

PROCESSED FOODS IN INFANT FEEDING: ANALYSIS OF THE VISUAL MEMORY OF SCHOOLCHILDREN IN TAUBATÉ CITY, SÃO PAULO

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Abstract

Objective: to describe the visual memory of children with regard to the packaging of savory snacks and sandwich cookies, and to correlate results with nutritional status, school grade and gender. **Methods:** the drawing technique was applied to 152 students enrolled at an elementary school in the city of Taubaté, São Paulo. Anthropometric data were collected, BMI calculated and the frequency of each component of the drawings was determined. The Chi-square test was used to analyze the relationship of each component with the variables studied. **Results:** for savory snacks packaging, the components that appeared most frequently in drawings were brand (54.6%), the image of the product adorning the package (45.4%) and characters (27.0%). Colors used were predominantly red (36.8%), blue (30.3%) and yellow (22.4%). For the sandwich cookies, the elements that appeared most frequently were brand (62.5%) and characters (30.9%) whereas the colors used were predominantly blue (36.8%) and brown (26.3%). The colors identified by the children, both for savory snacks and sandwich cookies, were similar to those found on the packages available in the market. The girls remembered more imagery on savory snack packaging ($p = 0.016$) and depicted more characters in the drawing of the sandwich cookie packaging ($p = 0.04$). There were no statistically significant differences between the memory of the components of the packaging and nutritional status, or between chosen color and gender. **Conclusions.** Marketing strategies employed in packaging were retained in children's memory. This finding points to the need for authorities to regulate advertising of food to this population, with special attention to the packaging of these products.

Key words: child; memory; package of food; industrialized food; marketing.

INTRODUCTION

The food industry, through the abundant supply of high energy density and tasty food products, has contributed to a shift in food consumption patterns of the population¹. This shift over time has led to a progressive reduction in malnutrition and increased levels of obesity².

The prevalence of overweight in children has been growing at an alarming rate in developing countries, including Brazil³. This is a major concern because obese children have a higher risk of becoming obese adults⁴. Similarly, a high prevalence of overweight-related blood pressure changes has been observed in adolescents⁵. The prevention of childhood obesity represents a rational and low cost approach for reducing the incidence of chronic degenerative diseases in adult life⁶.

The marketing of food and drinks with high energy density and low nutrient content increases the risk for obesity⁷. Given this knowledge, pressure to regulate the marketing of these foods has intensified⁸. In 2004, the World Health Organization published the Global Strategy on Diet, Physical Activity and Health, which promotes the non-disclosure of messages that stimulate unhealthy dietary practices⁹.

The importance of packaging as a marketing tool is well known¹⁰. Packaging plays a key role in the choice of products targeting children because it acts as a vehicle for characters, logos, colors and other components that attract children's attention¹¹. Numerous studies have focused on food advertising on TV^{12,13} and websites¹⁴, but few have evaluated the strategies used in product packaging.

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Thus, the aim of this study was to identify the visual memory of children in relation to the packaging of savory snacks and sandwich cookies and associate this to nutritional status, school grade and gender.

METHODS

A cross-sectional study in children between six and ten years of age of both genders enrolled in a private elementary school in the city of Taubaté, São Paulo, was conducted. The sample size was defined according to Ji and McNeal's methodology¹⁵. A total of 332 students were invited to participate in the study, 169 parents or guardians of whom, agreed to the participation of their children by returning the signed consent form. A pretest was conducted with 5 students giving a final study sample of 164 students. There was one dropout and eleven other students did not complete all phases.

Foods were selected based on the study by Aquino and Phillipi¹⁶ assessing foods in the diet of children from São Paulo, and also on the study of Chapman et al.¹⁷ evaluating food promotion strategies targeted at children.

The assessment of nutritional status was conducted using anthropometric data. Children's weight was obtained by using a TANITA® brand electronic digital scale with a capacity of 150 kg and sensitivity of 100 grams, while height was measured using a Seca® brand compact type stadiometer with a scale in millimeters. The stadiometer was affixed to a wall at a right angle to the floor. For measurement, the subjects kept their feet together and heels against the wall while in an upright position, with eyes fixed on the horizon. The measurements were taken in duplicate, and the average value used for calculating Body Mass Index (BMI) ($BMI = \text{weight}/\text{height}^2$). The classification of nutritional status recommended by the World Health Organization¹⁸ was employed.

