It is pleasant and heavy: convergence of visual contents in tobacco, alcohol and food marketing in Brazil

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Summary

The tactical use of visuoperceptual content in marketing may encourage impulsive consumption of unhealthy products. In this study, the application of visuoperceptual content was compared in advertisements used by industries of tobacco, alcohol and food. The aim was to ascertain whether similarities exist in the strategies used as variables for the selection of commercial stimuli, such as color, position and size. Scion Image and Corel Draw Graphics Suite software were used to analyze the content of a non-probabilistic sample of advertising images (N = 150). Differences were identified in the use of the colors green (p = 0.04) and red (p = 0.01), but not in the use of the color blue (p = 0.64), suggesting that induction of feelings of pleasantness resulting from the use of the color blue may be associated with the advertising in the alcohol and tobacco industries. Regarding the position of the commercial stimuli, a predominance of the use of quadrants ‘C’ (p = 0.00) and ‘D’ (p = 0.01) was found in all three industries, indicating a similar use of areas perceived as being ‘heavier’. As to the size, 78% of advertisements placed the commercial stimuli within a range of 0–25% of the total image. The results showed some similarities in the use of visuoperceptual content in advertisements for tobacco, alcohol and food, especially between tobacco and alcohol. The article offers a convergence analysis of these three industries altogether, providing additional subsidies for the formulation of protection policies.

Key words: tobacco, alcohol, food, advertising
INTRODUCTION

The impact of commercial advertising on the abuse of tobacco (Rigotti et al., 2005; Hanewinkel et al., 2010, 2011; Lovato et al., 2011), alcohol (Henriksen et al., 2008; Faria et al., 2011; Gordon et al., 2011; Morgenstern et al., 2011; Koordeman et al., 2012) and unhealthy foods (Boyland et al., 2011; Ferguson et al., 2012; Keller et al., 2012; Mekhmoukh et al., 2012; Scully et al., 2012) has been widely demonstrated in the literature. Moreover, in recent years, a number of studies have dealt with the formulation and effectiveness of public policies that attempt to regulate or even ban the advertising of these products (Anderson et al., 2009; Casswell, 2012; Paek and Hove, 2012). However, few studies have investigated the possible similarities in the marketing strategies (O’Donnell and Jeong, 2000) adopted in these industries, in particular the practice of global strategies (Mitry and Smith, 2009) and, therefore, the commitment to the standardization of consumption habits (Chung, 2009). Despite the warning issued by the Food and Health Research in Europe (FAHRE) (McCarthy et al., 2011) in 2011 regarding the need to consolidate studies into health and nutrition (such as tobacco, alcohol and food), studies that integrate these three industries remain incipient, at least with regard to the understanding of the marketing strategies adopted and their implications for consumer health.

Comparative analyses involving two of these industries have been performed. For instance, studies have observed the use of promotional strategies orienting alcohol consumption as a way to encourage the use of tobacco by young adults (Belstock et al., 2008) and risky populations (Cohen et al., 2011); this was especially prevalent in sports events and music concerts (Jiang and Ling, 2011; Kelly et al., 2011). In another study, in which the content presented on the websites of Philip Morris, Kraft and Nestle was compared, similarities were identified between the tobacco and food industries in the definition of the corporate image (Smith, 2012). Similarities were even found in the dissemination of social responsibility campaigns across tobacco and soft drinks industries (Dorfman et al., 2012). Similarities have also been identified in the lobbying and political marketing strategies used in the food and alcohol industries (Miller and Harkins, 2010).

However, even scarcer than comparative studies involving these three industries altogether are those focused on the analysis of the visuo perceptual content used in the promotion of tobacco, alcohol and unhealthy food. It is important to investigate this possible convergence in order to safeguard the population from typically misleading ‘health halos’ produced by marketing campaigns (Chandon and Wansink, 2007a) and consequently, the risk of a generalization effect, the tendency to respond in the same way to different but similar stimuli. Additionally, the relevance of understanding this type of strategy lies in the fact that sensory marketing strategies, especially those that explore the perception of visual elements, are considered effective ways to support the formation of meaning around products and brands, influencing the selection and processing of information and even encouraging impulsive consumption (Nagpal et al., 2011; Obermiller and Sawyer, 2011; Su et al., 2012). Color, position and size are some of the visual elements used in these strategies.

