

1 **Remember me? Exposure to unfamiliar food brands in TV advertising and online advergames**
2 **drives children's brand recognition, attitudes and desire to eat foods: A secondary analysis**
3 **from a crossover experimental-control study with randomization at the group level**

4 **Research snapshot**

5 **Research questions:** Does exposure to unfamiliar food brands in TV advertising and online
6 advergames increase children's brand recall and recognition? How does exposure affect children's
7 attitudes towards brands and consumers of those brands and children's desire to eat the advertised
8 products?

9 **Key findings:** In this secondary data analysis, children recognized more food brands following
10 exposure (mean difference 3.8, $p < 0.0001$). The majority of brands appealed to children. Children
11 wanting to eat the advertised products rated the brands more positively than children who did not
12 express a desire to eat them. Playing the advergames strengthened children's positive attitudes
13 towards consumers of the brand.

14
15 **Abstract**

16 **Background:** Limitations in current Australian regulatory provisions may be identified by
17 demonstrating the effect of different marketing methods on children's recognition and attitudes
18 toward unhealthy food brands.

19 **Objective:** To investigate how exposure to different marketing techniques from television (TV) and
20 online food advertising affects children's brand recall, recognition and attitudinal responses toward
21 brands and brand consumers, and children's desire to eat the advertised products.

22 **Design:** Secondary analysis of data from a crossover experimental-control study.

23 **Participants/setting:** 154 children (7-12 years) completed the study, conducted at four, six-day
24 holiday camps from April 2016 to January 2017 in New South Wales, Australia. Children were
25 assigned to a single-media (n=76) or multiple-media (n=78) condition.

26 **Intervention:** All children viewed 10 TV food advertisements in a cartoon on three occasions. For
27 one of the brands, one set of children additionally played online 'advergames' featuring the brand.

28 **Main outcome measures:** Children's recognition and attitudes towards brands and brand consumers
29 and children's desire to eat the product were reported via a brand recognition and attitude survey pre-
30 and post-intervention. Marketing techniques were categorized.

31 **Statistical analysis:** Pre- and post-brand recognition, and relationships between brand recognition
32 and attitudes by media condition and desire to eat product, were examined using generalized linear
33 mixed models and linear mixed models.

34 **Results:** There was a significant increase in the number of brands recognized post-exposure by
35 children in both media groups (mean difference 3.8, $p < 0.0001$). The majority of brands appealed to
36 children. Children who reported wanting to eat the advertised products rated brands more positively
37 than children who did not express a desire to eat the products. A larger proportion of children who
38 played the advergames (36%) rated brand consumers as 'cool' than children who viewed the TV
39 advertisements only (19%) ($p < 0.001$). Anti-adult themes, fun/humor and parent pleasing were
40 techniques unique to some of the most recognized and favored advertisements.

41 **Conclusions:** The marketing communications increased children's brand recognition and elicited
42 positive attitudinal responses. These findings indicate a need for policymakers to consider additional
43 regulations to protect children from the persuasive influence of unhealthy food advertising.

44

45 **Introduction**

46 Children's exposure to high levels of energy-dense, nutrient-poor (unhealthy) food advertising via
47 television (TV) and, increasingly, the Internet and social media,¹ creates societal norms for children
48 about which foods are acceptable and desirable to eat.² These normative influences have a strong
49 impact on children's food preferences and choices, further strengthened by children's desire for
50 conformity with their peers.^{3,4}

51 As branding is a powerful influencer of product choice, most child-oriented food advertising
52 campaigns take a brand-building approach.^{5,6} Fundamentally the role of branding is to establish
53 positive associations and attributes to a product that will differentiate it from other similar products.⁷
54 This is referred to as brand equity; that is, the added value attached to a product as a result of being
55 coupled with the brand.⁷ Advertising aims to build children's awareness of food brands and products
56 and their desire for them, thus building brand equity.^{6,8} Positive attitudes developed towards
57 unhealthy food products as a result of advertising exposure in childhood have been demonstrated to
58 persist into adulthood,⁹ with early brand exposure lasting the longest.¹⁰

