J Community Health (2009) 34:73–78
DOI 10.1007/s10900-008-9119-3

ORIGINAL PAPER

Brand Name Logo Recognition of Fast Food and Healthy Food among Children

Elva Arredondo · Diego Castaneda · John P. Elder · Donald Slymen · David Dozier

Published online: 1 October 2008

Abstract The fast food industry has been increasingly criticized for creating brand loyalty in young consumers. Food marketers are well versed in reaching children and youth given the importance of brand loyalty on future food purchasing behavior. In addition, food marketers are increasingly targeting the Hispanic population given their growing spending power. The fast food industry is among the leaders in reaching youth and ethnic minorities through their marketing efforts. The primary objective of this study was to determine if young children recognized fast food restaurant logos at a higher rate than other food brands. *Methods* Children ($n = 155$; 53% male; 87% Hispanic) ages 4–8 years were recruited from elementary schools and asked to match 10 logo cards to products depicted on a game board. Parents completed a survey assessing demographic and psychosocial characteristics associated with a healthy lifestyle in the home. *Results* Older children and children who were overweight were significantly more likely to recognize fast food restaurant logos than other food logos. Moreover, parents' psychosocial and socio-demographic characteristics were associated with the type of food logo recognized by the children. *Conclusions* Children's high recognition of fast food restaurant logos may reflect greater exposure to fast food advertisements. Families' socio-demographic characteristics play a role in children's recognition of food logos.

Keywords Food logo recognition · Latino children · Healthy eating

E. Arredondo (✉) · J. P. Elder · D. Slymen
Graduate School of Public Health, Center for Behavioral and Community Health Studies, San Diego State University, San Diego, CA 92123, USA
e-mail: earredondo@projects.sdsu.edu

D. Castaneda
School of Public Health, University of California, Berkeley, 50 University Hall #7360, Berkeley, CA 94720, USA

D. Dozier
School of Journalism & Media Studies, San Diego State University, San Diego, CA 92182-4561, USA

Introduction

In the past 20 years, the rate of overweight children in the United States (US) has rapidly increased [1]. The high incidence of obesity in children parallels with increases in US marketing on food and beverages. Between 1994 and 2004, the rate of marketing of foods high in total calories, sugars, salt and fat to children outpaced the total market [2]. A recent report and analysis of the influence of food marketing on children's diet suggests that there is strong evidence that television advertisement influences the food and beverage preferences of children ages 2–11 years [2]. Children who are exposed to a large percentage of advertisements are more likely to request high fat, energy dense snacks than healthy foods [3]. Although many individual and environmental level factors (e.g., family food preferences, availability of fast food restaurants) are hypothesized to contribute to the high childhood obesity rate, the fast food industry has been increasingly implicated as it employs commercial strategies to create brand loyalty in young consumers.

Fischer and colleagues [4] used "advertising recognition" theory [5] in a study exploring the recognition by children of adult and children's brands, specifically examining the identification of Old Joe the camel with a

box of cigarettes. Study findings suggest that children ages 3–5 recognized the Disney Channel's logo at higher rates than the Old Joe logo, but 6 year olds recognized both brands at equal rates. Like tobacco companies, many fast food companies employ marketing strategies that effectively engage the attention of young children and stimulate the appeal of promotional items. A consequence of unhealthy food advertisement and exposure may be that children request more fast foods and, in turn, may be contributing to the increase in consumption of fast food in children. To our knowledge, there are no published studies examining children's recognition of fast food versus other food logo recognition and understanding the types of food logos recognized by children may shed light on media-related influences that may contribute to the rise of obesity rates in young children.

This study sought to explore the following: (1) logo recognition rates of fast food and other food products in children ages 4–8 years; (2) the relation between the type (unhealthy vs. healthy) of food logo (fast food vs. other foods) recognized by children and their demographic characteristics (e.g., age and BMI); and (3) the relation between the type of food logo recognized by children and their parents' psychosocial (e.g., self-efficacy and perceived barriers to a healthy home lifestyle) and socioeconomic characteristics (e.g., income).

Methods

Recruitment

Participants were 155 child–parent pairs recruited through a convenience sample from five Chula Vista (California) School District Elementary schools. One hundred and four families were recruited as part of a randomized community trial aimed at addressing individual and environmental correlates of childhood obesity. Because participants involved in the main trial were recruited from schools composed of families from low SES backgrounds, additional parent–child dyads ($n = 51$) were recruited from two different schools that were located in zip codes with higher per capita income (determined by US Census Data from 2000 [6]) than those families enrolled in the main trial. A bilingual/bicultural research assistant approached parents of the children who were enrolled in grades K-2nd before and after school and explained to them the purpose of the study. Families were deemed eligible if they had a child who lived in the catchment area designated by the school they attended and were enrolled in K-2nd grade. Only one child per family was allowed to participate. This protocol was approved by San Diego State University's Institution of Review Board.

Procedures

Development of Logo Recognition Instrument

The logo game board was modeled after one developed by Fischer et al. [4] These investigators compared young children's recognition of cigarette brand logos to children's logos (e.g., Disney). First, foods and their corresponding logos were identified based on children's dietary consumption patterns, evidence of child-directed marketing of these foods, and availability of these products in the target community. These foods included fast food (McDonalds, Burger Kind, Dominos Pizza, Carl's Jr. and Taco Bell), yogurt (Yoplait), juice (Minute Maid), cereal (Cheerios), and fruits and vegetables (Chiquita, Green Giant, and 5-a-day). "Fast food" was defined as "food purchased in self-service or carry-out eating places without wait service" [7].