Color and marketing

Colors are exploited in marketing for various reasons, such as to augment characteristics of excitability, alertness, activity and strength (red) or competence, intelligence, communication, reliability, logic and seriousness (blue) in relation to the brand (Labrecque and Milne, 2012). When colors are associated with sophisticated names, they seem to promote the purchase decision (Skorinko et al., 2006). Research into Internet marketing has indicated that sites containing interaction between color tone and brightness, employing chromatic colors (e.g. red, green, blue) only as background can stimulate memory and enhance consumer intentions, as long as the consumer is in a good mood (Pelet and Papadopoulou, 2012). The colors used on websites or in commercial environments such as shopping malls, supermarkets, restaurants, bars, travel agencies and banks, for example, seem to influence the perception of time, relaxing (green, blue) the consumer or provoking impatience and impulsiveness (red, yellow) (Crowley, 1993; Gorn et al., 2004).

The influence of color has also been noted in studies into the perception of food and drink (Spence et al., 2010), indicating that the colors adopted in packaging and utensils (e.g. plates, glasses) can affect taste perception (Shankar et al., 2009; Young et al., 2009; Van Ittersum and Wansink, 2012), the recognition of the physical attributes of the product (e.g. temperature) (Piqueras-Fiszman and Spence, 2012) and even the quantity consumed (Genschow et al., 2012). For example, chocolates shown in brown (instead of other colors) are generally considered more chocolate-flavored (Shankar et al., 2009) and blue-colored beverages tend to be associated with menthol flavor (Zampini et al., 2007).

While there are numerous discrepancies between the results of studies with colors, especially on the effect of the color red (which is sometimes associated with pleasure and sometimes with fear), a possible explanation for the influence of color on behavior would be in the hypothesis...
that it occurs due to conditioned learning, that is through the pairing of colors with other stimuli, which, depending on the adopted color (e.g. red vs. blue) could present different trends in the behavior of the expression (e.g. avoidance, excitability vs. approximation, relaxation; Mehta and Zhu, 2009).

This line of research has encouraged works oriented toward consumer health and fostered public initiatives aimed at prohibiting the use of colors on cigarette packages (e.g. Hammond, 2010; Bansal-Travers et al., 2011).

Position and marketing
The position of the product in the advertisement also appears to influence how consumers perceive it, and therefore, represents another commonly exploited element in marketing. The position of a stimulus influences human behavior to such a degree that, in the field of experimental cognitive psychology, for example, it is debated whether position exerts greater influence on selectivity of attention than color (Kasten and Navon, 2008; Fecteau et al., 2009). Thus, the effects of the position of the commercial stimulus (either visible or tangible) on consumer behavior have been investigated in studies of perception (Deng and Kahn, 2009; Graham and Jeffery, 2011) and decision making (Atalay et al., 2012).

In a survey that assessed perceived weight from product images printed on the packaging, it was found that the perceived ‘heavier’ positions are the lower, right and bottom-right areas of the image. As a result, it was pointed out that, when promoting products in which weight is considered a positive attribute, the use of images located in those areas are considered favorable. An interesting finding in this study was shown that when the goal is to emphasize a product’s healthy characteristics, its presentation in areas of the image considered ‘heavier’, rather than in areas considered ‘lighter’ (i.e. upper, left and upper-left areas), tends to weaken the association of the product with healthiness (Deng and Kahn, 2009).

Size and marketing
The way the consumer responds to the size of a commercial stimulus also appears to be relevant in marketing, and the topic has been explored mainly in research of packaging. This is because evidence has indicated that size can influence the amount purchased (Chandon and Ordabayeva, 2009), the ability to control the consumption (Atalay et al., 2012), the degree of emotional valence (positive vs. negative) assigned to the product (Aydinoglu and Krishna, 2012) and perceived status (Dubois et al., 2012) for example. Interestingly, changes in the size of a product appear to be more subtle when the packages and the portions are altered in the three dimensions rather than in only one dimension (Chandon and Ordabayeva, 2009). Thus, consumers tend to increase the amount of items purchased when a single dimension of the size of the product is changed. On the other hand, they tend to reduce the amount acquired when the size is changed in three dimensions.