59 Social cognitive theories propose that repeatedly pairing food brands with highly appealing stimuli
60 will transfer positive attitudes towards the brand.² Furthermore, this positive affect transfer can occur
61 without conscious perception or processing of the marketing stimuli.¹¹ Contemporary food
62 advertisements are designed with implicit psychological processing in mind, utilizing an array of
63 persuasive appeals and affect-based content to promote both brand and product.¹²⁻¹⁴ Research in
64 adults has shown that it is not rational message content within advertising that drives strong brand
65 equity, but rather these emotional and creative appeals.¹⁵ In recent years, advergames have been
66 introduced as an online marketing tool, where the brand and/or product are a prominent feature⁸ with
67 brand immersion the main objective.¹⁶

68 A key recommendation from the World Health Organization's report on Ending Childhood Obesity
69 is not only to restrict the amount of unhealthy food advertising that children are exposed to, but also
70 to reduce the power of these communications.¹⁷ Persuasive power refers to the creative content and

71 marketing techniques within advertisements.¹⁸ Globally, there are limited statutory regulations
72 restricting the extent of food marketing to children and neither government nor industry-led
73 regulatory codes sufficiently cover the use of persuasive marketing techniques that appeal to
74 children.^{19,20} Typically, self-regulatory codes only apply when either the communication's content or
75 the media itself is deemed 'directed primarily to children'.²¹⁻²³ The ambiguous interpretation of this
76 definition together with unrealistic audience thresholds (in the UK children must represent 25% and
77 in the USA and Australia 35% of the media audience²¹⁻²⁵), results in children continuing to be
78 exposed to a high frequency of persuasive advertising for unhealthful foods on TV and online.^{26,27}

79 The range of persuasive techniques used in food advertising to appeal to children is well
80 documented; they include catchy music, mouth-watering food images and happy, fun-loving
81 characters.¹³ In their review of persuasive marketing techniques to promote food to children on TV,
82 Jenkin et al (2014) found that there is good evidence to show that the use of these techniques
83 promotes brand awareness and loyalty in children.¹³ Brand awareness is the first step in a hierarchy
84 of promotional effects that likely prompts a cascade of responses ultimately leading to the
85 consumption of these foods.⁶ Use of promotional characters, such as celebrities and brand mascots, is
86 a well-recognized marketing technique known to appeal to children.^{28,29} However, the appeal of other
87 persuasive elements commonly found in contemporary advertising are yet to be elucidated (e.g.
88 humor, action, anti-adult or parental themes).³⁰ Understanding which specific (and combinations of)
89 persuasive appeals most affect children would provide additional evidence to inform effective policy
90 to further reduce the negative impact of unhealthy food marketing to children.

91 The aim of the present study was to investigate how different unhealthy food advertisements on TV
92 and in online advergames influenced children's free-recall and recognition of brands, their attitudes
93 towards the advertised brands and brand consumers, and children's desire to eat the advertised
94 products. In addition, the creative content and the marketing techniques within the different
95 advertisements were reviewed and the dominant persuasive techniques were categorized.

96 **Methods**

97 *Study design and participants*

98 This secondary data analysis was conducted using data collected from a within-subject, randomized
99 controlled trial (RCT) that, primarily, investigated whether exposure to three days of food advertising
100 from a single-media (TV-only) or a multiple-media source (TV and online game) increased
101 children's snack intake after exposure, compared with three days of non-food advertising, and
102 whether any increased energy intake was compensated for at a later lunchtime meal.³¹ The RCT was
103 implemented across four, six-day school holiday camps from April 2016 to January 2017 in New
104 South Wales, Australia.³¹ Children (78 female, 82 male) aged 7–12 years were recruited through
105 local schools, social media and email networks. Forty children attended each holiday camp. Within
106 each camp, children were allocated to one of two groups of 20, with an even distribution of sex and
107 age. One of the two groups was randomized to either the single-media (TV-only) or multiple-media
108 (TV and online game) condition. Within each media condition was an experimental condition (three
109 days of unhealthy food advertising exposure) and a control condition (three days of non-food
110 advertising exposure). Within each camp, children took part in both the experimental and control
111 conditions, with the order of advertising condition counter-balanced across holiday camps. This
112 manuscript focused on children's responses to the experimental conditions.

