

# Content of Brazilian supermarket circulars do not reflect national dietary guidelines

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## Summary

Previous research on foods advertised in supermarket circulars revealed that advertisement for foods at promotional prices influence food choices and shopping behaviour, but no paper reporting the Latin American context was identified. Furthermore, most studies only assessed the products advertised on the front pages and not in the entire circulars. This paper quantifies and categorizes, according to level of processing, the foods advertised in circulars from four Brazilian supermarket chains in order to assess their compatibility with the national dietary guidelines issued by the Ministry of Health. Printed and online circulars were collected between June and July 2016. Foods items advertised were identified and classified into one of four categories using the NOVA classification as unprocessed or minimally processed, processed culinary ingredient, processed or ultra-processed. Sixteen documents were analysed, and 1786 food items identified, where 23% were categorized as unprocessed or minimally processed, and 63% as ultra-processed foods. While the mean proportion of ultra-processed and unprocessed or minimally processed foods advertised on circular covers was similar ( $p=0.49$ ), the mean proportion of ultra-processed foods advertised in the entire circular was significantly higher than unprocessed or minimally processed foods ( $p<0.001$ ). Brazilian supermarket circulars are stimulating the acquisition of ultra-processed foods, which does not encourage food choices to be in line with what is recommended by the Dietary Guidelines for the Brazilian Population.

**Key words:** marketing, food processing, consumer behaviour, dietary guidelines, food retail

## INTRODUCTION

The Dietary Guidelines recommended for the Brazilian Population in 2014 (Brazil, 2015) adopted a new approach by classifying foods according to their level of industrial processing. Accordingly, natural or minimally processed foods are recommended to be the core of

one's diet, while the consumption of oils, fats, salt, sugar and processed foods to be limited, and ultra-processed foods avoided altogether. However, consumption of processed and ultra-processed foods has been growing exponentially in the Brazilian population and is considered a contributing factor for the increased prevalence

of obesity and noncommunicable diseases in the country (Martins *et al.*, 2013; Bielemann *et al.*, 2015; Louzada *et al.*, 2015). In fact, over the past several decades dramatic changes in the way the entire globe eats, drinks and moves have created major shifts in body composition (Popkin *et al.*, 2012). The implications of these trends for health, quality of life, productivity and health care costs are enormous, and the burden is greater for much of Asia, Latin America, the Middle East and Africa (Popkin *et al.*, 2012).

Research on the purchase of household food items conducted in metropolitan areas in Brazil between 1987–88 and 2008–09 indicated a systematic increase in the acquisition of ultra-processed foods, and also a concomitant reduction in the acquisition of unprocessed/minimally processed foods and culinary ingredients (Martins *et al.*, 2013; Louzada *et al.*, 2015). Research on the source of food acquisition indicate that supermarkets and hypermarkets (both supermarkets and hypermarkets are establishments that sell predominantly a variety of food products, but also offer a varied range of other goods, such as household utensils, cleaning and personal hygiene products and clothing. Supermarkets have a selling area between 300 and 5000 square meters, while hypermarkets have a selling area larger than 5000 square meters; Brazilian Institute of Geography and Statistics, 2012) are the source for 49% of food purchases, and the main source for six of the seven food groups found in households (Costa *et al.*, 2013).

The supermarket sector is an important segment of the Brazilian economy. In 2012, its share of gross domestic product was 5.5%, which represents ~100 billion dollars in gross sales (De Melo *et al.*, 2018). While the main food companies operating in the country are controlled by international groups (Casino, Carrefour, Walmart, Cencosud), the Brazilian retail market has undergone significant changes in recent years, in part due to the expansion of the Brazilian economy between the years of 2006 and 2012. Due to the progress of international giants in the Brazilian market, regional chains began to join in an effort to gain competitiveness through the exchange of technologies, increased purchasing power and reduced operating costs (De Melo *et al.*, 2018).

Supermarkets sell a great variety of products (healthy foods included), using various marketing strategies which are recognized as important influencers of food choice decision making and shopping behaviour of consumers (Hawkes, 2008). Advertisement of goods on promotions in circulars is one of such strategies.