Due to bias in the perception of size, small packs may increase the risk of overconsumption (do Vale et al., 2008). Small sizes can also confuse the perception of consumers when it comes to clothing, food and status. Regarding to clothing, small sizes can evoke levels of positive self-perception related to appearance, especially in women (Aydinoglu and Krishna, 2012). In contrast, in research aimed at understanding the relationship between perceived social status and preference for food and drinks, it was found that participants allocated to situations related to low social status tended to choose larger food and drink packages (Dubois et al., 2012).

In short, the use of visuo-perceptual content is common in marketing. Based on the accumulated evidence about health halo effects, it is possible that such strategies may influence consumption intentions by increasing selective-accessibility biases. Accordingly, consumers not only tend to make inferences from incomplete information associated with products (e.g. inferring taste) or from other products that represent the same category (e.g. a soda or a healthy juice), but also have to deal with hedonic motivations when making product decisions (Chandon and Wansink, 2007a; Chandon, 2013). Thus, recognizing and investigating the tactical use of visuo-perceptual contents in commercial advertising is important not only to safeguard the population from the risk of exposure to misleading advertising, increasing control through previously established means (Grier and Kumanyika, 2010; Weishaar et al., 2012), but also to support monitoring and policy formulation more specifically related to the protection from sensory marketing, for example. Thus, the objective of this study was to investigate the existence of similarities in the strategies used by the tobacco, alcohol and food industries in relation to the variables for the selection of commercial stimuli linked to the products (i.e. color, position, and size).

The intensity with which of tobacco and alcohol industries use visual strategies in outdoor advertising (Scott et al., 2008), the advancement of ‘Big Food’, i.e. large transnational corporations that control the production and distribution of ultra-processed food in the world (Monteiro and Cannon, 2012), and with it alerts regarding possible similarities between the marketing strategies adopted by the tobacco, alcohol and food industries (Brownell and Warner, 2009; Stuckler and Nestle, 2012) also justify this study.
METHODS

Data collection
A total of 150 images were collected, 50 for each category (i.e. tobacco, alcohol and food), all related to advertising available online, and collected from Brazilian websites on the Internet. The images were associated with a web page aimed at advertising the product or directly connected with suppliers and producers. It is important to mention that our primary sources of images were formal marketing and advertising image web banks. However, because the images available at these web banks were not similar to the publicized ones, the data collection was performed from Google Images.

The images of tobacco advertisements were ~18 years older than those of alcohol and food, due to restrictive controls that have gradually increased in Brazil since 1988 (Law 12.546 of 2011). For the purpose of this study, it is worth mentioning the two policies that have made the most impact. First, in 1996, the display of tobacco commercials was restricted to the hours between 9 p.m. and 6 a.m. Later, in 2000, advertisement of tobacco products was banned in magazines, newspapers, billboards, television, radio, Internet, cultural and sports events. Regardless, studies show that ‘under the radar’ advertising strategies are still in effect in Brazil (Borzekowski and Cohen, 2013; Pereira and Veludo-de-Oliveira, 2014).

To standardize image search, the following descriptors were used: for alcoholic beverages (alcohol advertising, beverage advertising, marketing alcohol, beverage marketing, alcohol marketing); for cigarettes or tobacco (cigarette advertising, tobacco advertising, marketing cigarettes, marketing tobacco) and for food (food advertising, advertising fast food, food marketing, marketing fast food).

Procedures
Color, position and size
The Corel PHOTO-PAINT X5 contained in the CorelDraw Graphics Suite X5 (Corel Corporation, Canada) was used for measurement of the amount of red, green and blue, and to identify the position of the target commercial stimuli (product and brand). The frequency of color distribution (RGB histogram, i.e. red, green and blue) contained in the 150 collected images was quantified. With the aid of the tools in the CorelDraw package, the images were divided into quadrants. For this procedure, the Image Slicing Tool was used to split the image into four equal parts. The purpose was to highlight the quadrants (A, B, C or D) in which the commercial stimuli linked to the advertising image were positioned. The frequency of quadrant use and the quadrants in which the stimuli appeared were noted.

