decision no 6138/E/17.03.2000), and other programs popular to children, but not specifically designed for them (reality shows, movies and serials that display the blue, orange or purple sign, according to the above mentioned regulation, athletic events etc.) Each advertisement was linked to the program following it. Advertisements were categorised according to their type as "food" and "non-food". The former category was further subdivided according to the sugar and acid content of the product, following the codification used in previous studies (Rodd and Patel, 2005), as well as the specific nutrient profiles processed by the European Commission (2009):

- High sugar group: confectionery (sweets, chocolate etc.), baked foods high in sugar (cakes, biscuits, sweet pies) sugared cereals, flavoured milk drinks, sweet spreads
- High acid group: low-calorie or sugar free soft drinks, wines
- High sugar and high acid group: carbonated and non-carbonated soft drinks (including fast food advertisements incorporating soft drinks), fruit-flavoured drinks, yogurt desserts
- Low to moderate sugar and acid group: Dairy products (without added sugar), meat, bread, rice, cereals (without added sugar), fats, spreads (without sugar), meal helpers, fruits and vegetables, ready-to-eat meals, baby foods, convenience food (salty snacks), sugar-free desserts and chewing gums.
- Other alimentary products: food supplements, bottled water, alcohol, tea and coffee.

The first three categories are foods considered potentially harmful to teeth, whereas the last two are not.

Advertisements were also coded for the presence of each of the following four promotional techniques: free gifts, lottery/competitions, discounts/more product, and call for connection to an interactive website.

The codification of the advertisements into the food subgroups was conducted in collaboration with a team of dentists specialised in Preventive and Public Health

Dentistry. The rest of the codification was conducted by one investigator (TG). The intra-operator agreement was assessed by re-codification of 60 advertisements within 10 days. The Kappa coefficients were found 0.95-0.97, indicating excellent repeatability. The data were processed and analysed using SPSS v20.0. Descriptive statistics are given and univariate analyses of differences, using the chi-square test, were conducted for all variables used. Potential harmful effect of food (food harmful to teeth versus non-harmful) was further investigated through multivariate logistic regression modelling entering the day of week, the type of program, and the type of promotional technique as possible explanatory variables. The level of statistical significance for all tests was set at 0.05.

Results

The recordings of 166.7 hours of broadcast television included 28 hours of children's programs and 138.7 hours of other programs popular to children. During the recorded period 4,977 advertisements (ads) were found and analysed. On average, 29.9 ads were shown per hour, accounting for 17.6% of the total programming time (10.5 minutes each hour).

As can be seen in Table 1, 1,567 ads (31.5%) were recorded on weekdays and 3,410 (68.5%) on weekends, while 950 ads (19.1%) were broadcast in children's programs, and 4,027 (80.9%) in the other programs. Food ads accounted for 1,330 (26.7%) of all ads recorded. The highest frequency of both food and non-food ads was observed on weekends during children's programs (11.8 and 24.7 ads/hour respectively).

Table 2 presents the distribution of food ads according to their sugar and/or acidic content and type of program. Of the 1,330 food ads, 595 (44.7%) were for products with a high sugar and/or acid content, namely those considered potentially harmful to teeth. Statistically significant heterogeneity was observed between children's programs and the other programs ($p < 0.001$). The former contained mainly advertisements for high sugar food products, whereas the latter for foods of low sugar and acid content. The most heavily advertised foods during children's programs were confectionery (27.7%), followed by yogurt desserts (18.7%), bottled water (10.4%), fruit flavoured drinks (9.3%) and breakfast cereals with added sugar (9.0%). The most frequently advertised foods during the other programs were dairy products (22.7%), followed

by confectionery (12.8%), soft drinks (6.0%), alcohol (6.0%) and fruit flavoured drinks (5.0%). There were no advertisements promoting the consumption of fresh fruits and vegetables during the child-focused programs.