113 Informed written parental consent was obtained for all study participants. The study was registered
114 with the Australian New Zealand Clinical Trials Registry (ACTRN12617001230347) and approved
115 by the University of Wollongong Human Research Ethics Committee.

116 *Materials and measures*

117 *Media and advertising*

118 In the experimental condition, 10 food advertisements were embedded into three different 10 minute,
119 age-appropriate cartoons; one for each day. Each advertisement was approximately 30 seconds in
120 length. Cartoons did not contain any pictures or references to food. The advergAMES featured the
121 advertised brand/product as active game pieces, present throughout the duration of the game (five

122 minutes of game play daily) and were rated as suitable to be played by all age groups. Three different
123 food advergames were used, all representing the same brand. The advertised food products were
124 classified as ‘unhealthy’ as per nutrient profiling scoring criteria developed for health claims
125 regulation in Australia³². The advertisements were selected because their creative content would
126 appeal to children¹³ but would not be deemed ‘directed primarily to children’ and, as such, were
127 representative of the food advertising permitted for broadcast during children’s viewing times under
128 current regulatory standards in Australia.^{21,22,33,34} In order to isolate the effects of the study
129 advertising, international brands that were unfamiliar to children were used. The TV advertisements
130 were sourced from overseas and had never been aired on Australian commercial TV stations and the
131 advergames were only available for download through international app stores (Table 1). Using
132 novel brands to test children’s attitudinal responses to marketing was an approach employed in prior
133 studies.^{35,36}

134 *Free brand recall, brand recognition and attitude*

135 Children completed an online, purpose-designed questionnaire and brand recognition tool at home
136 both pre- and one week post-study. This tool was based on a validated food brand recognition
137 instrument for children of this age group³⁷ and based on questions used in previous research on
138 children’s food brand attitudes.³⁸ A pilot study conducted with 30 children in January 2016
139 confirmed that the pictorial format and simple language used in the questionnaire could be
140 comprehended by children as young as seven years. Parents were told they could sit with their child
141 if they needed some guidance, but to not answer for them.

142 The first section of the questionnaire assessed children’s free-recall of brands for different product
143 categories. Children were asked to name three brands of breakfast cereal, confectionery and snack
144 food, in addition to some non-food brands, without any prompts.

145 The second section asked children: i) if they recognized 20 different photographs of food logos (the
146 advertised brands) and non-food logos, and ii) to describe the product to which the brand logo
147 related. If they did correctly identify the advertised food logos, they were then asked to rate: i) their

Table 1: Product descriptions and persuasive techniques within the advergames and TV advertisements that formed the experimental condition of a crossover experimental-control study to test the effect of food advertising exposure on children’s brand recall, recognition and attitudes

Brand and food category	Advertised product	Advertisement country of origin	Dominant persuasive techniques ^a
Advergames			
A: breakfast cereal	Chocolate flavored cereal	Malaysia	Brand equity characters, fantasy, accomplishment, palatability
TV advertisements:			
A: breakfast cereal	Chocolate flavored cereal	Malaysia	Brand equity characters, action, fantasy, palatability
B: confectionery	Chocolate spread	USA	Happiness, parent pleasing, parental themes, palatability
C: confectionery	Animal shaped candy	UK	Fun, fantasy, anti-adult, parent pleasing, parental themes, palatability
D: fast food	Burger, fries, soft drink meal deal	USA	Palatability, economical
E: fast food	Mexican fast food smart phone app	USA	Creativity, new product, convenient
F: savory snack	Salted potato ring snacks	UK	Fun, fantasy, anti-adult, parent pleasing, parental themes, palatability
G: savory snack	Ridge-cut potato chips	UK	Fantasy, palatability, new product
H: savory snack	Assorted potato/corn savory snacks	UK	Celebrity, humor, anti-adult, parental themes, palatability
I: sweet snack	Chocolate-filled ‘smiley-face’ cookies	UK	Brand equity characters, fun, fantasy, parental themes, palatability
J: sweet snack	Chocolate-coated cookies	UK	Brand equity characters, fun, fantasy, palatability