A game board and game logo cards were then construed. Eleven brand logo cards were created using logos from the corresponding company's website. Logo cards were printed in color and mounted professionally on 4 by 6 construction paper cutouts, with strips of laminating paper to protect them. Each of the 11 images was downloaded and printed.

Logo Matching Procedures

During the school visits, the bilingual/bicultural research assistants (RAs) measured children's anthropometric information such as height and weight using a portable scale and stadiometer. Following anthropometric measurements, it was explained to the child that he or she would play a game matching cards with specific products on a game board. A demonstration of matching was done with a sample card. Children were then asked to match the pictures of the 11 logo cards to the corresponding products on the game board. Children were praised for giving any response and not told whether their responses were accurate. Children completed the matching game alone, lasting approximately 15–20 min. Parents were asked to complete a brief survey assessing parents' obesity prevention knowledge, self-efficacy and barriers to promoting a healthy lifestyle and demographic characteristics. Families were given a small cash incentive for their participation.

Predictors

Children's Body Mass Index (BMI)

BMI was calculated as weight in kilograms divided by the square of height in meters. The 2000 Centers for Disease

Control and Prevention Growth Charts outline the 25th, 50th, 75th, 85th and 95th percentile specific for age and gender [6]. A score above the 85th percentile is considered to represent at risk for overweight. A score above the 95th percentile is considered to be overweight or obese.

Demographic Data

Child demographic data included age, gender and ethnicity. Parents were asked to report on their education level, income, marital status, ethnicity, number of household members, employment status, and length of time living in US.

Obesity Prevention Knowledge

Parents' knowledge on obesity related health problems was evaluated with 10 true/false questions. A total score was compiled based on these answers with the highest score (10) indicating 10 correct answers.

Self-Efficacy to Promoting a Healthy Lifestyle in the Home

Self-efficacy was evaluated with a 13-question scale that ascertained how confident parents were about encouraging healthy behaviors. A sample item included: "How confident are you that you can make healthy food choices available in your home". This was followed with a five-point Likert scale that gave options ranging from "(1) Not at all Confident" to "(5) Extremely Confident." The reliability of the scale was good ($\alpha = .76$).

Barriers to Promoting a Healthy Lifestyle in the Home

Perceived barriers to health was measured with a 9-item scale assessing parents' reports of encountering difficulties in promoting a healthy lifestyle within their family. A sample item included: "There are not enough healthy options in the store and restaurants where my family buys food." A five-point Likert scale was given as answer choices ranging from "(1) Strongly Disagree" to "(5) Strongly Agree." The reliability of the scale was good ($\alpha = .74$).

Outcome Measure

Logo Recognition

For all analyses, children's food logo recognition was used as the main outcome of interest. If a child was able to correctly match a logo (e.g., McDonalds) with the product picture on the game board (hamburger and fries), this was considered a correct recognition.

Data Analyses

Given our research question, *t*-tests were used to examine differences in the average percentage score between fast food restaurant logos and other food logo recognition. Univariate Poisson regressions were employed to examine the associations between the predictors and the outcome as they allow for a continuous response and accounts for the skewed distribution that is often found with counting outcomes [8]. To further examine differences in fast food versus other food logo recognition, a "logo difference score" was calculated by subtracting the number of fast food logos recognized from the number of other food logos recognized. For example if a child recognized "3" food logos and "5" fast food logos his/her score would be a "−2". A composite SES score was derived for each family by taking the average income and education status of each parent and because many of the continuous variables were skewed, they were dichotomized by median split. Separate independent sample *t*-tests were run to evaluate whether the logo difference score differed among the demographic and psychosocial predictors. All analyses were conducted using the Statistics Analysis Software 8.0 (1999; SAS Institute Inc, Cary, NC). An alpha of .05 was used for all statistical tests.

Results

The study population consisted of 155 child–parent pairs from the Chula Vista Elementary School District. All of the adult respondents were women. The majority of the parents identified themselves as Hispanic/Other Latin American (85.8%), while 8.4% were White/Anglo/Caucasian Americans, .6% were African-American/Not of Hispanic Descent, .6% were Asian American, .6% described themselves as Other and 3.9% did not respond. Children included 83 males (53.6%) and 72 females (47.4%). The average age of the children was 5.9 years. The majority of the children were Hispanic (87.10%), 10.3% were white, .6% African American, and 1.2% Asian. Most children were at least at the 75th percentile for overweight based on age and gender (BMI = 17.75) [6]. Table 1 presents parent and family socio-demographic characteristics.

Prior to conducting the planned analyses, it was of interest to examine differences in characteristics among the families from the two different SES school regions. *T*-test results reveal that parents from higher SES school regions had significantly higher SES index scores ($P < .001$), spent more time living in the US ($P < .001$), had children with lower BMI ($P < .05$), reported higher self-efficacy ($P < .05$), and lower perceived barriers ($P < .001$) to

Table 1 Parents' demographic information ($N = 155$)

Parenting variable	
Mean (SD) age (years)	34.4 (7.09)
Mean time in US (years)	16.06 (12.3)
Mean (SD) no. of household members	4.86 (1.16)
Marital status	
% Married ($n = 114$)	73
Household income(monthly $)	
% ≤ $2000 ($n = 79$)	51
Years of formal education	
% ≤ High school ($n = 82$)	53
Employment status	
% Employed ($n = 135$)	87

promoting a healthy home lifestyle than parents from lower SES schools.