The drawing method was used to collect data about visual memory. The children were given a sheet of paper of a similar size to the food packaging and a set of 12 crayons. Students were asked to produce drawings of savory snack and sandwich cookie packs, including all the information they could remember about the packaging of these food products. While students were drawing, the researcher ensured the children were unable to see each other's drawings.

Content analysis was used to categorize the details of children's drawings following the criteria of McNeal and Ji¹⁵, including: brand name, manufacturer name, product image, movie and cartoon characters, slogans, gifts / awards / sweepstakes / contests, price, ingredients, nutritional information and colors used. This methodology was adapted to exclude separate analysis of each side of the packaging because the focus of the study was on the pack as a whole.

The absolute (n) and relative (%) frequency of each component of the drawings was calculated. The Chi-square test was performed with a significance level of $p < 0.05$ to verify the existence of an association between each component of the drawing and the study variables. Statistical analysis was performed using the SPSS software package version 17.0.

The study was reviewed and approved by the Research Ethics Committee of the University (protocol n.244/09).

RESULTS

The study included 152 children (mean age 7.92 years, $SD = 1.204$). The majority of the population was eutrophic. Results showed that 43.4% of participants were overweight to some degree and revealed a 20.4% prevalence of obesity and 2.6% severely obese in the sample (Table 1).

Among male students, 23.7% were eutrophic, 27.6% overweight and of these, 15.1% were obese. Among female students, 32.2% were eutrophic and 12.8% were overweight, with obesity found in 2.3%. Only one student had low weight.

The frequencies of components of the sandwich cookie packaging in drawings produced by children are given in Table 2 in descending order by grade and for the entire sample.

The component most included in drawings was color (94.1%), and no significant difference among school grades was evident. The predominant colors in the drawings and the most frequently used were red, blue, yellow and green. Students of fourth and fifth grade most often remembered red, third graders used more blue, whereas second graders used blue and yellow. There was no significant difference between colors remembered by gender.

The brand name was the second most remembered element (54.6%). For this component, significant differences were observed between the second and fourth grade students ($p = 0.002$) and between second and fifth graders ($p = 0.025$), where students of the second grade had recalled this component less.

Ten brands were cited in the drawings of savory snacks. Of the 118 citations of brand, 39 (33.1%) were for A, 26 (22.0%) for B, 18 (15.3%) for C, 16 (13.6%) for brand D and 16% for other brands.

The image of the savory snacks was included in 45.4% of the drawings and a statistically significant difference was found between the memory of product image and school grade for students from the second and third grades ($p = 0.018$), second and fourth grades ($p = 0.001$) and the second and fifth grades (0.025), where in all these situations, the second grade students remembered less of the image of the product compared to the other grades. Regarding gender, girls remembered more of the packaging component ($p = 0.016$).

Table 1: Distribution of number and percentage of students at a private school education by age, gender, school grade and nutritional status. Taubaté, 2009. Taubaté, 2009

| Variables | Category | n | % |
|---------------------------|----------------|----|------|
| Gender | Male | 78 | 51,3 |
| | Female | 74 | 48,7 |
| Age | 6 years old | 18 | 11,8 |
| | 7 years old | 45 | 29,6 |
| | 8 years old | 37 | 24,3 |
| | 9 years old | 35 | 23,0 |
| | 10 years old | 17 | 11,2 |
| School grade | Second | 59 | 38,8 |
| | Third | 35 | 23,0 |
| | Fourth | 31 | 20,4 |
| | Fifth | 27 | 17,8 |
| Nutritional status | Underweight | 1 | 7 |
| | Eutrophy | 85 | 55,9 |
| | Overweight | 35 | 23,0 |
| | Obesity | 27 | 17,8 |
| | Severe Obesity | 4 | 2,6 |

The characters representing the savory snacks were recalled in 27.0% of the drawings. The second grade students remembered less of this component of the packaging than the third grade ($p = 0.015$) or fourth year students ($p = 0.012$).