^a Persuasive technique definitions¹⁴: Fantasy = shows imaginary characters, situations or events; Accomplishment = depicts an accomplishment tied to the product; Anti-adult= depicts oppositional themes e.g. child characters portrayed laughing at or dominating adult characters; Parental pleasing = shows parents are pleased that their child (animated or human) is consuming the product; Parental themes = themes of family life; Palatability = food product is described/depicted as tasting or smelling good

148

149 perceptions of the brand on five-point semantic differential scales of ‘very cool’ to ‘very uncool’,
 150 ‘very exciting’ to ‘very unexciting’ and ‘very fun’ to ‘very boring’; ii) their perceptions of consumers
 151 of the food brands, using five-point semantic differential scales of ‘very popular’ to ‘very
 152 unpopular’, ‘very sporty’ to ‘very unsporty’ and ‘very cool’ to ‘very uncool’; and iii) to indicate
 153 whether they would like to eat this product sometime soon (yes or no).

154 *Demographic and clinical characteristics*

155 Children's sex and date of birth were reported by parents. Children's weight and height were
156 measured on Day One of the study. Children's body mass index (BMI) was calculated and these
157 values were used to classify children into underweight, normal weight, overweight or obese
158 categories using international standardized cut-points.³⁹

159 *Marketing techniques used in advertisements*

160 The taxonomy developed by Hebden et al¹⁴ was used to code the marketing techniques and themes in
161 the TV food advertisements and advergames by two researchers. Coding reliability was confirmed
162 with 100% agreement for thematic coding. For the purposes of this manuscript, brands were de-
163 identified and the food categories only were described.

164 **Statistical analyses**

165 All analyses were conducted with multilevel statistical models to account for the clustered nature of
166 the data and the crossover aspect of the study design (i.e. camp identifier and order of the
167 experimental/control conditions were included as random intercepts in all models). Children's
168 correct recognition of the different food brands and total number of food brands pre- and post-
169 intervention was analyzed using generalized linear mixed models with a repeated measure for time
170 (baseline and follow-up). A child who correctly identified a study food brand logo at baseline was
171 then excluded from that individual brand analysis. The proportions of children with favorable brand
172 perception ratings (cool, exciting, fun); with favorable brand consumer perception ratings (popular,
173 sporty or cool); and desire to eat the product soon, were then calculated. Any differences between
174 these proportions by media condition for Brand A (the featured brand in the advergames and a TV
175 advertisement) were compared using generalized linear mixed models with a binomial distribution.

176 Overall ratings of children's perceptions of individual food brands and brand consumers were
177 calculated from the mean of children's ratings on the five-point semantic differential scales. In line
178 with earlier studies³⁸, mean scores less than three indicated more positive perceptions and higher than
179 three more negative perceptions. Assessment of distribution plots for the rating scale data confirmed

180 that normality assumptions were met and these data were treated as continuous variables.⁴⁰ Linear
181 mixed models were used to examine children's overall brand ratings and overall brand consumer
182 ratings by children's expressed desire to eat the product for each advertised brand. Analyses were
183 performed using SPSS (version 25.0).⁴¹ Findings were considered significant at the $\alpha < 0.05$ level.

184 **Results**

185 *Sample characteristics*

186 Complete data were available for 154 children (50% girls), aged 7-12 years (9.3 ± 1.6 (mean \pm SD)).
187 Six children did not complete all days of the study so their data were not included in the final
188 analysis. A comparable number of children were in each media condition group (single-media: n=76;
189 multiple-media: n=78) with similar child age, sex and weight status distributions between these two
190 groups.

191 *Marketing techniques in TV advertisements and online advergames*

192 Common persuasive techniques used across the TV advertisements included fantasy, smiling, happy
193 characters and highly palatable food products. Snacking outside meal times by children and youths
194 was the dominant theme. In addition, some unique combinations were identified in some of the
195 popular TV advertisements (Brands C (confectionery), F and H (savory snacks)): anti-adult themes,
196 humor, parent pleasing and parental themes. A summary of the dominant marketing techniques used
197 in the TV advertisements and advergames can be found in Table 1 and full details of the creative
198 content in Table 2.