Univariate Poisson Regression

Poisson regressions were computed for the criterion variable of counts of the number of logos recognized [8]. Parents' education level, household income, SES index, obesity prevention knowledge, self-efficacy and barriers to promoting a healthy lifestyle in the home, and time in the US in years as well as child's age and BMI were entered univariately in the Poisson models to examine their relation with fast food and other food logo recognition. Six year olds and 7 to 8 year olds had another food logo recognition rate 1.69 (95% CI = 1.19–2.39, $P < .05$) and 2.23 (95% CI = 1.52–3.14; $P < .001$) times, than that of 4 to 5 year olds, respectively. Children of parents with more than a high school education had a 1.46 (95% CI = 1.12–1.90; $P < .01$) rate of recognizing an other food logo compared to children with less educated parents. Children from higher SES families (using the SES composite score) had a 1.36 (95% CI = 1.03–1.77; $P < .05$) greater rate of recognition of other food logos than families with lower SES scores. Mothers with higher self-efficacy to promoting a healthy home had children who recognized other food logos 1.32 (95% CI = 1.00–1.72; $P < .05$) times compared to children whose mothers had lower self efficacy. Children who attended schools in the higher SES area recognized other food logos at a 1.37 (95% CI = 1.04–1.80; $P < .05$) times higher rate than children in the lower SES area. No significant relationships between child's weight were found for parents' household income, obesity knowledge, perceived barriers, years in the USA, nor child's BMI.

In terms of fast food logos, child's age was the only significant predictor. Six year olds had a rate of recognition of fast food logos 2.78 (95% CI = 1.21–6.38; $P < .01$) times that of 4–5 year olds. Seven to eight year olds had a rate of fast food logo recognition 11.2 (95% CI = 3.08–41.2; $P < .001$) times that of 4 to 5 year olds.

Differences in Food Logo Recognition

A logo difference score was developed (other food logo recognition sum minus fast food logo recognition sum) and separate independent sample t-tests were run to evaluate if results differed from the Poisson analyses. A series of analyses were run for various BMI levels. First, the two groups were split by those children who were below the 50th percentile for age and sex and those above this level. These categories were then applied as grouping predictors where the logo differences score served as the dependent factor (See Table 2).

T-tests results showed significant food logo mean differences between the two geographic locations with lower

Table 2 Independent sample t-tests for logo difference score grouped by various predictors

Predictors	n	Mean delta (SD)	P value[a]
School location			
Lower SES	108	−2.27 (1.22)	.0001
Upper SES	47	−1.28 (1.4)	
BMI			
<50th percentile	36	−1.50 (1.16)	.03
≥50th percentile	118	−2.12 (1.44)	
<50th percentile	36	−1.52 (1.15)	.009
≥95th percentile	38	−2.34 (1.4)	
SES index score			
<4.74	73	−2.47 (1.30)	.0001
≥4.74	82	−1.50 (1.30)	
Self-efficacy			
<4.0	76	−2.25 (1.49)	.013
≥4.0	79	−1.69 (1.25)	
Barriers to health			
<2.22	78	−1.65 (1.40)	.005
≥2.22	77	−2.29 (1.40)	
Obesity knowledge			
<7.36	78	−2.17 (1.80)	.195
≥7.36	77	−1.85 (2.10)	
Age of child			
4–5 years old	50	−2.01 (1.30)	.636
6 years. old	59	−2.00 (1.50)	
7+	46	−1.80 (1.30)	
Time spent in US			
<4 years	39	−2.26 (1.30)	.060
4–13.5 years	39	−2.24 (1.40)	
13.5–27 years	39	−1.80 (1.30)	
>27 years	39	−1.50 (1.40)	

[a] Significant at $P < .05$ level

scores reporting a greater recognition of fast food logos ($P < .001$). Children with higher BMI had a more negative logo difference score, indicating more fast food recognition than those children at or below the 50th percentile for BMI ($P < .05$). Also, children from lower SES families and attending lower SES school regions recognized other food logos less and recognized fast food logos more than their higher SES counterparts ($P < .001$). Parents who reported higher self efficacy ($P < .05$) and lower barriers ($P < .01$) to promoting a healthier lifestyle in the home had children who recognized other logos more. Though marginally significant, parents who were in the US for longer periods had children who recognized more fast food logos ($P < .06$).

Discussion

In the present study, children on average recognized fast food logos at a much higher frequency than other food logos, with McDonalds' and Burger King's recognized at 89 and 86% respectively. Yoplait yogurt was recognized by children in the lower and upper SES schools at rates 70 and 55%, respectively. This brand is served as part of the school lunch program in both school regions, perhaps explaining the high recognition of Yoplait in both schools. The high recognition of fast food logos by children in study results parallel the findings found by Fischer et al. [4]. These findings suggest that marketing strategies employed by fast food companies may be effective in engaging children's attention. In turn, children may influence their parents' food purchasing behavior.

Consistent with previous research [9, 10], our findings suggest that the child's age was positively associated with food logo recognition. Seven to eight-year-old children recognized fast food logos 11 times more than younger children. Also, for every 4–5 year old child who recognized other food logos, approximately two 7–8 year olds recognized these logos. Moreover, findings from the *t*-tests suggest that overweight children were more likely to recognize fast food logos, while the opposite was true of the normal weight child. A plausible explanation for the higher recognition of unhealthy logos noted by other investigators is that overweight children are more exposed to unhealthy food advertisements (through television watching) than normal weight children [11].