In Brazil, as in many countries, consumers have access to circulars online, in-store, and also posted directly into their letter boxes. Foods advertised in circulars are

further promoted in the store and positioned in strategic places such as end-of-aisle or islands located in places of great circulation, in order to significantly influence shopping decisions (Hawkes, 2008; Lino *et al.*, 2013). Studies conducted on supermarket catalogue advertising are important for monitoring the food environment, and also may help to inform policy development and practice decisions to achieve healthier supermarket environments (Ravensbergen *et al.*, 2015).

Previous research analysing characteristics of foods advertised in supermarket circulars found that the biggest proportion of foods in these circulars are unhealthy food items, when evaluated using the official recommendations from health authorities on diet quality (Martin-Biggers *et al.*, 2013; Charlton *et al.*, 2015; Ravensbergen *et al.*, 2015; Cameron *et al.*, 2017). These studies were conducted in Europe, North America and Australia and no similar studies were identified in Latin-America.

Brazilian dietary guidelines are based on a novel food classification that categorises foods according to the extent and purpose of processing, rather than in terms of nutrients. The classification, NOVA (a name, not an acronym), classifies all foods and food products into four clearly distinct and meaningful groups. In this sense, the guidelines are unique in their approach that recommends that people abstain from eating ultra-processed foods. NOVA is recognised as a valid tool for nutrition and public health research, policy and action, in reports from the Food and Agriculture Organization of the United Nations and the Pan American Health Organization (Monteiro *et al.*, 2016). As in Brazil supermarkets are the main source of food purchases (Costa *et al.*, 2013), it is relevant to know what types of foods and food products supermarkets are promoting, as well as their degree of processing, to identify if they are in consonance with what the guidelines indicate. Furthermore, most studies only assessed products advertised in the front page, but consumers who seek out promotions in order to save money are likely to go through the entire circular.

Based on the ecological model explaining food choices and obesity, supermarkets can be viewed as part of the physical and economic environment in which people make food choices (McLeroy *et al.*, 1988; Glanz *et al.*, 2005), where supermarket circulars act as a unique independent component in this environment. Supermarkets are important gatekeepers of the food supply, and the fact that they encourage consumers to eat more, whatever the food (Hawkes, 2008), is very relevant from a health promotion perspective. Health promotion strategies enable people to increase control over their own health, but human health is heavily influenced by factors outside the domain of the health sector (WHO, 2008). The factors

that aid progress and development in today's world can be a double-edged sword as they can lead to positive health outcomes on the one hand but can also increase the vulnerability to poor health as these factors can contribute to sedentary lifestyles and unhealthy dietary patterns (Kumar and Preetha, 2012). Promotional strategies are one of the many strategies used by supermarket operators that have important dietary implications, as they can influence the decisions consumers make about food. The implications of these strategies can be positive (supermarkets can make a more diverse diet available and accessible to more people) or negative (supermarkets can reduce the ability of marginalized populations to purchase a high-quality diet, and encourage the consumption of energy-dense, nutrient-poor highly processed foods) to consumer health (Hawkes, 2008).

The present study aims to quantify and categorize food items advertised in circulars from different supermarket chains in Brazil according to the level of processing, to explore how well these food items fit in with the National Dietary Guidelines issued by the Ministry of Health recommended for the Brazilian Population. The study's focus on supermarket circulars as a component of the information environment influencing health may help to inform the development of public policies designed to regulate indiscriminate advertising of unhealthy ultra-processed foods.

## MATERIALS

This cross-sectional study was undertaken in the city of Florianópolis/SC, southern Brazil. Circulars from four traditional chain supermarkets were retrieved and analysed. One of the chains was national (A), one was international (B) and two were regional (C and D). Chain B focussed on cost-effectiveness to a greater extent compared with A, C and D, and also offered a high proportion of own-brand products. All four stores advertised offers in weekly printed and/or online circulars. These were collected/downloaded during a 9-week period, in the months of June and July 2016. There were no major holidays in the period selected.