199 [Table 2 will be available as supplementary materials]

200 *Free brand recall*

201 Brand H (savory snack) was cited as an unprompted snack brand by 23% (n=33) of children in the
202 free brand recall phase of the post-intervention questionnaire. All other brands were mentioned
203 between 0 and 5 times ($< 0.1\%$ of children). Data not shown.

Table 2: Creative content description of advergames and TV advertisements that formed the experimental condition of a crossover experimental-control study to test the effect of food advertising exposure on children’s brand recall, recognition and attitudes

Brand and food category	Advertised product	Advertisement creative content description
Advergames Brand A: breakfast cereal	Chocolate flavored cereal	Screen features brand equity character (lion) and a boy grinning while game loads. The player (you) is the brand equity character. Chocolate, cereal pieces and packets are central to games. Games have different challenges and players collect points to progress to next level.
TV advertisements: Brand A: breakfast cereal Brand B: confectionery Brand C: confectionery Brand D: fast food Brand E: fast food Brand F: savory snack Brand G: savory snack Brand H: savory snack Brand I: sweet snack Brand J: sweet snack	Chocolate flavored cereal Chocolate spread Animal shaped candy Burger, fries, soft drink meal deal Mexican fast food smart phone app Salted potato ring snacks Ridge-cut potato chips Assorted potato/corn savory snacks Chocolate-filled ‘smiley-face’ cookies Chocolate-coated cookies	Action cartoon featuring a brand equity character (a lion) and a boy who overcome a villain trying to steal the chocolate that is shown being used to coat the breakfast cereal. Closes with the brand equity character and boy eating the cereal and smiling. Fast upbeat music throughout. Human characters of all ages, including parents and children, eating chocolate spread in different locations; in homes and outdoors. All characters smiling and laughing. Voiceover throughout the advert. Family of cartoon hedgehogs in home. Dad reading. Mum and child with packet of candy. Mum reads out a question from packet, “What do hedgehogs do when they are scared?” Child draws out a tiger-shaped candy. Dad gets a fright, curls into a ball; Mum and child ridicule Dad. Each meal deal component enthusiastically introduced and described by voiceover: burger, nuggets, fries, cookies, soft drink. Value of meal deal emphasized. Young man standing in his home. His face is not shown but camera focuses on his hands ‘creating’ different menu items. Semblance of a magic show with small flames appearing when he creates hot/fiery items. Food order can be placed via app. Female child shown controlling female adult dancer. Child’s fingers are the dancer’s legs and advertised potato rings are the dancer’s shoes. Closes in home with child eating packet of potato rings while mother smiles at child. Garden party. Young adult character barbecuing next to character with a tiger head. Other young adults are eating potato chips, laughing. Young adult character runs through garden (watched by child) to steal the chips. Closes with young adult on branch in tree (like a tiger) eating the chips. UK sports celebrity in a hospital bed eating big bag of assorted savory snacks, naming each one as he eats them. His 3 children enter. Dad does not share snacks. Children snap the bed shut with the bed controller, trapping the Dad inside. Children eat the snacks, looking smug. Two girls sitting in front of TV after school looking bored. Mum brings in packet of cookies. Cute owl brand equity character pops out. Catchy music starts. Two owls appear, sit on girls’ heads and girls laugh. Closes with girls and Mum eating cookies, all smiling. Three young adults in a library. Female gets packet of cookies out of bag. Cute, llama brand equity character pops out of packet. Adults laugh. Llama starts eating books and furniture with crunching sounds. One adult strokes llama. Final scene: adults eating cookies looking satisfied.