The savory snack's flavor was depicted in 22 drawings. The flavors cited were cheese (31.8%), onion (18.2%), ham (13.6%), cheese (9.1%), and original (9.1%). The flavors of turkey, cheddar cheese, sweet chili and barbecue had one citation each. There was a statistically significant difference between students of the second and fifth grades ($p = 0.000$) and between third and fifth graders ($p = 0.011$), where fifth graders displayed better memory of this component of the package.

The gifts were remembered in 13 drawings, and were present in 53.8% of fifth grade children's drawings. There were significant differences among the students of the second and third grades ($p = 0.002$), third and fourth grades ($p = 0.028$), and the third and fifth grades ($p = 0.001$). The mention of gifts in the drawings included the phrases: "With toy car", "Card", "Make a small

poster," "Comes with toast," "You can make two trump cards", "Cards".

Several mentions about the nutritional characteristics of the savory snacks were seen in the drawings, mostly for the quantity of fat in the product: "0% fat", "It has fat," "0 trans-fat," "Rich in vitamins," "It is baked". Fifth graders had greater memory of this component in drawings in comparison to second grade students ($p = 0.034$).

Table 3 shows the frequency of components of the Sandwich cookie package remembered by students according to school grade.

Of the components studied, color was the most mentioned (98.0%). The color blue was the most used followed by brown, green, red, yellow, black, pink and orange. Students at fourth and fifth grades remembered blue the most, whereas third grade students more frequently used brown and green while second graders used brown and yellow. There was no significant difference between color remembered and gender.

The second most mentioned characteristic in the drawings was brand (62.5%). Thirteen brands

Table 2: Components of the package of savory snacks present in the children’s drawings by school grade. Taubaté, 2009.

| Component | School grade | | | | | | | | Total n | p* | | |
|--|------------------|------------------|-----------------|------|-----------------|------|-----------------|------|------------|------|-------|-------|
| | Second n = 59 | | Third n = 35 | | Forth n = 31 | | Fifth n = 27 | | | n | % | p |
| | n | % | n | % | n | % | n | % | | | | |
| Color | 57 | 37,5 | 33 | 21,7 | 28 | 18,4 | 25 | 16,4 | 143 | 94,1 | 0,665 | |
| ReComponents of the package of savory snacks present in the children’s drawings by school grade. Taubaté, 2009.d | 16 | 17,1 | 10 | 28,6 | 18 | 58,1 | 12 | 44,4 | 56 | 36,8 | | |
| Blue | 16 | 27,1 | 14 | 45,7 | 10 | 32,3 | 6 | 22,2 | 46 | 30,3 | | |
| Yellow | 16 | 27,1 | 8 | 22,9 | 6 | 19,4 | 4 | 14,8 | 34 | 22,4 | | |
| Green | 7 | 11,9 | 2 | 5,7 | 3 | 9,7 | 2 | 7,4 | 14 | 9,2 | | |
| Black | 3 | 5,1 | 1 | 2,9 | 0 | 0,0 | 0 | 0,0 | 4 | 2,6 | | |
| Brown | 0 | 0,0 | 0 | 0,0 | 0 | 0,0 | 2 | 7,4 | 2 | 1,3 | | |
| Gray | 0 | 0,0 | 0 | 0,0 | 0 | 0,0 | 1 | 3,7 | 1 | 0,7 | | |
| Pink | 1 | 1,71 | 0 | 0,0 | 0 | 0,0 | 0 | 0,0 | 1 | 0,7 | | |
| Brand | 24 | 5,8 | 18 | 11,8 | 23 | 15,1 | 18 | 11,8 | 83 | 54,6 | | 0,011 |
| Savory snack’s image | 16 | 10,5 | 18 | 11,8 | 20 | 13,2 | 15 | 9,9 | 69 | 45,4 | 0,003 | |
| Character | 9 | 5,9 | 13 | 8,6 | 12 | 7,9 | 7 | 4,6 | 41 | 27,0 | 0,043 | |
| Flavor | 2 | 1,3 | 2 | 1,3 | 4 | 2,6 | 8 | 5,3 | 16 | 10,5 | 0,002 | |
| Gift | 2 | 1,3 | 0 | 0,0 | 4 | 2,6 | 7 | 4,6 | 13 | 8,6 | 0,001 | |
| Ingredient | 0 | 0,0 | 2 | 1,3 | 1 | 0,7 | 1 | 0,7 | 4 | 2,6 | 0,383 | |
| Nutritional characteristics | 0 | 0,0 | 0 | 0,0 | 0 | 0,0 | 2 | 1,3 | 4 | 2,6 | 0,383 | |
| Price | 1 | 0,7 ^a | 0 | 0,0 | 0 | 0,0 | 0 | 0,0 | 1 | 0,7 | 0,662 | |