Images and description of products advertised in the circulars relating to food and non-alcoholic beverages were analysed. Different package sizes and different shapes of the same product, from the same brand, were counted as one (e.g. coconut water of 1000 and 200 ml; spaghetti and penne pasta, respectively). Different flavours of the same food item (e.g. grape juice and orange juice from the same brand) were counted as different items. The same criterion was applied to similar products produced by different manufacturers and/or brands.

The advertised products were classified into one of four categories using the NOVA classification (Monteiro *et al.*, 2016): unprocessed or minimally processed, processed culinary ingredient, processed or ultra-processed.

The unprocessed or minimally processed food category included fresh, dry or frozen fruits or vegetables, grains, legumes, meat, fish and milk. The processed culinary ingredients included table sugar, oils, fats, salt and other substances extracted from foods or from nature, and used in the kitchen to make culinary preparations. The processed food category included of foods that were manufactured with the addition of salt, sugar or other substances of culinary use to unprocessed or minimally processed foods, such as canned food and breads and cheese. The ultra-processed food category included foods that were formulated with several ingredients which, besides salt, sugar, oils and fats, included food substances not used in culinary preparations; in particular, flavours, colours, sweeteners, emulsifiers and other additives in order to imitate the sensorial qualities of unprocessed or minimally processed foods and their culinary preparations or to disguise undesirable qualities of the final product (Monteiro *et al.*, 2016).

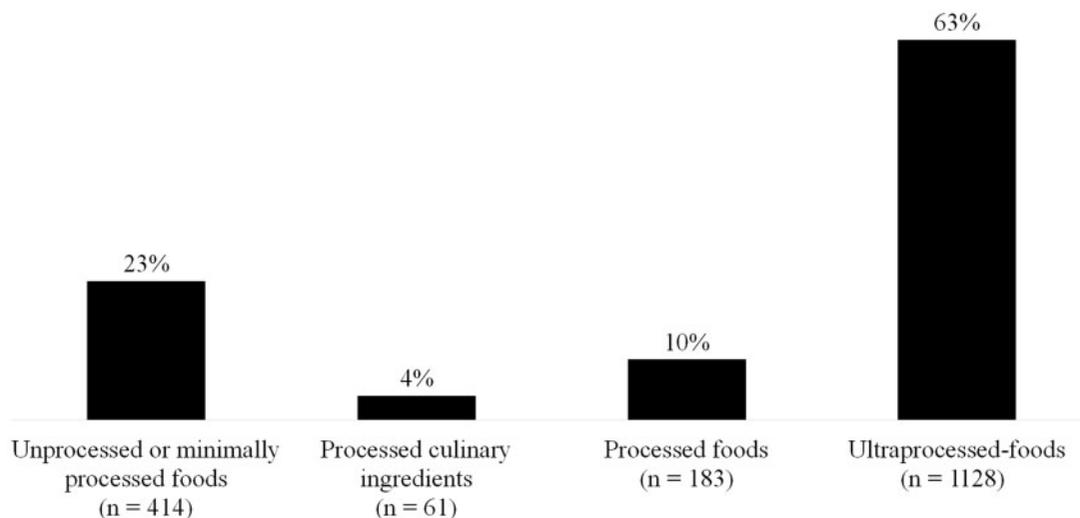
Information retrieved from the images and description of products were organized in a spreadsheet which included: the commercial name, brand, page number and the classification according to the level of processing. As a first step, the categorization was performed by the second author. Any doubt regarding it was discussed with the third author. In a second step, the third author double checked the classification to identify inconsistencies. As a third step, inconsistencies not solved between the second and the third author were submitted to a panel of six specialists, and discussed until consensus was achieved for all products. A conservative criterion (Steele *et al.*, 2016) was applied when there was disagreement and a lower degree of processing was allocated to the product.