204 *Brand recognition*

205 There was a significant increase in the total number of brand logos correctly recognized by children
206 in both media groups from pre-intervention (1.3 ± 1.2 (mean \pm SD)) to post-intervention for all food
207 brands (5.1 ± 2.7 (mean \pm SD)) ($p < 0.001$). The brand logo most frequently identified post-
208 intervention was Brand A (cereal), which was recognized by 74% ($n=56$) of children in the multiple-
209 media group (Table 3).

210 Among the TV advertisements, five brands (A, D, F, H and J) were recognized by at least 60% of
211 children who had not previously recognized the logo at baseline. Brands B, E, G and I were
212 comparatively less recognized post-intervention ($< 21\%$). The low numbers of children able to
213 correctly recognize Brands B, E, G and I post-intervention prohibited meaningful sub-analyses so
214 consequently these brands were not included in further analyses.

215 *Perceptions of brands*

216 Children's mean overall brand ratings ranged from 2.5 ± 0.89 to 2.8 ± 0.96 (mean \pm SD), with 1
217 signifying very positive perceptions and 5 signifying very negative perceptions (Table 3). The
218 overall mean scores are less than three which shows that children perceived all brands to be
219 somewhat positive.³⁸ Across all three attitude ratings (cool, exciting and fun), Brand H (savory
220 snack) was the most positively perceived (49–54% rated this as 'very' or 'a little' cool/exciting/fun)
221 (Table 3) and had an overall brand rating of 2.5 ± 0.89 (mean \pm SD).

222 *Perceptions of product consumers*

223 Children's perceptions of product consumers are reported in Table 3. The highest ratings for positive
224 consumer perceptions were for Brand A (cereal) by children in the multiple-media group ('very' or
225 'a little' popular, $n=18$ (32%); 'very' or 'a little' cool, $n=20$ (36%)). Compared with children who
226 just watched the TV advertisement, a greater proportion of children who played the advergimes as
227 well as watched the TV advertisement perceived a person who would eat Brand A to be 'very' or 'a
228 little' cool (36% vs. 19%, $p < 0.001$).

Table 3: Pre- and post- intervention logo recognition and brand ratings, product consumer attitude ratings and desire to eat product post-intervention among all children who participated in a crossover experimental-control study to test the effect of food advertising exposure on children's brand recall, recognition and attitudes

Brand	Number of children at baseline	Recognized logo at baseline n (%)	Recognized logo post-intervention n (%)	Recognition rank	Brand is very or a little...			Overall brand rating ^b mean (SD ^c)	Person who would eat product is very or a little...			Overall product consumer rating ^b mean (SD ^c)	Eat soon n ^a (%)
					Cool n ^a (%)	Exciting n ^a (%)	Fun n ^a (%)		Popular n ^a (%)	Sporty n ^a (%)	Cool n ^a (%)		
A: cereal (<i>Multiple-media group</i>)	78	0 (0)	56 ^d (74)	1	19 (34)	24 (43)	20 (36)	2.7 (0.96)	18 (32)	10 (18)	20 ^e (36)	2.8 (0.81)	24 (42)
F: savory snack	154	15 (10)	94 ^d (68)	2	36 (42)	39 (42)	35 (37)	2.7 (0.88)	24 (26)	11 (12)	23 (25)	3.0 (0.60)	45 (48)
H: savory snack	154	10 (7)	94 ^d (65)	3	51 (54)	46 (49)	47 (50)	2.5 (0.89)	26 (28)	10 (11)	24 (26)	2.9 (0.66)	60 (64)
J: sweet snack	154	10 (11)	87 ^d (60)	4	30 (35)	35 (40)	29 (33)	2.8 (0.70)	26 (30)	11 (13)	16 (18)	2.9 (0.60)	52 (59)
A: cereal (<i>Single-media group</i>)	76	8 (11)	42 ^d (60)	4	18 (43)	15 (36)	15 (36)	2.8 (0.77)	10 (24)	8 (19)	8 (19)	3.0 (0.63)	21 (50)
D: fast food	154	90 (58)	38 ^d (60)	4	13 (34)	16 (42)	13 (34)	2.7 (0.83)	11 (29)	5 (13)	12 (32)	3.0 (0.80)	17 (45)
C: confectionery	154	2 (1)	85 ^d (56)	7	41 (48)	36 (42)	34 (40)	2.7 (0.90)	15 (18)	6 (7)	15 (18)	3.1 (0.64)	47 (55)