The software Scion Image, beta 4.0.2 version (Scion Corporation, Frederick, MD, USA) was used to measure the size of the target stimuli. After selecting the edges, the selected objects were measured in terms of their proportion to the overall size of the image in pixels. Thus, it was possible to estimate what percentage of the image corresponded to the selected object(s).

Content analysis
Besides product and brand analyses, a content analysis was performed to investigate other types of stimuli present in the remainder of the advertisement. The analysis consisted of three broad categories based on the preliminary results of an ongoing study (Rigoni, 2014), which are as follows: (i) visual components (i.e. context or ambience, cartoons, celebrities); (ii) product appeal (i.e. convenience, quality, innovation, flavor, saving, winning prizes) and (iii) emotional appeal (i.e. satisfaction, triumph, social acceptance, sports, adventures, happiness, physical attractiveness and beauty, family, fantasy vs. reality, fun, self-confidence, romance, energy, goal achievement). The frequencies of each item in each category were summed and total scores were calculated for tobacco, alcohol and food industries.

Nutritional evaluation
For the purpose of nutritional evaluation, the labels corresponding to the products advertised in the food image sample (N = 50) were selected and classified as ‘healthy’ or ‘unhealthy’ by two nutritional sciences research assistants, who used objective parameters set by the Brazilian National Sanitary Surveillance Agency (Agência Nacional de Vigilância Sanitária, ANVISA) for distribution of food products in Brazil. These criteria relate to levels of sugar, saturated fat, trans fat, sodium and nutritional content.

Statistical analysis
Exploratory data analyses were conducted to assess the studied variables in terms of distribution of frequency, scores, means, medians, standard deviations and confidence intervals. The Kolmogorov–Smirnov frequency test was used to check the normality of the different variable distributions. Single factor analysis of variance (ANOVA) and the Bonferroni post hoc test were used to compare the groups’ use of colors. Additionally, the $\chi^2$-test was used to compare the position of product and brand in the image sample, as well as to support the content analysis comparisons. An alpha level ($\alpha$) of 5% was adopted as significance criterion.
RESULTS

Color

Differences were identified in the use of colors. The red color was found to occur in similar range, from 50 to 75% in the image categories ‘alcohol’ and ‘tobacco’. Blue, in turn, presented similar values in the range from 25 to 50% in the image categories ‘alcohol’ and ‘food’ and from 50 to 75% in the category ‘tobacco’. The green color was more accentuated in the images from the category ‘alcohol’, with a range from 50 to 75%. The amount of color exposed in the range from 0 to 255 was divided into four categories: 0–25%, 25–50%, 50–75%, and 75–100%. Groups differed with regard the color used, with \( F(2,147) = 3.28, p = 0.04 \) for green and \( F(2,147) = 4.14, p = 0.01 \) for red, but not on the use of color blue, \( F(2,147) = 0.44, p = 0.64 \). A post hoc Bonferroni test confirmed differences in the conditions green color, \( p = 0.03 \), and red color, \( p = 0.01 \), between groups of tobacco advertisements and unhealthy food advertisements (Table 1).

Position

Regarding the position of the stimuli (product and brand) in the advertisement, a predominance of the use of quadrants ‘C’ and ‘D’ was found in all three industries. Our findings revealed a statistically significant result in quadrant ‘C’, with \( \chi^2 (2, N = 150) = 9.75, p = 0.00 \), and in quadrant ‘D’, with \( \chi^2 (2, N = 150) = 9.10, p = 0.01 \). The results in terms of the frequency range for each quadrant within the groups are shown in Table 2.

Size

As to the size of the stimulus (product and brand), 78% of advertisements (tobacco 82%, alcohol 88% and food 64%) placed the target stimuli within a range of 0 to 25% of the total image. The alcohol industry stands out, due to the greater proportion of images (45%) with commercial stimuli occupying between 0 and 25%, this is also true for tobacco (40%) and food (31%). Regarding to the food category, a secondary range stands out due to the proportion of images (18%) with commercial stimuli occupying from 25 to 50%.