Data are presented as means and standard deviations (SD). To compare the content of the food products advertised on the cover versus the entire circular we calculated the density of the products by food group classified according to NOVA for each circular, using the equations:

$$\text{Food group density (cover)} = \frac{n \text{ foods on cover}}{1}$$

Food group density (entire circular)

$$= \left[ \frac{(n \text{ foods on entire circular} - n \text{ foods on cover})}{(\text{number of circular pages} - 1)} \right]$$



**Fig. 1:** Summary of content in circulars of four Brazilian supermarket chains by level of processing (percentage of entire circular) ( $n = 1786$ ).

For this comparison paired *t*-test or paired Wilcoxon signed rank test was used, depending on the normality and homogeneity of the data distribution. To compare the difference between the supermarket circulars one-way ANOVA or Kruskal–Wallis test was used, depending on the normality and homogeneity of the distribution, with Bonferroni or Mann–Whitney *post hoc*, respectively. Normality was assessed with Shapiro–Wilk test. Significance was established at  $p < 0.05$ .

Review by the Research Ethics Committee was not required for this study as human subjects were not involved, as per Brazilian National Health Council guidelines.

## RESULTS

Analysis of food and beverage items advertised on all of the circulars' pages (including the cover) identified 1786 food items. The most advertised group was ultra-processed foods at 63% ( $n = 1128$ ) followed by unprocessed or minimally processed foods at 23% ( $n = 414$ ), processed foods at 10% ( $n = 183$ ) and processed culinary ingredients at 4% ( $n = 61$ ) (Figure 1).

The most featured unprocessed or minimally processed food products were bottled water, coconut water, 100% fruit juice, rice, ground coffee, wheat flour, milk, dried pasta, fresh and frozen meats and seafood. Prominently advertised processed culinary ingredients were sugar, vegetable oils, double cream and honey.

The main processed foods advertised were cheese, tomato sauce, jams and canned products such as olives, mushrooms, vegetables and fish. Ultra-processed foods frequently advertised were flavoured yoghurts, sugared beverages such as juices and soda; sweets such as cookies, biscuits, chocolate, cereals, granola bars, cakes and ice cream. In addition, ultra-processed products such as breads, crackers, fresh pasta, processed cheese, sausages, seasoned meats, sauces, margarine, ready-to-heat lasagne and pizza; instant powder to prepare chocolate drink and soup were also advertised.

The mean density of unprocessed or minimally processed foods advertised on the cover pages compared with the rest of the circular did not differ significantly ( $p = 0.74$ ). However, the mean densities of the other three groups were higher on the entire circular compared with the cover ( $p$  values appear in Table 1).

When mean density of unprocessed or minimally processed foods and ultra-processed foods on the cover were compared, no difference was observed ( $p = 0.49$ ). The same comparison (mean density of unprocessed or minimally processed foods and ultra-processed foods) on the entire circulars revealed that the offer of ultra-processed foods was significantly higher than the offer of unprocessed or minimally processed foods ( $p < 0.001$ ).

When the differences among the circulars (all pages, including covers) from the four different supermarket chains were investigated, the mean of unprocessed or minimally processed foods advertised in the national

**Table 1:** Foods advertised on entire circulars and circulars' covers of four Brazilian supermarket chains by level of processing

Group	Cover pages ( <i>n</i> = 79) Mean density (SD)	Entire circular ( <i>n</i> = 1707) Mean density (SD)	<i>p</i>
Unprocessed/minimally processed foods	2.7 (1.4)	2.8 (1.4)	0.74 <sup>a</sup>
Processed culinary ingredients	0.1 (0.2)	0.4 (0.2)	0.005 <sup>b</sup>
Processed foods	0.2 (0.4)	1.3 (0.6)	<0.001 <sup>b</sup>
Ultra-processed foods	2.1 (2.4)	7.6 (2.6)	<0.001 <sup>b</sup>

Food group density (cover) =  $n$  foods in cover/1; food group density (entire circular) =  $[(n \text{ foods on entire circular} - n \text{ foods on cover}) / (\text{number of circular pages} - 1)]$ .