In the overall sample, 1,421 advertisements (28.6%) used at least one of the promotional techniques assessed to target their audience, while among food ads, 199 (15.0%) used at least one of these techniques. Table 3 presents the promotional techniques used by the food marketers, according to the type of food advertised, and the type of program in which the ads were shown. Statistically significant differences were observed between the compared groups. The promotional techniques were used more often in advertisements of foods potentially harmful to teeth than in those that were not (22.5% vs 8.8% respectively, $p < 0.001$), and in ads broadcast during children's programs than in those of the other programs (51.6% vs 4.8%, $p < 0.001$). The most commonly used marketing technique in ads potentially harmful to teeth as well as in those aired during children's programs was free gifts (19.5% and 39.4% respectively).

Table 4 shows multivariate logistic regression derived odds ratios for advertised food harmfulness. An ad for foods potentially harmful to teeth was almost 3 times as likely to be shown during children's programs; it was also 35 times as likely to include a gift with purchase, as a promotional technique, and 11 times less likely to include a competition as a promotional technique.

Discussion

The present study analysed the advertisements broadcast on Greek television during children's peak viewing times, since evidence from audience viewing statistics has shown, that children watch other programs apart from those specifically targeted to them (Bell *et al.*, 2009; Kelly *et al.*, 2008; Morgan *et al.*, 2009; Morton *et al.*, 2005; Neville *et al.*, 2005); a fact confirmed by this study as children's programs accounted for only 17% of children's peak viewing times.

Since the sampling process was based on children's audience data for Attica region, the sample might not correspond to children's viewing habits for the whole country. The Attica region accounts for 36% of the whole population and 47% of the urban population of Greece (National Statistical Service of Greece, 2009) and the chosen television channels broadcast all over the country.

Table 1. Number, percentage and frequency (adverts/hour) of food and non-food advertisements by type of program and day of week

	Food advertisements		Non-food advertisements		All advertisements	
	n (%)	Ads/hour	n (%)	Ads/hour	n	Ads/hour
Children's programs	289 (30.4)	10.2	661 (69.6)	23.3	950	33.5
Weekdays	35 (21.5)	5.2	128 (78.5)	18.9	163	24.1
Weekends	254 (32.3)	11.8	533 (67.7)	24.7	787	36.5
Other programs	1041 (25.9)	7.5	2986 (74.1)	21.6	4027	29.1
Weekdays	376 (26.8)	6.8	1028 (73.2)	18.7	1404	25.5
Weekends	665 (25.4)	8.0	1958 (74.6)	23.5	2623	31.5
All programs	1330 (26.7)	8.0	3647 (73.3)	21.9	4977	29.9

Table 2. Distribution of food advertisements according to type of food and type of program