Children who had parents with higher levels of education and a higher overall SES index score, and reported higher self-efficacy for promoting a healthy home lifestyle were more likely to recognize other food logos. Consistent with these findings, children who attended higher SES schools had a higher recognition rate of other food logos compared to their counterparts. Although we did not collect information on children's dietary intake nor the types of foods parents from higher SES serve, one reason why children from higher SES households recognized other food logos may be due to their parents serving these types of foods frequently compared to their counterparts [12]. Another plausible explanation as to why children from higher SES backgrounds recognized other food logos is that they may live in areas in which unhealthy food advertisements are less visible than in low SES regions. Recent studies show that fast food restaurant density [13] and the number of McDonalds outlets [7] are higher in poorer neighborhoods. Moreover, it may be that children from low SES homes watch more television [14] and therefore, are more exposed to advertisements of unhealthy foods. In turn, studies show that children exposed to television advertisement affects their brand preferences [15].

Parents' knowledge of obesity prevention strategies was not a significant predictor of other food logo recognition in neither the Poisson models nor the *t*-tests analyses. This finding was unexpected, particularly among parents from higher SES schools who reported higher self-efficacy and lower barriers in promoting a healthier lifestyle. There may be a number of explanations accounting for this finding. It may be that parents have the knowledge of behaviors that help prevent obesity, but encounter psychosocial and economic barriers in implementing them. Because the average score was highly skewed, the lack of significance may have been due to a measurement artifact (e.g., ceiling effect). With a larger sample size, perhaps we would have had a wider distribution.

Study Limitations, Strengths and Future Research

There are several limitations that merit noting. This study did not examine consumption of specific food products. Although recognition may be equated with knowledge of brands and knowledge of logos has shown to lead to purchasing influence [16], we did not address the linkage between logo recognition and fast food (nor healthy food) consumption. Future studies should consider the mediating role of logo recognition between exposure to food logo (TV watching or neighborhood fast food density) and food intake. Moreover, these findings are limited in generalizability as we included a convenience sample.

This study augments previous research by shedding light on environmental influences of obesity risk among underserved children. Policies to help regulate the marketing industry are needed because young children lack the cognitive skills to discriminate commercial from non-commercial content or to recognize persuasion intent to advertising [17, 18]. Children as young as 2–11 years develop consumption preferences resulting from commercial exposure; at the same time, children in this age group

develop strategies for purchase requests and negotiation. Future studies should extend the present results and address parental food-buying and restaurant preferences as it relates to child logo recognition.

References

1. Mei, Z. G., Scanlon, K. S., & Grummer-Strawn, M. (1998). Increasing prevalence of overweight among US low-income preschool children: The Centers for Disease Control and Prevention Pediatric Nutrition Surveillance, 1983–1995. *Pediatrics, 101*, 1–8.
2. Committee on food marketing and the diets of children and youth, McGinnis, M. J., Appleton Gootman, J., Krack, V. I. Food marketing to children and youth: Threat or opportunity? http://www.iom.edu/report.asp?id=31330.
3. Francis, L. A., Lee, Y., & Birch, L. L. (2003). Parental weight status and girls' television, snacking, and body mass indexes. *Obesity Research, 11*, 143–151.
4. Fischer, P. M., Schwartz, M. P., Richards, J. W., Goldstein, A. O., & Rojas, T. H. (1991). Brand logo recognition by children aged 3 to 6 years. Mickey Mouse and Old Joe the Camel. *JAMA, 266*, 3145–3148.
5. Leckenby, J. D., Plummer, J. T. (1983). Advertising stimulus measurement and assessment research: a review of advertising testing methods. *Current Issues in Research Advertising, 6*(2), 135–165.
6. Center for Science in the Public Interest (2005). Guidelines for responsible food marketing to children. Washington, D.C.: Center for Science in the Public Interest.
7. Cummins, S. C. J., McKay, L., & MacIntyre, S. (2005). McDonald's restaurants and neighborhood deprivation in Scotland and England. *American Journal of Preventive Medicine, 29*, 308–310.
8. Afifi, A., Clark, V., & May, S. (2004). *Computer aided multivariate analysis* (4th ed.). Boca Raton: Chapman & Hall.
9. Bahn, K. D. (1986). How and when do brand perceptions and preferences first form? A cognitive developmental investigation. *Journal of Consumer Research, 13*, 382–393.
10. McNeal, J. U. (1992). *A handbook of marketing to children*. Ney York, NY: Lexington books.
11. Lobstein, T., & Dibb, S. (2005). Evidence of a possible link between obesogenic food advertising and child overweight. *Obesity reviews: an official journal of the International Association for the Study of Obesity, 6*, 203–208. Aug.
12. Olvera-Ezzell, N., Power, T. G., & Cousins, J. H. (1990). Maternal socialization of children's eating habits: Strategies used by obese Mexican-American mothers. *Child Development, 61*, 395–400.
13. Block, J., Scribner, R. A., & DeSalvo, K. B. (2004). Fast food, race/ethnicity, and income. *American Journal of Preventive Medicine, 27*, 211–217.
14. McMurray, R. G., Harrell, J., Deng, S., et al. (2000). The influence of physical activity, socioeconime status and ethnicity on the weight status of adolescents. *Obesity Research, 8*, 130–139.
15. Borzekowski, D., & Robinson, T. (2001). The 30-second affect: an experiment revealing the impact of television commercials on food preferences of preschoolers. *Journal of the American Dietetic Association, 101*, 42–46.
16. Galst, J. P., & White, M. A. (1976). The unhealthy persuader: The reinforcing value of television and children's purchase-influencing attempts at the supermarket. *Child Development, 47*, 1089–1096.
17. Kunkel, D., Wilcox, B., Cantor, J., Palmer, E., Linn, S., & Dowrick, P. (2004). *Report of the APA Task Force on Advertising and Children*. Washington, DC: American Psychological Association.
18. British Medical Association. (2005). *Preventing Childhood Obesity*. London, England: British Medical Association.