<sup>a</sup>Paired *t*-test.

<sup>b</sup>Paired Wilcoxon signed rank test. Comparison between unprocessed or minimally processed foods and ultra-processed foods on cover  $p = 0.49$ . Comparison between unprocessed or minimally processed foods and ultra-processed on entire circular  $p < 0.001$ .

**Table 2:** Level of processing of foods advertised on entire circulars by supermarket chains of a Brazilian capital

Group	Entire circular ( <i>n</i> = 1786)				<i>p</i>
	Supermarket mean (SD)				
	A	B	C	D	
Unprocessed/minimally processed foods	33.7 (5.8)	20.7 (3.3)	27.5 (5.0)	21.5 (4.9)	0.006 <sup>a,b</sup>
Processed culinary ingredients	3.2 (0.5)	2, 7 (0.5)	7.5 (2.6)	1.7 (2.4)	0.028 <sup>c,d</sup>
Processed foods	9.5 (1.9)	11.5 (4.6)	16.7 (0.9)	8.0 (4.2)	0.015 <sup>e,f</sup>
Ultra-processed foods	67.5 (1.0)	40.5 (10.3)	110.2 (22.5)	63.7 (3.9)	0.003 <sup>c,g</sup>

In this analysis, the entire circular includes de cover. A (national chain), B (international chain), C (regional chain), D (regional chain).

<sup>a</sup>One-way ANOVA ( $F = 0.76$ ).

<sup>b</sup>Bonferroni post hoc indicated differences between supermarkets A and B ( $p = 0.012$ ), A and D ( $p = 0.018$ ).

<sup>c</sup>Kruskal–Wallis.

<sup>d</sup>Mann–Whitney post hoc indicated difference between supermarkets C and D ( $p = 0.003$ ).

<sup>e</sup>One-way ANOVA ( $F = 5.28$ ).

<sup>f</sup>Bonferroni post hoc indicated difference between supermarkets C and D ( $p = 0.018$ ).

<sup>g</sup>Mann–Whitney post hoc indicated difference between supermarkets B and C ( $p < 0.001$ ).

chain (A) was significantly higher compared with the international chain (B) and one of the regional chains (D) ( $p = 0.006$ ). Furthermore, the number of ultra-processed foods advertised by the international chain (B) was significantly lower in comparison to one of the regional chains (C) ( $p < 0.001$ ). Offer of processed culinary ingredients and processed foods only differed significantly between the two regional chains (C and D) ( $p = 0.003$  and  $p = 0.018$ , respectively) (Table 2).

## DISCUSSION

This research categorized and quantified the foods advertised in circulars from different supermarket chains in Brazil according to the levels of processing.

The most advertised food group in these circulars was of ultra-processed foods, almost three times higher than unprocessed or minimally processed foods. One possible explanation for this could be that, as profit-

seeking entities, supermarkets have most to gain economically by selling products for which they can most easily cut costs, i.e. packaged processed foods (Hawkes, 2008).

According to Moodie *et al.*, the product assortment of multinational food companies typically includes a large number of highly processed discretionary foods (Moodie *et al.*, 2013). However, circulars are reportedly used by consumers as planning tools (Bassett *et al.*, 2008; Cannuscio *et al.*, 2014) and can predict subsequent memory of the advertised product or brand (Higgins *et al.*, 2014). Thus, this situation does not help people to comply with recommendations given by the Dietary Guidelines for the Brazilian Population.

The increasing offer of processed foods in the supermarket is part of a process of centralizing the shopping task in one store. This process involves greater offer of packaged and easy to stock items, which favour price reduction (Hawkes, 2008). Our study results are similar to

the ones obtained by Charlton *et al.* in their analysis of promotional circulars of supermarkets from 12 non-Latin American countries (Charlton *et al.*, 2015). Ravensbergen *et al.*, Martin-Biggers *et al.* and Cameron *et al.* also found circular offers that contributed towards an environment that supports unhealthy eating behaviour in the Netherlands, USA and Australia, respectively (Martin-Biggers *et al.*, 2013; Ravensbergen *et al.*, 2015; Cameron *et al.*, 2017).