Note: p value obtained by chi-square

Table 3: Components of the package of sandwich cookie present in the children's drawings by school grade. Taubaté, 2009.

| Component | School grade | | | | | | | | Total n | p* | | |
|-------------------------|------------------|------|-----------------|------|-----------------|------|-----------------|------|------------|------|-------|-------|
| | Second n = 59 | | Third n = 35 | | Forth n = 31 | | Fifth n = 27 | | | n | % | p |
| | n | % | n | % | n | % | n | % | | | | |
| Color | 58 | 38,2 | 35 | 23,0 | 30 | 19,7 | 26 | 17,1 | 149 | 98,0 | 0,706 | |
| Blue | 11 | 18,6 | 7 | 20,0 | 14 | 45,2 | 14 | 51,9 | 46 | 36,8 | | |
| Brown | 14 | 23,7 | 14 | 40,0 | 5 | 16,1 | 7 | 25,9 | 40 | 26,3 | | |
| Green | 6 | 10,2 | 12 | 34,3 | 8 | 22,9 | 4 | 14,8 | 25 | 16,4 | | |
| Red | 7 | 11,9 | 4 | 11,4 | 8 | 22,9 | 3 | 11,1 | 22 | 14,5 | | |
| Yellow | 12 | 20,3 | 6 | 17,1 | 0 | 0,0 | 1 | 3,7 | 21 | 13,8 | | |
| Black | 6 | 10,2 | 1 | 2,9 | 1 | 3,2 | 0 | 0,0 | 8 | 5,3 | | |
| Pink | 2 | 3,4 | 0 | 0,0 | 2 | 6,5 | 0 | 0,0 | 4 | 2,6 | | |
| Orange | 2 | 3,4 | 1 | 2,9 | 1 | 3,2 | 0 | 0,0 | 4 | 2,6 | | |
| Brand | 19 | 12,5 | 24 | 15,8 | 26 | 17,1 | 26 | 17,1 | 95 | 62,5 | | 0,000 |
| Character | 12 | 7,9 | 10 | 6,6 | 13 | 8,6 | 12 | 7,9 | 47 | 30,9 | 0,064 | |
| Sandwich cookie’s image | 13 | 8,6 | 10 | 6,6 | 11 | 7,2 | 4 | 2,6 | 38 | 25,0 | 0,281 | |
| Flavor | 7 | 4,6 | 6 | 3,9 | 4 | 2,6 | 7 | 4,6 | 24 | 15,8 | 0,390 | |
| Ingredient | 0 | 0,0 | 1 | 0,7 | 0 | 0,0 | 1 | 0,7 | 2 | 1,3 | 0,388 | |
| Slogan | 0 | 0,0 | 0 | 0,0 | 0 | 0,0 | 2 | 1,3 | 2 | 1,3 | 0,025 | |
| Price | 1 | 0,7 | 0 | 0,0 | 0 | 0,0 | 0 | 0,0 | 1 | 0,7 | 0,662 | |
| Games | 0 | 0,0 | 0 | 0,0 | 1 | 0,7 | 0 | 0,0 | 1 | 0,7 | 0,269 | |
| Gift | 1 | 0,7 | 0 | 0,0 | 0 | 0,0 | 0 | 0,0 | 1 | 0,7 | 0,662 | |

Note: p value obtained by chi-square

of sandwich cookies were cited in the drawings. Of the 102 citations, 69 (67.6%) were for brand T, 12 (11.8%) for P, 5 (4.9%) for O and 15.7% cited other brands. The second grade students remembered less of this component in the drawings compared with the third ($p = 0.001$), fourth ($p = 0.000$) and fifth graders ($p = 0.000$) while third grade students also displayed less memory on this element compared with fifth graders ($p = 0.006$).