J Community Health (2009) 34:73–78
DOI 10.1007/s10900-008-9119-3

ORIGINAL PAPER

Brand Name Logo Recognition of Fast Food and Healthy Food among Children

Elva Arredondo · Diego Castaneda · John P. Elder · Donald Slymen · David Dozier

Published online: 1 October 2008

Abstract The fast food industry has been increasingly criticized for creating brand loyalty in young consumers. Food marketers are well versed in reaching children and youth given the importance of brand loyalty on future food purchasing behavior. In addition, food marketers are increasingly targeting the Hispanic population given their growing spending power. The fast food industry is among the leaders in reaching youth and ethnic minorities through their marketing efforts. The primary objective of this study was to determine if young children recognized fast food restaurant logos at a higher rate than other food brands. *Methods* Children ($n = 155$; 53% male; 87% Hispanic) ages 4–8 years were recruited from elementary schools and asked to match 10 logo cards to products depicted on a game board. Parents completed a survey assessing demographic and psychosocial characteristics associated with a healthy lifestyle in the home. *Results* Older children and children who were overweight were significantly more likely to recognize fast food restaurant logos than other food logos. Moreover, parents' psychosocial and socio-demographic characteristics were associated with the type of food logo recognized by the children. *Conclusions* Children's high recognition of fast food restaurant logos may reflect greater exposure to fast food advertisements. Families' socio-demographic characteristics play a role in children's recognition of food logos.

Keywords Food logo recognition · Latino children · Healthy eating

E. Arredondo (✉) · J. P. Elder · D. Slymen
Graduate School of Public Health, Center for Behavioral and Community Health Studies, San Diego State University, San Diego, CA 92123, USA
e-mail: earredondo@projects.sdsu.edu

D. Castaneda
School of Public Health, University of California, Berkeley, 50 University Hall #7360, Berkeley, CA 94720, USA

D. Dozier
School of Journalism & Media Studies, San Diego State University, San Diego, CA 92182-4561, USA

Introduction

In the past 20 years, the rate of overweight children in the United States (US) has rapidly increased [1]. The high incidence of obesity in children parallels with increases in US marketing on food and beverages. Between 1994 and 2004, the rate of marketing of foods high in total calories, sugars, salt and fat to children outpaced the total market [2]. A recent report and analysis of the influence of food marketing on children's diet suggests that there is strong evidence that television advertisement influences the food and beverage preferences of children ages 2–11 years [2]. Children who are exposed to a large percentage of advertisements are more likely to request high fat, energy dense snacks than healthy foods [3]. Although many individual and environmental level factors (e.g., family food preferences, availability of fast food restaurants) are hypothesized to contribute to the high childhood obesity rate, the fast food industry has been increasingly implicated as it employs commercial strategies to create brand loyalty in young consumers.

Fischer and colleagues [4] used "advertising recognition" theory [5] in a study exploring the recognition by children of adult and children's brands, specifically examining the identification of Old Joe the camel with a

box of cigarettes. Study findings suggest that children ages 3–5 recognized the Disney Channel's logo at higher rates than the Old Joe logo, but 6 year olds recognized both brands at equal rates. Like tobacco companies, many fast food companies employ marketing strategies that effectively engage the attention of young children and stimulate the appeal of promotional items. A consequence of unhealthy food advertisement and exposure may be that children request more fast foods and, in turn, may be contributing to the increase in consumption of fast food in children. To our knowledge, there are no published studies examining children's recognition of fast food versus other food logo recognition and understanding the types of food logos recognized by children may shed light on media-related influences that may contribute to the rise of obesity rates in young children.

This study sought to explore the following: (1) logo recognition rates of fast food and other food products in children ages 4–8 years; (2) the relation between the type (unhealthy vs. healthy) of food logo (fast food vs. other foods) recognized by children and their demographic characteristics (e.g., age and BMI); and (3) the relation between the type of food logo recognized by children and their parents' psychosocial (e.g., self-efficacy and perceived barriers to a healthy home lifestyle) and socioeconomic characteristics (e.g., income).

Methods

Recruitment

Participants were 155 child–parent pairs recruited through a convenience sample from five Chula Vista (California) School District Elementary schools. One hundred and four families were recruited as part of a randomized community trial aimed at addressing individual and environmental correlates of childhood obesity. Because participants involved in the main trial were recruited from schools composed of families from low SES backgrounds, additional parent–child dyads ($n = 51$) were recruited from two different schools that were located in zip codes with higher per capita income (determined by US Census Data from 2000 [6]) than those families enrolled in the main trial. A bilingual/bicultural research assistant approached parents of the children who were enrolled in grades K-2nd before and after school and explained to them the purpose of the study. Families were deemed eligible if they had a child who lived in the catchment area designated by the school they attended and were enrolled in K-2nd grade. Only one child per family was allowed to participate. This protocol was approved by San Diego State University's Institution of Review Board.

Procedures

Development of Logo Recognition Instrument

The logo game board was modeled after one developed by Fischer et al. [4] These investigators compared young children's recognition of cigarette brand logos to children's logos (e.g., Disney). First, foods and their corresponding logos were identified based on children's dietary consumption patterns, evidence of child-directed marketing of these foods, and availability of these products in the target community. These foods included fast food (McDonalds, Burger Kind, Dominos Pizza, Carl's Jr. and Taco Bell), yogurt (Yoplait), juice (Minute Maid), cereal (Cheerios), and fruits and vegetables (Chiquita, Green Giant, and 5-a-day). "Fast food" was defined as "food purchased in self-service or carry-out eating places without wait service" [7].