Content analysis

With regard to the content of the remaining 75% of the images, our findings indicated that 62% of the sample showed visual elements, which included context or ambience (46%), cartoons (17.3%) and celebrities (16.7%). Results revealed no significant difference between samples in the use of context or ambience features \( \chi^2 (2, N = 150) = 2.09, p = 0.35 \). The alcohol sample presented celebrity images at a rate of 30% compared with 10% for both food and tobacco, \( \chi^2 (2, N = 150) = 9.60, p = 0.01 \). There was a significant difference in the use of cartoons \( \chi^2 (2, N = 150) = 19.35, p = 0.00 \), which was most prevalent in the food images (36%).

Fifty-eight percent of the sample showed features related to product appeal, among which flavor (24%), quality (21.3%) and innovation (21.3%) were most emphasized. We found no significant difference in the presentation of flavor, \( \chi^2 (2, N = 150) = 4.60, p = 0.10 \), or in the use of convenience features, \( \chi^2 (2, N = 150) = 4.962, p = 0.08 \).

Emotional appeal features were found in 68.7% of the sample. The most explored were physical attractiveness and beauty (26.7%), happiness (24.7%) and sports (15.3%). There was a significant difference in the use satisfaction features, which was most prevalent in the food (16%) and tobacco (14%) samples, \( \chi^2 (2, N = 150) = 8.44, p = 0.01 \). We also found a significant difference in the presentation of adventures \( \chi^2 (2, N = 150) = 7.03, p = 0.03 \), which was most common in the food sample (22%). The use of sports features was most prevalent in the tobacco sample (24%), followed by alcohol (12%) and food (10%), although this difference was not significant, \( \chi^2 (2, N = 150) = 4.41, p = 0.11 \). We found no significant difference in the use of social acceptance, \( \chi^2 (2, N = 150) = 0.76, p = 0.68 \).

| Table 1: Results of ANOVA and Bonferroni post hoc test for the comparison of use of colors in the three categories of advertising images |
|---|---|---|---|---|---|---|
| Colors | 1. Alcohol | 2. Tobacco | 3. Food | ANOVA | Bonferroni p values |
| | M (SD) | M (SD) | M (SD) | F | df | p | 1 vs. 2 | 1 vs. 3 | 2 vs. 3 |
| Green | 136.46 (6.40) | 122.51 (5.81) | 144.93 (6.49) | 3.281* | 2 | 0.04 | 0.35 | 1 | 0.03* |
| Blue | 107.24 (6.82) | 113.76 (6.07) | 115.99 (7.44) | 0.446 | 2 | 0.61 | 1 | 1 | 1 |
| Red | 158.32 (6.81) | 143.30 (5.72) | 168.21 (5.88) | 4.147* | 2 | 0.01 | 0.26 | 0.77 | 0.01* |

Note. The amount of color was measured with histogram tool (see supplementary data) and exposed in the range from 0 to 255 for each color.

* \( p < 0.05 \).
In the tobacco sample, we noted a predominance of images of people in advertisements, while not all of them were smoking; in some, they were just holding the cigarette. The logos and the trademarks appeared in most of the images, but in some, the brand was highlighted on objects and clothes. Besides smoking, there were other types of products, such as ashtrays and mint drops, for example. As mentioned above, there was a notable appeal to sports and nature (24%), with the use of wide landscapes showing young, beautiful (38%), fun (12%), self-confident (14%) and successful (16%) people, often exalting energy (10%) while practicing sports.

In the alcohol sample, there was a strong appeal to sensuality (40%), showing attractive women in swimsuits or underclothes. Similarly, as noted in the tobacco images, the beverages were commonly linked to contexts related to fun (30%) and sophistication. There was also a noticeable use of phrases that encouraged the consumption of the product, as well as references to famous people (30%) who drink or prefer a certain brand (16%). Full glasses and bottles, as well as the presence of groups of people in the pictures were predominant features of these images.