	<i>Children's programs</i>		<i>Other programs</i>		<i>All programs</i>	
	<i>n</i>	<i>(%)</i>	<i>n</i>	<i>(%)</i>	<i>n</i>	<i>(%)</i>
High sugar group	122	(42.2)	225	(21.6)	347	(26.1)
Confectionery	80	(27.7)	133	(12.8)	213	(16.0)
Breakfast cereals with sugar	26	(9.0)	36	(3.5)	62	(4.7)
Cakes, biscuits, sweet pies	14	(4.8)	25	(2.4)	39	(2.9)
Flavoured milk drinks	0	(0.0)	22	(2.1)	22	(1.7)
Sweet spreads	2	(0.7)	9	(0.9)	11	(0.8)
High acid group	0	(0.0)	28	(2.7)	28	(2.1)
Sugar-free soft drinks	0	(0.0)	23	(2.2)	23	(1.7)
Wines	0	(0.0)	5	(0.5)	5	(0.4)
High sugar and acid group	89	(30.8)	131	(12.6)	220	(16.5)
Fruit flavoured drinks	27	(9.3)	52	(5.0)	79	(5.9)
Yoghurt desserts	54	(18.7)	17	(1.6)	71	(5.3)
Soft drinks	3	(1.0)	62	(6.0)	65	(4.9)
Fast-food incorporating soft drinks	5	(1.7)	0	(0.0)	5	(0.4)
Low to moderate sugar and acid group	47	(16.3)	493	(47.4)	540	(40.6)
Dairy	28	(9.7)	236	(22.7)	264	(19.8)
Bread, rice, cereals	0	(0.0)	47	(4.5)	47	(3.5)
Meal helpers	0	(0.0)	45	(4.3)	45	(3.4)
Meat and meat alternatives	15	(5.2)	29	(2.8)	44	(3.3)
Ready-to-eat meals	0	(0.0)	44	(4.2)	44	(3.3)
Salty snacks	0	(0.0)	32	(3.1)	32	(2.4)
Baby foods	3	(1.0)	11	(1.1)	14	(1.1)
Fats	0	(0.0)	13	(1.2)	13	(1.0)
Sugar-free chewing gum	1	(0.3)	11	(1.1)	12	(0.9)
Fruits, vegetables, fruit product	0	(0.0)	11	(1.1)	11	(0.8)
Sugar-free deserts	0	(0.0)	8	(0.8)	8	(0.6)
Low sugar breakfast cereals	0	(0.0)	6	(0.6)	6	(0.5)
Other food products	31	(10.7)	164	(15.8)	195	(14.7)
Alcohol	0	(0.0)	63	(6.0)	63	(4.7)
Bottled water	30	(10.4)	23	(2.2)	53	(4.0)
Food supplements	1	(0.3)	42	(4.0)	43	(3.2)
Coffee, tea	0	(0.0)	36	(3.5)	36	(2.7)
All food types *	289	(100)	1041	(100)	1330	(100)

* Chi-square test for heterogeneity between food groups, p<0.001

Table 3. Promotional techniques used in advertisements by type of food and type of program

	<i>n</i>	<i>Type of promotion</i>				
		<i>Gifts</i>	<i>Lottery/ competitions</i>	<i>Discount/ more product</i>	<i>Interactive website</i>	<i>Any promotion ^a</i>
	<i>n (%)</i>	<i>n (%)</i>	<i>n (%)</i>	<i>n (%)</i>	<i>n (%)</i>	
Type of food						
Potentially harmful to teeth	595	116 (19.5)	21 (3.6)	0 (0.0)	41 (6.9)	134 (22.5)
Non harmful to teeth	735	4 (0.5)	31 (4.2)	11 (1.5)	31 (4.2)	65 (8.8)
		*** b	NS ^b	** b	* b	*** b
Type of program						
Children's programs	289	114 (39.4)	42 (14.5)	0 (0.0)	57 (19.7)	149 (51.6)
Other programs	1041	6 (0.6)	10 (1.0)	11 (1.1)	15 (1.4)	50 (4.8)
		*** b	*** b	NS ^b	*** b	*** b
Overall	1330	120 (9.0)	52 (3.9)	11 (0.8)	72 (5.4)	199 (15.0)

^a As advertisements may contain different types of promotional techniques, the sum of columns 3-6 can exceed that of the last column^b Chi-square test for trend, *p<0.05, **p<0.01, ***p<0.001, NS: non-significant

Table 4. Multivariate logistic regression derived adjusted odds ratio and 95% confidence intervals for advertisement of foods with a potential harmful effect^a

<i>Variable</i>	<i>Category</i>	<i>Adjusted odds ratio</i>	<i>95% Confidence interval</i>	<i>Two tailed p-value</i>
Day of week	Weekday	1.00		
	Weekend	0.97	0.76-1.25	NS
Type of program	Other programs	1.00		
	Children's programs	2.92	2.04-4.16	<0.001
Gift	No	1.00		
	Yes	35.43	10.83-115.88	<0.001
Lottery/Competition	No	1.00		
	Yes	0.09	0.03-0.28	<0.001
Interactive Website	No	1.00		
	Yes	2.33	0.88-6.12	NS

^a Dependent variable: advertisement for food potentially harmful for teeth / advertisement for food non-harmful for teeth

NS: non-significant

The time spent by children watching TV may differ considerably between urban and rural populations. However, the patterns of children's peak television viewing times are considered relatively stable, since they are determined mainly by the day-to-day routines of the children (after school, before bedtime, etc.). The fact that a previous study, with similar sampling procedure, found that peak viewing times were stable throughout the country (Neville *et al.*, 2005), reinforces the validity of the results of the present study. Thus, our estimates for the exposure of Greek children to advertisements per hour of television viewing are expected to be quite realistic.