The flavor of sandwich cookies was remembered in 24 drawings. The cookie flavors cited were chocolate (41.7%), strawberry (41.7%), lemon (12.5%) and half and half (4.2%). The flavor of half and half refers to a sandwich cookie that is half chocolate flavor and half strawberry flavor.

A total of 51 characters were recalled, 41 (80.4%) of which were characters for the packaging of brand T. In another 5 (9.8%) cases the character of the brand P was remembered. A doll was depicted in a further 5 drawings rendering it impossible to determine which brand the character represented.

A statistically significant difference was found in relation to child gender ($p = 0.04$) where girls remembered more characters. In addition, the second grade students remembered less of this component compared with students of the fourth ($p = 0.030$) and fifth grades ($p = 0.040$).

Two fifth graders recalled the slogan used to promote one brand of Sandwich cookie. A significant difference was observed in relation to this component between the students of second and fifth grades ($p = 0.034$).

No statistically significant differences were found in relation to nutritional status and memory for components of the drawings.

DISCUSSION

The prevalence of overweight in the study population (43.4%) was higher than that found in other studies conducted in Brazil. A higher prevalence of obesity was noted among students of second and third grades as well as in males (27.6%). Caratin et al.¹⁹ found a prevalence of 30.7% of overweight in schoolchildren enrolled in a public school in São Paulo. In the study by Vieira et al.²⁰, the prevalence of overweight found in school children enrolled in public and private schools of the city of Pelotas was 38.9%, and the prevalence was higher in private school students. According to these authors, in the higher income classes the availability of foods with high fat content and soft drinks is greater, which in part could explain the higher prevalence of overweight in school children from private schools.

According to the Consumer Expenditure Survey (POF-2008-2009)³, the prevalence of overweight 5-9 year-old children is 33.5%, and is higher in boys (35.4%). The same study found that, on average, 14% of children were obese, with a

higher prevalence in boys (16.6%). The prevalence of obesity in the present study was higher than that indicated by the POF data, but the higher prevalence of obesity in boys was common to both studies.

A recent report about advertising, packaging and labels of food products²¹ targeting children and adolescents, concluded that knowledge about food advertisements, the meaning of labels and packaging, and their influence at the time of purchase, is essential for health professionals in order for them to deal with marketing that has increasingly invested in the design of their products in an attempt to set new consumer trends.

The colors most remembered in packaging of savory snack drawings were red, blue, yellow and green. For the sandwich cookie, the colors were the same, including the color brown. These colors are similar to those found on the packages available in the market. This shows that, in addition to representing the color, the students retain in memory the exact colors used by the food industry in their products. Elliott²² observed in his study about marketing in food packaging targeting children that packages are dominated by four colors: blue, yellow, red and green. These colors are the same as those found in the present study.

Consumers learn to make associations between products and colors, choosing certain colors for certain categories of products²³. Another study²⁴ reported that girls were more likely to choose products because of the color of the packaging and its general appearance. In the present study, although product choice in relation to the color of the packaging was not assessed, no significant difference was noted between choice of background color used in the drawing of packaging and child gender.

For both the savory snack and sandwich cookies, more than half the children mentioned the product brand name. In a North American study on visual memory of children in relation to the packaging of breakfast cereal¹⁵, almost all children (97.6%) recalled the brand. This percentage was higher than that found in the present study, but it should be born on mind that breakfast cereals are widely consumed products in the United States and the industry invests heavily in product marketing.

Thus, upon examining the influence of brand on children's food choices, it was observed that exposure to a particular brand can alter the food preferences of children²⁵. These data show that the product brand seems to play an important role in the preference of food by children.