^aThe denominator for n (%) in each column is the number of children who recognized the logo post-intervention

^b1 signifies very positive perceptions and 5 signifies very negative perceptions

^cSD = standard deviation

^dSignificant increase in the correct recognition of the brand logo from baseline to post-intervention (p<0.001)

^eSignificant difference between media conditions (p<0.001)

231 *Desire to eat soon*

232 The proportion of children reporting that they wanted to eat a particular ‘product soon’ ranged
233 between 42% and 64% (Table 3). Across most brands (except for Brand A, cereal) children who
234 expressed a desire to ‘eat the product soon’ rated the brands and the people who would eat the
235 advertised brands more positively than those children who did not express a desire to ‘eat the product
236 soon’, all $p < 0.05$ (Table 4). Brand H (savory snack) was the product that the highest number of

Table 4: Children’s overall brand and consumer ratings by their expressed desire ‘to eat the advertised product soon’ for children who correctly identified the individual brand logos following food advertising exposure in a crossover experimental-control study

Desire to eat product soon	n	Overall brand rating mean (SD ^a)	Overall consumer rating mean (SD ^a)
Brand A: cereal (TV & advergaming group)			
Yes	24	2.1 (0.78)	2.4 (0.87)
No	32	3.1 (0.85)	3.1 (0.63)
P-value		<0.001	0.001
Brand F: savory snack			
Yes	45	2.3 (0.71)	2.7 (0.59)
No	49	3.1 (0.82)	3.2 (0.51)
P-value		<0.001	<0.001
Brand H: savory snack			
Yes	60	2.2 (0.74)	2.7 (0.69)
No	34	3.0 (0.96)	3.1 (0.53)
P-value		<0.001	0.004
Brand J: sweet snack			
Yes	52	2.5 (0.58)	2.8 (0.59)
No	35	3.2 (0.66)	3.1 (0.56)
P-value		<0.001	0.011
Brand A: cereal (TV-only group)			
Yes	21	2.5 (0.62)	2.8 (0.67)
No	21	3.1 (0.83)	3.2 (0.55)
P-value		0.022	0.073
Brand D: fast food			
Yes	17	2.3 (0.77)	2.6 (0.76)
No	21	3.1 (0.71)	3.3 (0.68)
P-value		0.002	0.004
Brand C: confectionery			
Yes	47	2.3 (0.79)	2.9 (0.58)
No	38	3.1 (0.84)	3.3 (0.65)
P-value		<0.001	0.006

^a SD = standard deviation

238 children wanted to eat (n=60, n=64%). For Brand A (cereal) in the single-media group, the means
239 (SD) were similar to those in other groups, but the smaller number of children in each group may
240 have lacked the statistical power to show a statistically significant effect.

241 **Discussion**

242 This study demonstrates that brief exposures to unfamiliar TV and online food advertisements that
243 would not be deemed primarily directed to children (and hence would be permitted under current
244 Australian regulatory schemes) can affect children's brand recognition and attitudes towards brands.
245 There was a significant increase in the total number of food brands children recognized following the
246 brief exposure and all brands were rated somewhat positively. Six of the brand logos were correctly
247 identified after advertising exposure by almost two-thirds of children who had not previously
248 recognized them. Furthermore, Brand H (savory snack) was a prominent brand in children's free
249 recall. Recognition and recall of brands are two primary effects that advertisers aim to elicit from
250 marketing exposures.⁴² They are both important in making purchase and consumption decisions.⁴³
251 When a child is presented with shelves of food products within the same category (e.g. snacks) to
252 choose from, brand recognition can be the stimulus to prompt a specific purchase request or
253 decision.⁴⁴ For the most recognized brands, an average of 50% of children said they would like to eat
254 that product soon. Additionally, children who expressed a desire to 'eat the product soon' rated the
255 brands and the people who would eat the advertised brands significantly higher than the children who
256 did not express a desire to 'eat the product soon'. This suggests that children who reported wanting
257 to eat the product may have been driven to do so by these positive brand attitudes. Expressed
258 intention is the most proximal determinant of actual behavior and likely predicts children's
259 consumption behaviors if they were presented with the branded product.⁴⁵ These findings were
260 observed after just three advertising exposures. There is strong evidence that repeated exposures to
261 advertising augments evaluation of that stimuli^{46,47} and that maximum attitude and affect is reached
262 at around ten advertising exposures.⁴⁸ Therefore, it is likely that the effect of marketing campaigns,