A game board and game logo cards were then construed. Eleven brand logo cards were created using logos from the corresponding company's website. Logo cards were printed in color and mounted professionally on 4 by 6 construction paper cutouts, with strips of laminating paper to protect them. Each of the 11 images was downloaded and printed.

Logo Matching Procedures

During the school visits, the bilingual/bicultural research assistants (RAs) measured children's anthropometric information such as height and weight using a portable scale and stadiometer. Following anthropometric measurements, it was explained to the child that he or she would play a game matching cards with specific products on a game board. A demonstration of matching was done with a sample card. Children were then asked to match the pictures of the 11 logo cards to the corresponding products on the game board. Children were praised for giving any response and not told whether their responses were accurate. Children completed the matching game alone, lasting approximately 15–20 min. Parents were asked to complete a brief survey assessing parents' obesity prevention knowledge, self-efficacy and barriers to promoting a healthy lifestyle and demographic characteristics. Families were given a small cash incentive for their participation.

Predictors

Children's Body Mass Index (BMI)

BMI was calculated as weight in kilograms divided by the square of height in meters. The 2000 Centers for Disease

Control and Prevention Growth Charts outline the 25th, 50th, 75th, 85th and 95th percentile specific for age and gender [6]. A score above the 85th percentile is considered to represent at risk for overweight. A score above the 95th percentile is considered to be overweight or obese.

Demographic Data

Child demographic data included age, gender and ethnicity. Parents were asked to report on their education level, income, marital status, ethnicity, number of household members, employment status, and length of time living in US.

Obesity Prevention Knowledge

Parents' knowledge on obesity related health problems was evaluated with 10 true/false questions. A total score was compiled based on these answers with the highest score (10) indicating 10 correct answers.

Self-Efficacy to Promoting a Healthy Lifestyle in the Home

Self-efficacy was evaluated with a 13-question scale that ascertained how confident parents were about encouraging healthy behaviors. A sample item included: "How confident are you that you can make healthy food choices available in your home". This was followed with a five-point Likert scale that gave options ranging from "(1) Not at all Confident" to "(5) Extremely Confident." The reliability of the scale was good ($\alpha = .76$).

Barriers to Promoting a Healthy Lifestyle in the Home

Perceived barriers to health was measured with a 9-item scale assessing parents' reports of encountering difficulties in promoting a healthy lifestyle within their family. A sample item included: "There are not enough healthy options in the store and restaurants where my family buys food." A five-point Likert scale was given as answer choices ranging from "(1) Strongly Disagree" to "(5) Strongly Agree." The reliability of the scale was good ($\alpha = .74$).

Outcome Measure

Logo Recognition

For all analyses, children's food logo recognition was used as the main outcome of interest. If a child was able to correctly match a logo (e.g., McDonalds) with the product picture on the game board (hamburger and fries), this was considered a correct recognition.

Data Analyses

Given our research question, *t*-tests were used to examine differences in the average percentage score between fast food restaurant logos and other food logo recognition. Univariate Poisson regressions were employed to examine the associations between the predictors and the outcome as they allow for a continuous response and accounts for the skewed distribution that is often found with counting outcomes [8]. To further examine differences in fast food versus other food logo recognition, a "logo difference score" was calculated by subtracting the number of fast food logos recognized from the number of other food logos recognized. For example if a child recognized "3" food logos and "5" fast food logos his/her score would be a "−2". A composite SES score was derived for each family by taking the average income and education status of each parent and because many of the continuous variables were skewed, they were dichotomized by median split. Separate independent sample *t*-tests were run to evaluate whether the logo difference score differed among the demographic and psychosocial predictors. All analyses were conducted using the Statistics Analysis Software 8.0 (1999; SAS Institute Inc, Cary, NC). An alpha of .05 was used for all statistical tests.

Results

The study population consisted of 155 child–parent pairs from the Chula Vista Elementary School District. All of the adult respondents were women. The majority of the parents identified themselves as Hispanic/Other Latin American (85.8%), while 8.4% were White/Anglo/Caucasian Americans, .6% were African-American/Not of Hispanic Descent, .6% were Asian American, .6% described themselves as Other and 3.9% did not respond. Children included 83 males (53.6%) and 72 females (47.4%). The average age of the children was 5.9 years. The majority of the children were Hispanic (87.10%), 10.3% were white, .6% African American, and 1.2% Asian. Most children were at least at the 75th percentile for overweight based on age and gender (BMI = 17.75) [6]. Table 1 presents parent and family socio-demographic characteristics.

Prior to conducting the planned analyses, it was of interest to examine differences in characteristics among the families from the two different SES school regions. *T*-test results reveal that parents from higher SES school regions had significantly higher SES index scores ($P < .001$), spent more time living in the US ($P < .001$), had children with lower BMI ($P < .05$), reported higher self-efficacy ($P < .05$), and lower perceived barriers ($P < .001$) to

Table 1 Parents' demographic information ($N = 155$)

Parenting variable	
Mean (SD) age (years)	34.4 (7.09)
Mean time in US (years)	16.06 (12.3)
Mean (SD) no. of household members	4.86 (1.16)
Marital status	
% Married ($n = 114$)	73
Household income(monthly $)	
% ≤ $2000 ($n = 79$)	51
Years of formal education	
% ≤ High school ($n = 82$)	53
Employment status	
% Employed ($n = 135$)	87

promoting a healthy home lifestyle than parents from lower SES schools.