According to our results, on average, 29.9 advertisements, lasting 10.5 minutes, were shown per hour of programming recorded. The broadcast time shared by advertisements is in accordance with national regulations (Presidential Decree 109/2010 Harmonization of the Greek Broadcasting Legislation with the Directive 2010/13/EE concerning Audiovisual Media Services), which allow up to 20% of the broadcast time for advertising. However, children's programs were targeted more heavily by marketers than the other programs (33.5 vs 29.1 ads/hr) and particularly during weekends (36.5 ads/hr on weekends versus 31.5 ads/hr on weekdays). This indicates that children are greatly exposed to advertising.

Food advertisements accounted for 26.7% of the total advertisements seen during children's peak viewing times, with a mean rate of 8 food ads/hr. This means that a child in Greece, who watches television for an average of 2.6 hours every day, is expected to be exposed to 7,592 food advertisements every year. Our findings are almost similar to those of a previous study conducted in Greece (Kelly *et al.*, 2010). Moreover, in the same study, that compared television food advertising to children in eleven countries, Greece had the highest proportion of all for food advertisements (29%) and the highest rate of food advertising (9ads/hr). Although there are great variations in the level of food advertising between the various studies (Batada *et al.*, 2008; Chestnutt and Ashraf,

2002; Kelly *et al.*, 2010), probably due to differences in study design and in advertising regulations in each country, food products in this, as well as in other studies are among the top three advertised products (Kelly *et al.*, 2010).

Our results support the findings of earlier investigations, showing that food marketers, counting on the fact that children are particularly vulnerable to advertising, are selectively promoting during children's programs. In countries where no restrictions on advertising towards children are set, a significantly greater proportion of food advertisements are broadcast during children's programs compared to other programs (Bell *et al.*, 2009; Boyland *et al.*, 2012; Chestnutt and Ashraf, 2002). In Greece, general regulations protect children against unfair advertising and bans exist for tobacco, alcohol and toy advertising, but there are no restrictions on advertising particular foods. However, in countries where restrictions on food advertising apply only during children's programs, such as in the UK, US, and Australia, it seems that the exposure of children to unhealthy food marketing, is not sufficiently moderated, as children watch mostly program's that are not specifically designed for them (Adams *et al.*, 2012; King *et al.*, 2012; Kunkel *et al.*, 2009).

Almost half (44.7%) of the food advertisements shown during the study period concerned food products potentially detrimental to oral health, but the proportion of advertisements with high sugar and/or acid content was significantly higher in children's programs (73%). In a study conducted in the UK, Chestnutt and Ashraf (2002) found that during children's television, 73.4% of advertising time was devoted to food products deemed potentially detrimental to oral health, compared to only 18.6% of advertising time during evening perk viewing. Also, Neville *et al.* (2005) found that approximately half of all confectionery advertisements (53.4%) were broadcast during children's programs in Sydney, Australia and that there were nearly three times as many confectionery advertisements per hour during children's television pro-

grams than during adults' programs. These observations are of particular concern since they reveal that there is a selective targeting of children by promoters of foods potentially harmful to teeth.

In another study conducted in the UK, Rodd and Patel (2005), found a much higher proportion (95.3%) of food and drink advertisements potentially detrimental to oral health during children's television programming, than that determined in the present study. This difference may be attributed to the fact that in our study, the non-harmful to teeth group included additional items such as bottled water (10.4%) and meat products (5.2%) that were not seen advertised in the previously mentioned study.