In a study on persuasive marketing, Hebden et al.²⁶ highlighted that promoting food for children used techniques such as palatability, convenience, fantasy / imagination, fun / happiness and cartoon characters, and children are subject to passive (verbally), and sometimes almost coercive, persuasion. In addition, food and beverage advertisers often use different visual and emotional ap-peal to attract children and their parents.

Moreover, as shown in Tables 1 to 3, some 27% and 30.9% of children remembered the characters on packaging of savory snacks and sandwich cookies, respectively. These data are in line with those reported by Mc Neal and Ji¹⁵ in their study on the visual memory of packaging for breakfast cereals (37.6%). Children of all grades drew this item, showing that the characters present in the packaging are registered in children's memory, regardless of grade.

The packaging of processed foods may confound children and their parents, misleading them into believing that a product is healthy when in fact it is not. When consumers look at the packaging of savory snacks and sandwich cookies sold in the market, they encounter phrases like "It's roasted" and "0% trans-fat" but in spite of these claims such products contain large amounts of total fat and sodium. The drawings of the children had phrases such as "0% fat" and "rich in vitamins", which may indicate that this type of marketing strategy in the packaging is retained in children's memory.

In another study, Elliot²⁴ noted that claims such as "contains no fat" on the packaging of food products leads children to believe that if they consume these products, they will not become fat. Thus, it is noteworthy that children have insufficient cognitive development to interpret this type of claim and may mistakenly believe that a product whose packaging carries a message that it contains no fat, is in fact healthy.

Increasing investment is being made by food producers to show on packaging that the products have adequate nutritional characteristics by the inclusion of phrases such as "0% trans-fat," "It is baked", and specifying that the product is a source of vitamins and minerals. This is because sandwich cookies and savory snacks are considered "unhealthy" and to reverse this notion, companies rely on promotional strategies to show consumers that these products may be included as part of a healthy diet. In Brazil, food companies have employed the marketing strategy of promoting improvements in the nutritional content of products as a product differential²⁸.

In another line of marketing, besides flavor, product packaging directed to children uses strategies of fun and happiness, and does not address the negative consequences of the consumption of these products. Free gifts were remembered in 8.6% of the drawings of savory snacks and 1.4% of drawings of sandwich cookies, a relatively low frequencies given that the industry, especially manufacturers of savory snacks, invests heavily in the offering of gifts in packages²⁹.

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In the study by Mc Neal and Ji¹⁵, the authors observed similar results regarding gifts in cereal packaging where 9.6% of the children remembered this component. Chapman et al.¹⁷ reported that 13% of foods directed to children in Australian supermarkets offered gifts related to characters and television programs or movies.

Children of fourth and fifth grades recalled more information about some savory snack packaging components than children in second and third grades, such as gifts, snacks image, brand, characters, flavor and nutritional characteristics. In the drawings of sandwich cookies, this pattern was observed only for the components brand and slogan. It was also noted that the child's gender had no influence on the chosen color while girls more often included the image of the savory snack and associated characters in their drawings than did boys.

Recently (2010), the National Agency for Sanitary Surveillance (ANVISA) published a resolution requiring food manufacturers of low nutrition drinks and food products with high amounts of sugar, trans and saturated fat or sodium to carry warnings about the dangers of excessive consumption in all promotional materials of such products.

Moreover, symbols, pictures or drawings that may cause misinterpretation, error or confusion as to the origin, quality and composition of foods were also banned³⁰. This measure is an advance in the regulation of food advertising, but no recommendation has yet been made in relation to strategies used to attract the attention of children, such as the use of colors, characters and gifts. This resolution is currently suspended pending a trial in the Federal court amid claims from the Brazilian Association of Food Industry that ANVISA has no power to legislate on the matter, because according to the Constitution any restrictions on advertising must be first approved by Congress.

Although the influence of packaging components on food choices by children was not evaluated in this study, our results confirmed that the marketing strategies employed in food packaging were retained in the memory of the children. This reiterates the need for authorities to regulate advertising of food to this population, with special focus not only on television advertising, but also on the packaging used in these products.

Thus, it was observed that marketing strategies are widely used tools in the food industry with a focus on children, and that information about the food products savory snacks and sandwich cookies are largely retained in the memory of this population.

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