Univariate Poisson Regression

Poisson regressions were computed for the criterion variable of counts of the number of logos recognized [8]. Parents' education level, household income, SES index, obesity prevention knowledge, self-efficacy and barriers to promoting a healthy lifestyle in the home, and time in the US in years as well as child's age and BMI were entered univariately in the Poisson models to examine their relation with fast food and other food logo recognition. Six year olds and 7 to 8 year olds had another food logo recognition rate 1.69 (95% CI = 1.19–2.39, $P < .05$) and 2.23 (95% CI = 1.52–3.14; $P < .001$) times, than that of 4 to 5 year olds, respectively. Children of parents with more than a high school education had a 1.46 (95% CI = 1.12–1.90; $P < .01$) rate of recognizing an other food logo compared to children with less educated parents. Children from higher SES families (using the SES composite score) had a 1.36 (95% CI = 1.03–1.77; $P < .05$) greater rate of recognition of other food logos than families with lower SES scores. Mothers with higher self-efficacy to promoting a healthy home had children who recognized other food logos 1.32 (95% CI = 1.00–1.72; $P < .05$) times compared to children whose mothers had lower self efficacy. Children who attended schools in the higher SES area recognized other food logos at a 1.37 (95% CI = 1.04–1.80; $P < .05$) times higher rate than children in the lower SES area. No significant relationships between child's weight were found for parents' household income, obesity knowledge, perceived barriers, years in the USA, nor child's BMI.

In terms of fast food logos, child's age was the only significant predictor. Six year olds had a rate of recognition of fast food logos 2.78 (95% CI = 1.21–6.38; $P < .01$) times that of 4–5 year olds. Seven to eight year olds had a rate of fast food logo recognition 11.2 (95% CI = 3.08–41.2; $P < .001$) times that of 4 to 5 year olds.

Differences in Food Logo Recognition

A logo difference score was developed (other food logo recognition sum minus fast food logo recognition sum) and separate independent sample t-tests were run to evaluate if results differed from the Poisson analyses. A series of analyses were run for various BMI levels. First, the two groups were split by those children who were below the 50th percentile for age and sex and those above this level. These categories were then applied as grouping predictors where the logo differences score served as the dependent factor (See Table 2).

T-tests results showed significant food logo mean differences between the two geographic locations with lower

Table 2 Independent sample t-tests for logo difference score grouped by various predictors

Predictors	n	Mean delta (SD)	P value[a]
School location			
Lower SES	108	−2.27 (1.22)	.0001
Upper SES	47	−1.28 (1.4)	
BMI			
<50th percentile	36	−1.50 (1.16)	.03
≥50th percentile	118	−2.12 (1.44)	
<50th percentile	36	−1.52 (1.15)	.009
≥95th percentile	38	−2.34 (1.4)	
SES index score			
<4.74	73	−2.47 (1.30)	.0001
≥4.74	82	−1.50 (1.30)	
Self-efficacy			
<4.0	76	−2.25 (1.49)	.013
≥4.0	79	−1.69 (1.25)	
Barriers to health			
<2.22	78	−1.65 (1.40)	.005
≥2.22	77	−2.29 (1.40)	
Obesity knowledge			
<7.36	78	−2.17 (1.80)	.195
≥7.36	77	−1.85 (2.10)	
Age of child			
4–5 years old	50	−2.01 (1.30)	.636
6 years. old	59	−2.00 (1.50)	
7+	46	−1.80 (1.30)	
Time spent in US			
<4 years	39	−2.26 (1.30)	.060
4–13.5 years	39	−2.24 (1.40)	
13.5–27 years	39	−1.80 (1.30)	
>27 years	39	−1.50 (1.40)	

[a] Significant at $P < .05$ level

scores reporting a greater recognition of fast food logos ($P < .001$). Children with higher BMI had a more negative logo difference score, indicating more fast food recognition than those children at or below the 50th percentile for BMI ($P < .05$). Also, children from lower SES families and attending lower SES school regions recognized other food logos less and recognized fast food logos more than their higher SES counterparts ($P < .001$). Parents who reported higher self efficacy ($P < .05$) and lower barriers ($P < .01$) to promoting a healthier lifestyle in the home had children who recognized other logos more. Though marginally significant, parents who were in the US for longer periods had children who recognized more fast food logos ($P < .06$).

Discussion

In the present study, children on average recognized fast food logos at a much higher frequency than other food logos, with McDonalds' and Burger King's recognized at 89 and 86% respectively. Yoplait yogurt was recognized by children in the lower and upper SES schools at rates 70 and 55%, respectively. This brand is served as part of the school lunch program in both school regions, perhaps explaining the high recognition of Yoplait in both schools. The high recognition of fast food logos by children in study results parallel the findings found by Fischer et al. [4]. These findings suggest that marketing strategies employed by fast food companies may be effective in engaging children's attention. In turn, children may influence their parents' food purchasing behavior.

Consistent with previous research [9, 10], our findings suggest that the child's age was positively associated with food logo recognition. Seven to eight-year-old children recognized fast food logos 11 times more than younger children. Also, for every 4–5 year old child who recognized other food logos, approximately two 7–8 year olds recognized these logos. Moreover, findings from the *t*-tests suggest that overweight children were more likely to recognize fast food logos, while the opposite was true of the normal weight child. A plausible explanation for the higher recognition of unhealthy logos noted by other investigators is that overweight children are more exposed to unhealthy food advertisements (through television watching) than normal weight children [11].