This study found that the most heavily advertised food items broadcast during children's programs were for high sugar or high sugar and acid foods, with the most advertised food category being confectionery, followed by yoghurt desserts, fruit flavoured drinks and sugared cereals. In three similar studies conducted in UK, Chestnutt and Ashraf (2002) found that confectionery was the most commonly advertised category followed by sugared cereals and sugared dairy products, while the most advertised food products in the study of Rodd and Patel (2005) were sugared cereals followed by confectionery, and in the study of Morgan *et al.* (2009), sugared cereals and sweetened dairy products. The differences observed between the present study and the studies conducted in UK may be due to variations in climate and/or dietary habits of children between the two countries, or due to different data collection period. However, some of the above observed differences may also be attributed to variations in the definition of food categories.

Morgan *et al.* (2009) have pointed out a shift in advertising towards foods like high-sugar breakfast cereals and sweetened dairy products that appear healthier but actually contain large amounts of hidden sugars. This observation is in accordance with our findings since yoghurt desserts were the second and sugared breakfast cereals were the fourth most advertised food products.

Among the various categories of foods advertised, fruit-flavoured drinks and soft drinks are of special interest for oral health, as having both high cariogenic and high erosive potential. Some studies suggest children begin consuming fruit-flavoured drinks in early childhood (Gatou and Mamai-Homata, 2012), since infants' mothers appear to consider them as healthy alternatives to fresh fruit juices (Scheiwe *et al.*, 2010), possibly due to misleading nutritional and health claims often used in the marketing of these products (Silverglade and Heller, 2010).

In the present study, 12% of food advertisements aired during child-focused programs were for soft/fruit drinks with high sugar and acid content (including fast food advertisements that incorporate soft drinks). The respective percentage for the other programs was 11%, with a further 2.2% of advertisements for sugar free soft drinks. International findings concerning soft/fruit drinks advertising on television are vary. For example, in UK Chestnutt and Ashraf (2002) found that 10.9% of advertisements were for sugared and 2.5% for sugar free soft drinks. The respective percentages in the study of Rodd and Patel (2005) were 38.6% and 0.3%, while Morgan *et al.* (2008) reported that only 2.2% of advertisements

were for drinks high in sugar. Other studies conducted in other European countries, Australia and US that were not oriented solely to the advertisement of foods possibly detrimental to oral health, report a proportion of advertisements for sugared beverages ranging from 2% to 6.5% (Batada *et al.*, 2008; Bell *et al.*, 2009; Neville *et al.*, 2005). However, the results of these studies are not comparable with ours due to a different food classification system, or different data collection period.

Consistent with previous research findings (Batada *et al.*, 2008; Kelly *et al.*, 2008; Morton *et al.*, 2005), this study found that the use of persuasive marketing techniques was distributed mainly over children's programs. About three quarters of the advertisements containing a persuasive marketing technique were accumulated in the child-focused programs, which represented only 17% of the study timeframe. Among the assessed techniques, the most commonly used by advertisers during these programs were free gifts with purchase of food products (39.4%) and promotion of interactive food company or product websites (19.7%). Free gifts are often part of collectible sets, a strategy that encourages repeated purchases as well as brand loyalty (Roberts and Pettigrew, 2007). The interactive websites call children to subscribe and play video games and/or take part in competitions, while using the data entered by children for market research. In US, Batada *et al.* (2008), reported giveaways in 26% and use of websites in 15% of food advertisements. Therefore, it seems that these techniques are widely used by advertisers for the promotion of food products to children.

Another interesting finding of this study was that persuasive marketing techniques were used significantly more often in the advertisement of food products potentially harmful to teeth compared to the non-harmful ones and that the most commonly used techniques for this kind of foods were free gifts and interactive websites. Although the use of persuasive techniques in food advertisements according to their ability to influence dental health has not been investigated previously, it is generally accepted that they are used more often in advertisements for non-core unhealthy foods (Boyland *et al.*, 2012; Kelly *et al.*, 2008; 2010).

In conclusion, food advertising on Greek television during children's programs is dominated by food items that are potentially harmful to oral health. Moreover, persuasive marketing techniques, that have been proved to affect children's food preferences and consumption, are intensely used in the advertisement of foods with high sugar and/or acid content.