In the food sample, the logo and the product were usually presented together. A greater range of colors and appeal related to innovation (38%), flavor (34%), fun (32%), winning prizes (30%), surprise (22%) and convenience (22%) were also used. Unlike the images related to tobacco (4%) and alcohol (12%), in which the human figure was often used, in the unhealthy food images, drawings, cartoons and human caricatures (36%) were commonly presented. The food images also showed a large amount of text per image, which usually reinforced product quality (36%), for example, on a famous brand of chocolates, the slogan ‘The best chocolate!’.

Some features did not appear frequently enough to be included in our statistical analyses. However, it could be informative to consider them from a descriptive standpoint.

Table 2: Frequency of the quadrants used and chi square statistics

<table>
<thead>
<tr>
<th>Quadrants</th>
<th>Tobacco</th>
<th>Alcohol</th>
<th>Food</th>
<th>X²</th>
<th>df</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>35</td>
<td>43</td>
<td>32</td>
<td>4.750</td>
<td>2</td>
<td>0.09</td>
</tr>
<tr>
<td>B</td>
<td>31</td>
<td>41</td>
<td>45</td>
<td>4.955</td>
<td>2</td>
<td>0.08</td>
</tr>
<tr>
<td>C</td>
<td>35</td>
<td>38</td>
<td>37</td>
<td>9.750*</td>
<td>2</td>
<td>0.00</td>
</tr>
<tr>
<td>D</td>
<td>33</td>
<td>41</td>
<td>45</td>
<td>9.108*</td>
<td>2</td>
<td>0.01</td>
</tr>
</tbody>
</table>

X², Qui square; df, degree of freedom.
*p < 0.05.

DISCUSSION

The goal of this study was to investigate the existence of similarities in the strategies used by the tobacco, alcohol and food industries in relation to the variables for the selection of commercial stimuli linked to the products (i.e. color, position and size). Our results indicate this may be the case, especially between tobacco and alcohol marketing.

In this sample, the analysis of the advertising images indicated similarities regarding the presence of the color blue in the tobacco and alcohol industries. If the color blue is actually associated with intelligence, communication, reliability, logic and integrity (Labrecque and Milne, 2012), a reduced perception of the passage of time (Crowley, 1993; Gorn et al., 2004), and activates the memory of menthol flavors (Zampini et al., 2007), the results from this study would suggest that these would be potential features that the industries may have sought to highlight through advertising. Additionally, these findings suggest that behaviors related to closeness and feelings of relaxation (Mehta and Zhu, 2009) may have been associated with the products of these industries. Thus, these results may corroborate research or interventions aimed at regulating the use of colors, especially blue in the advertising for beverages, similarly to those introduced to control colors on cigarette packages, for instance (Hammond, 2010; Bansal-Travers et al., 2011).

In a similar vein, the observed high frequencies of red and green colors in the food sample might trigger effects of health halos, leading consumers to make inaccurate evaluations about the product (Chandon and Wansink, 2007a; Chandon, 2013). Although the color red is

Nutritional evaluation

Our results showed that almost the entire sample of foods advertised (82%) was immediately classified as unhealthy. The highest percentage of inadequacy was found for saturated fat (44%). As for sodium, 32% of the products exceeded the stipulated limit. A quarter of the products showed high levels of sugar (24%), and 62% of products potentially containing sugar did not have this information on the label, thus possibly underrating this item. Additionally, 4% of the products showed high levels of trans fat. The labels for 18% of the products contained incomplete information, making their classification as either healthy or unhealthy difficult. Despite this limitation, and based on the fact that these products were highly processed and violated the recommendations of the Brazilian agency (ANVISA), they were classified as unhealthy. Therefore, the totality of products advertised on the food image sample was considered ‘unhealthy’.
considered capable of motivating ambiguous responses, such as approach or avoidance toward a particular stimulus, it is plausible that its presence in the context of food advertisements may trigger subjective hunger and automatic consumption of food—i.e. eating without intention or lack of control. Also in accordance with the health halo effect and especially because it is commonly associated with health, it is possible that the prevalent use of green by the food industry may favor calorie underestimation (Wansink and Chandon, 2006) and also lead to overeating and obesity (Chandon and Wansink, 2007). 