Children who had parents with higher levels of education and a higher overall SES index score, and reported higher self-efficacy for promoting a healthy home lifestyle were more likely to recognize other food logos. Consistent with these findings, children who attended higher SES schools had a higher recognition rate of other food logos compared to their counterparts. Although we did not collect information on children's dietary intake nor the types of foods parents from higher SES serve, one reason why children from higher SES households recognized other food logos may be due to their parents serving these types of foods frequently compared to their counterparts [12]. Another plausible explanation as to why children from higher SES backgrounds recognized other food logos is that they may live in areas in which unhealthy food advertisements are less visible than in low SES regions. Recent studies show that fast food restaurant density [13] and the number of McDonalds outlets [7] are higher in poorer neighborhoods. Moreover, it may be that children from low SES homes watch more television [14] and therefore, are more exposed to advertisements of unhealthy foods. In turn, studies show that children exposed to television advertisement affects their brand preferences [15].

Parents' knowledge of obesity prevention strategies was not a significant predictor of other food logo recognition in neither the Poisson models nor the *t*-tests analyses. This finding was unexpected, particularly among parents from higher SES schools who reported higher self-efficacy and lower barriers in promoting a healthier lifestyle. There may be a number of explanations accounting for this finding. It may be that parents have the knowledge of behaviors that help prevent obesity, but encounter psychosocial and economic barriers in implementing them. Because the average score was highly skewed, the lack of significance may have been due to a measurement artifact (e.g., ceiling effect). With a larger sample size, perhaps we would have had a wider distribution.

Study Limitations, Strengths and Future Research

There are several limitations that merit noting. This study did not examine consumption of specific food products. Although recognition may be equated with knowledge of brands and knowledge of logos has shown to lead to purchasing influence [16], we did not address the linkage between logo recognition and fast food (nor healthy food) consumption. Future studies should consider the mediating role of logo recognition between exposure to food logo (TV watching or neighborhood fast food density) and food intake. Moreover, these findings are limited in generalizability as we included a convenience sample.

This study augments previous research by shedding light on environmental influences of obesity risk among underserved children. Policies to help regulate the marketing industry are needed because young children lack the cognitive skills to discriminate commercial from non-commercial content or to recognize persuasion intent to advertising [17, 18]. Children as young as 2–11 years develop consumption preferences resulting from commercial exposure; at the same time, children in this age group

develop strategies for purchase requests and negotiation. Future studies should extend the present results and address parental food-buying and restaurant preferences as it relates to child logo recognition.

References

1. Mei, Z. G., Scanlon, K. S., & Grummer-Strawn, M. (1998). Increasing prevalence of overweight among US low-income preschool children: The Centers for Disease Control and Prevention Pediatric Nutrition Surveillance, 1983–1995. *Pediatrics, 101*, 1–8.
2. Committee on food marketing and the diets of children and youth, McGinnis, M. J., Appleton Gootman, J., Krack, V. I. Food marketing to children and youth: Threat or opportunity? http://www.iom.edu/report.asp?id=31330.
3. Francis, L. A., Lee, Y., & Birch, L. L. (2003). Parental weight status and girls' television, snacking, and body mass indexes. *Obesity Research, 11*, 143–151.
4. Fischer, P. M., Schwartz, M. P., Richards, J. W., Goldstein, A. O., & Rojas, T. H. (1991). Brand logo recognition by children aged 3 to 6 years. Mickey Mouse and Old Joe the Camel. *JAMA, 266*, 3145–3148.
5. Leckenby, J. D., Plummer, J. T. (1983). Advertising stimulus measurement and assessment research: a review of advertising testing methods. *Current Issues in Research Advertising, 6*(2), 135–165.
6. Center for Science in the Public Interest (2005). Guidelines for responsible food marketing to children. Washington, D.C.: Center for Science in the Public Interest.
7. Cummins, S. C. J., McKay, L., & MacIntyre, S. (2005). McDonald's restaurants and neighborhood deprivation in Scotland and England. *American Journal of Preventive Medicine, 29*, 308–310.
8. Afifi, A., Clark, V., & May, S. (2004). *Computer aided multivariate analysis* (4th ed.). Boca Raton: Chapman & Hall.
9. Bahn, K. D. (1986). How and when do brand perceptions and preferences first form? A cognitive developmental investigation. *Journal of Consumer Research, 13*, 382–393.
10. McNeal, J. U. (1992). *A handbook of marketing to children*. Ney York, NY: Lexington books.
11. Lobstein, T., & Dibb, S. (2005). Evidence of a possible link between obesogenic food advertising and child overweight. *Obesity reviews: an official journal of the International Association for the Study of Obesity, 6*, 203–208. Aug.
12. Olvera-Ezzell, N., Power, T. G., & Cousins, J. H. (1990). Maternal socialization of children's eating habits: Strategies used by obese Mexican-American mothers. *Child Development, 61*, 395–400.
13. Block, J., Scribner, R. A., & DeSalvo, K. B. (2004). Fast food, race/ethnicity, and income. *American Journal of Preventive Medicine, 27*, 211–217.
14. McMurray, R. G., Harrell, J., Deng, S., et al. (2000). The influence of physical activity, socioeconime status and ethnicity on the weight status of adolescents. *Obesity Research, 8*, 130–139.
15. Borzekowski, D., & Robinson, T. (2001). The 30-second affect: an experiment revealing the impact of television commercials on food preferences of preschoolers. *Journal of the American Dietetic Association, 101*, 42–46.
16. Galst, J. P., & White, M. A. (1976). The unhealthy persuader: The reinforcing value of television and children's purchase-influencing attempts at the supermarket. *Child Development, 47*, 1089–1096.
17. Kunkel, D., Wilcox, B., Cantor, J., Palmer, E., Linn, S., & Dowrick, P. (2004). *Report of the APA Task Force on Advertising and Children*. Washington, DC: American Psychological Association.
18. British Medical Association. (2005). *Preventing Childhood Obesity*. London, England: British Medical Association.