There is currently little protection for Greek children against television advertising of unhealthy foods, since there are no restrictions in food advertising, with the exception of alcohol, that is not allowed to be promoted during programs designed for children. Therefore, our findings provide some evidence that could be used by public health officers and policymakers, for advocacy and interventions that could reduce the exposure of children to advertising of potentially unhealthy food and drink products.

The present study is the first content analysis of food advertisements broadcast on Greek television that compares children's programs with other programs within the children's peak viewing timeslots. Furthermore, it

provides baseline data on the exposure rate of Greek children to advertisements of foods potentially harmful to oral health that can be used to guide future research in this area and to assess time trends. However, further research is needed for the assessment of other marketing strategies that are being developed to influence the dietary choices of children.

References

- Adams, J., Tyrrell, R., Adamson, A., White, M. (2012): Effect of restrictions on television food advertising to children on exposure to advertisements for 'Less Healthy' foods: Repeat cross-sectional study. *PLoS ONE* **7**, e31578.
- Australian Bureau of Statistics (2010): *Square eyes and couch potatoes: Children's participation in screen-based activities*. Canberra: Perspectives on Sport, Australian Bureau of Statistics.
- Batada, A., Seitz, M.D., Wootan, M.G. and Story, M. (2008): Nine out of 10 food advertisements shown during Saturday morning children's television programming are for foods high in fat, sodium, or added sugars, or low in nutrients. *Journal of the American Dietetic Association* **108**, 673-678.
- Bjurström, E. (2000): *Children and television advertising. A critical study of international research concerning the effects of TV-commercials on children. Report 1994/95:8*, 2nd edn. Stockholm: Konsumentverket.
- Bell, R.A., Cassady, D., Culp, J. and Alcalay, R. (2009): Frequency and types of foods advertised on Saturday morning and weekday afternoon English- and Spanish-language American television programs. *Journal of Nutrition Education and Behavior* **41**, 406-413.
- Boylard, E.J., Harrold, J.A., Kirkham, T.C. and Halford, J.C. (2012): Persuasive techniques used in television advertisements to market foods to UK children. *Appetite* **58**, 658-664.
- Cairns, G., Angus, K. and Hastings, G. (2009): *The Extent, Nature and Effects of Food Promotion to Children: A Review of the Evidence to December 2008*. Geneva: World Health Organization.
- Chestnutt, I.G. and Ashraf, F.J. (2002): Television advertising of foodstuffs potentially detrimental to oral health – a content analysis and comparison of children's and primetime broadcasts. *Community Dental Health* **19**, 86-89.
- Consumers International (2011): *Manual for monitoring food marketing to children*. London: Consumers International.
- European Commission (2006): *Eurobarometer 64.3 Special Eurobarometer No 246 Health and Food*. http://ec.europa.eu/public_opinion/archives/ebs/ebs_246_en.pdf
- European Commission (2009): *Working Document on the Setting of Nutrient Profiles – 13/2/2009*. www.senat.fr/europe/textes_europeens/a0006.pdf
- Federal Trade Commission (2008): *Marketing Food to Children and Adolescents. A Review of Industry Expenditures, Activities, and Self-Regulation. A Report to Congress. Appendices*. Washington, DC: Federal Trade Commission.
- Gantz, W., Schwartz, N., Angelini, J.R. and Rideout, V. (2007): *Food for thought: television food advertising to children in the United States*. Washington, DC: Kaiser Family Foundation.
- Gatou, T. and Mamai-Homata, E. (2012): Tooth wear in the deciduous dentition of 5-7-year-old children: risk factors. *Clinical and Oral Investigation* **16**, 923-933.