Regarding the position of the commercial stimulus, the use of quadrants ‘C’ and ‘D’ (i.e. at the bottom of the advertising image) was predominant in the sample from the tobacco, alcohol and food industries. A possible explanation for this similarity might be found in the adoption of the ‘position effect’ strategy. The idea of this strategy is that the visual perception and the weight assessment of a product are mediated by its location within the consumer’s visual field. Remembering that, according to this theory, products displayed at the bottom of the packaging would be considered heavier (Deng and Kahn, 2009). Although any attempt at interpretation may seem speculative, a way of looking at these data would be to take into account the high level of industrialization involved in all three of the investigated product categories. Cigarettes and alcoholic beverages, as well as unhealthy foods (i.e. those high in fat, salt and sugar, as observed in our nutritional evaluation) are similar in that they are ultra-processed (Brownell and Warner, 2009; Stuckler and Nestle, 2012). These products are known as being dense in flavor and may, therefore, have been associated as ‘heavy’ products in marketing campaigns.

Regarding the size of the commercial stimulus (product and brand), 78% of the advertisements (82% tobacco, 88% alcohol and 64% food) presented commercial stimuli within a range of 0–25% of the total advertising image. Although merely descriptive, these results may have indicated a minimalist approach to the representation of these commercial stimuli in advertising images. If the observations regarding the bias in the perception of size are correct (do Vale et al., 2008; Chandon and Ordabayeva, 2009), it could be reasonable to assume that representations of commercial stimuli in small proportions may have supported marketing strategies for tobacco, alcohol and unhealthy food. The context in which they appear might convey the main information.

While concern has been directed to color, position and size, our content analyses suggest that other kinds of similarities in the marketing of tobacco, alcohol and food industries may also pose risks. Our findings indicate a convergence in presenting visual elements related to context or ambience, as well as product and emotional appeal features, like convenience, flavor, sports and social acceptance. Since part of the categories did not meet the criteria for statistical analysis, we cannot affirm that there also a tendency to associate other types of stimuli (e.g. triumph, happiness, family interaction, romance and energy) but this is possible and deserves further attention. Given the qualitative data we have mentioned, it seems that the marketing of tobacco and that of alcohol have more in common with each other than they do with the food industry.

On the other hand, the results of this study show similarities in the use of visuoperceptual content in advertisements for tobacco, alcohol and food, which is consistent with data from previous research that showed convergence in the marketing strategies of those industries (Belstock et al., 2008; Cohen et al., 2011; Jiang and Ling, 2011; Kelly et al., 2011; Dorfman et al., 2012; Smith, 2012). However, it is important to point out some of the limitations to the study. The difficulty of finding suitable software to measure the predominant colors used in the images was one. Moreover, the measure used in these programs does not take into account the interaction of the colors, which is the way in which the human brain processes this information. The division of the images into quadrants was useful for organizing the relevant information in the images, since it facilitated the process of locating and grouping. However, adopting this classification meant the ability to analyze each image, as a whole was lost. We attempted to overcome this limitation with our content analysis.

Finally, it is possible that the present sample of tobacco, alcohol and unhealthy food images is not representative of advertising outside Brazil. However, considering the tendency of practice of global marketing strategies, this possibility can actually highlight an opportunity or demand for further replication of these analyses, including advertising samples selected from different cultures. Another limitation was that this study did not include the perception and the behavior of individuals. Despite these limitations, the present research is novel because earlier studies have not involved the analysis of convergence of tobacco, alcohol and food industries altogether, especially in the use of visuoperceptual content. To our knowledge there have been no similar studies conducted. However, more comparative studies can be conducted, such as research based on the analysis of similarities on other sources of exposure to advertising, like on the television advertisements, websites and social networks of these industries.

Further research could identify how the three features analyzed (i.e. color, position and size) may affect cognition
and behavior when combined together in the same advertising. Therefore, more research is needed to determine how to minimize the potentially harmful effects of people’s exposure to tobacco, alcohol and unhealthy food advertising. Results in this line of research would help identify whether cognitive and behavioral peculiarities, such as perceptual biases that may currently be exploited in the marketing strategies of those industries, would provide subsidies for the formulation of policies to protect the health of consumers.

**SUPPLEMENTARY DATA**

Supplementary data are available at *Health Promotion International* online.

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