263 that typically span multiple media and strive for repetition and ubiquity, would have even greater
264 impacts on children's brand perceptions than measured here.

265 Brand H's (savory snack) advertisement featured a UK sports celebrity who portrays a whimsical
266 character at the mercy of his children who steal his snack foods. Current UK regulations, while
267 considered to be the 'gold standard' in legislative control for unhealthy food marketing to children,
268 permit such a celebrity endorsement as this celebrity is deemed to be of 'general appeal' and not 'just
269 popular with children'.^{49,50} In the current study, this advertisement evoked the most attention and
270 positive feelings, yet, it is unlikely that this celebrity would have been familiar to Australian
271 children. In the UK where this celebrity is more well-known, children's attitudes and responses
272 toward the advertisement and brand may well have been even more pronounced as, indeed, was
273 demonstrated by Boyland et al.,(2013).⁵¹

274 Child and youth characters were central in most of the more popular advertisements (Brands A
275 (cereal), C (confectionery), F, H (savory snacks) and J (sweet snack)). In Australia, the inclusion of
276 child actors or characters is rarely seen to be a sufficient argument that an advertisement is directed
277 at, or of appeal to, children, with industry self-regulatory bodies dismissing complaints where this is
278 the case.^{52,53}

279 Notably, while playing the advergimes increased children's brand exposure, it did not increase
280 children's recognition of Brand A (cereal) compared with the TV-only group; however playing the
281 games did appear to strengthen children's positive perceptions towards consumers of the brand.
282 Given the importance placed by children on peer perceptions and the influence of these normative
283 perceptions on food choices^{3,4} this is an important finding. These advergimes provided an
284 immersive, brand-rich experience where children's interest was stimulated through challenge and
285 reward.⁵⁴ In an advergime the distinction between entertainment content and promotional messages
286 are blurred, increasing a child's susceptibility to influence.⁵⁵ Indeed, previous studies have also
287 found that children had more positive attitudes towards a brand (though not brand consumers
288 specifically) after playing an advergime compared with watching a TV advertisement.^{56,57} The lack

289 of an advergame-only group meant that we were unable to isolate whether the observed effects were
290 due to the fact that children in the multiple-media group had substantially more Brand A exposure
291 than the single-media group or to the nature of the game itself. The effects of advergames-only on
292 children's brand consumer attitudes warrants further investigation.

293 Advertising in this study used marketing techniques to associate products with fun, humor and being
294 cool (e.g. anti-adult themes). These attributes are important motivators for this age group of children²
295 and may explain children's attitudinal responses to the advertised brands. However, while the current
296 study suggests that some techniques may be more persuasive than others in prompting recognition
297 and positive attitude, a limitation was that the study was not designed to experimentally test specific
298 marketing techniques and, hence, precluded a clear comparison between the different techniques.
299 Future studies should address this knowledge gap.

300 **Conclusions**

301 This study found that brief marketing exposures to unfamiliar, unhealthy food brands in TV and
302 online advertising increased children's brand recognition and elicited positive attitudinal responses
303 towards advertised brands. These findings add to the body of evidence on the persuasive influence of
304 unhealthy food advertising to children and indicate the need for government regulatory agencies to
305 consider what additional regulations are required to further protect children from the negative
306 impacts of food advertising. Future research that determines the influence of specific marketing
307 techniques would serve to inform policy makers on the types of persuasive appeals that should be
308 restricted in unhealthy food advertising to children, and also to identify those appeals that could be
309 used to encourage children to adopt healthier dietary choices.

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314 **References**

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