- Hawkes, C. (2006): *Marketing food to children: changes in the global regulatory environment 2004-2006*. Geneva, WHO.
- Institute of Medicine of the National Academies, Committee on food marketing and the diets of children and youth (2006): *Food Marketing to Children and Youth: Threat or Opportunity?* McGinnis, J.M., Gootman, J.A. and Kraak, V.I., Eds p.536. Washington, DC: The National Academies Press.
- Kelly, B., Hattersley, L., Lesley, K. and Flood, V. (2008): Persuasive food marketing to children: use of cartoons and competitions in Australian commercial television advertisements. *Health Promotion International* **24**, 337-344.
- Kelly, B., Halford, J.C., Boyland, E.J., Chapman, K., Bautista-Castaño, I., Berg, C., Caroli, M., Cook, B., Coutinho, J.G., Effertz, T., Grammatikaki, E., Keller, K., Leung, R., Manios, Y., Monteiro, R., Pedley, C., Prell, H., Raine, K., Recine, E., Serra-Majem, L., Singh, S. and Summerbell, C. (2010): Television food advertising to children: a global perspective. *American Journal of Public Health* **100**, 1730-1736.
- King, L., Hebden, L., Grunseit, A., Kelly, B. and Chapman, K. (2012): Building the case for independent monitoring of food advertising on Australian television. *Public Health Nutrition* **1**, 1-6.
- Kunkel, D., McKinley, C. and Wright, P. (2009): *The impact of industry self-regulation on the nutritional quality of foods advertised on television to children*. Arizona: University of Arizona, Commissioned by Children Now. www.childrennow.org/uploads/documents/adstudy_2009.pdf
- Morgan, M., Fairchild, R., Phillips, A., Steward, K. and Hunter, L. (2009): A content analysis of children's television advertising: focus on food and oral health. *Public Health Nutrition* **12**, 748-755.
- Morton, H., Stanton, R., Zuppa, J. and Metha, K. (2005): Food advertising and broadcasting legislation – a case of system failure? *Nutrition and Dietetics* **62**, 26-32.
- National Statistical Service of Greece (2009): *Statistical Yearbook of Greece 2008*. Pireas: National Statistical Service of Greece. http://dlib.statistics.gr/Book/GR-ESYE_01_0002_00060.pdf
- Neville, L., Thomas, M. and Bauman, A. (2005): Food advertising on Australian television: the extent of children's exposure. *Health Promotion International* **20**, 105-112.
- Petersen, P.E., Bourgeois, D., Ogawa, H., Estupinan-Day, S. and Ndiaye, C. (2005): The global burden of oral diseases and risks to oral health. *Bulletin of World Health Organization* **83**, 661-669.
- Roberts, M. and Pettigrew, S. (2007): A thematic content analysis of children's food advertising. *International Journal of Advertising* **26**, 357-367.
- Roberts, D.F., Foehr, U.G. and Rideout, V.R. (2005): *Generation M: Media in the Lives of 8-18 year-olds*. p140. Moenlo Parc, CA: Henry J. Kaiser Family Foundation.
- Rodd, H.D. and Pattel, V. (2005): Content analysis of children's television advertising in relation to dental health. *British Dental Journal* **199**, 710-713.
- Scheiwe, A., Hardy, R. and Watt R.G. (2010): Four-year follow-up of a randomized controlled trial of a social support intervention on infant feeding practices. *Maternal and Child Nutrition* **6**, 328-337.
- Sheiham, A. (2001): Dietary effects on dental diseases. *Public Health Nutrition* **4**, 569-591.
- Silverglade, B. and Heller, I.R. (2010): *Food labeling chaos: the case for reform*. Washington, DC: Center for Science in the Public Interest.
- Vereecken, C.A., Todd, J., Roberts, C., Mulvihill, C. and Maes, L. (2006): Television viewing behavior and associations with food habits in different countries. *Public Health Nutrition* **9**, 244-250.
- World Health Organization (2010): *Set of recommendations on the marketing of foods and non-alcoholic beverages to children*. Geneva: WHO.
- Yannakoulia, M., Karayiannis, D., Terzidou, M., Kokkevi, A. and Sidossis, L.S. (2004): Nutrition-related habits of Greek adolescents. *European Journal of Clinical Nutrition* **58**, 580-586.