Although the offer of ultra-processed, processed foods and processed culinary ingredients was higher inside the circular than on the cover, when we compared the extremes groups, i.e. unprocessed or minimally processed foods versus ultra-processed in the cover, the offer is quantitatively the same. In contrast, the same comparison made for the entire circular confirms that ultra-processed foods are offered in greater quantity than unprocessed or minimally processed foods. That means the cover does not reflect the entire circular content, because on the cover healthier foods have a similar position than those with lower nutritional quality, but the latter has a higher prominence throughout the circular. Thus, as we already discussed, the greatest amount of foods offered was of ultra-processed (63% from  $n = 1128$ ) so throughout the circular the mean offer per page of these products was high.

Interestingly, the cover, a privileged space for marketing, appears not to offer ultra-processed products. One possible explanation could be that in Brazil it is common for supermarkets to announce on the cover of the circular their weekly specials (e.g. Thursday and Saturday as fruit and veg days, Friday as meats day). Therefore, each week such products, which are mainly unprocessed or minimally processed foods, have a place on the cover getting equal share of the space with ultra-processed, processed foods and processed culinary ingredients. While our results show similar offer of healthy foods (unprocessed or minimally processed) on the cover and in the entire circular, in the study by Charlton *et al.* the covers tended to include a much greater proportion of healthy products than the circulars over all (Charlton *et al.*, 2015).

Results showed that the national chain offered a significantly higher mean number of unprocessed or minimally processed foods on the circulars compared with the international chain and one of the regional chains. The number of ultra-processed foods on offer, on the other hand, was lower in the international chain when compared with one of the regional chains, but statistically the same as the national chain.

The circulars could be targeting different consumer segments, which may explain the differences observed

among the chains. Alternatively, the difference possibly rests in the variety of items offered. The lowest offer of ultra-processed foods from the international chain may be due to the fact that the supermarket sells a great quantity of non-food items, such as clothes and houseware, which also occupy space in the circulars, as discussed by other authors (Cameron *et al.*, 2017). Comparison with other studies is difficult, since supermarket chains from different countries have different profiles. Despite this, differences in the offer of healthier and lower nutritional quality products between supermarket chains were also observed in a study conducted in Australia (Cameron *et al.*, 2017).

But how influential are promotional circulars when pre-planning healthy choices? Research shows that consumers frequently search for promotions on the cover of supermarket circulars (Cannuscio *et al.*, 2014), and frequently use these as planning tools (Bassett *et al.*, 2008). Planning is considered a facilitator of fresh food purchase (Lavelle *et al.*, 2016) and a predictive factor for the consumption of fruits and vegetables (Crawford *et al.*, 2007), and studies mention that consumers will eat more of the products bought on promotion (Ailawadi and Neslin, 1998; Chandon and Wansink, 2002). Hollywood *et al.* (Hollywood *et al.*, 2013) identified that during shopping, whenever cost was relevant, healthy purchases were avoided as they were considered to be more expensive. Individuals were more prone to buy items that were on promotion in order to save money, and healthy foods were rarely advertised in promotional materials (Hollywood *et al.*, 2013).

Even when a degree of cognition is involved when choosing a product, most choices are unconscious due to the growing number of information processed (Dijksterhuis *et al.*, 2005). Therefore, people use unconscious facilitator mechanisms such as appearance, familiar imagery, sizes, logos, brands and also price as support for decision making (Cohen and Babey, 2012; Higgins *et al.*, 2014).

The decision to eat more healthily is an individual, conscious and effortful process (Ogden, 2012). Therefore, studies on determinants of eating behaviours have primarily focussed on individual-level factors, and insight into motivational determinants have informed health education interventions to promote more healthful eating habits. More recently, it has been argued that the environment may be the driving force behind many of people's less healthful eating habits. This more recent focus on environmental determinants of eating habits asks for a health protection approach, i.e. changing the environment to protect the population against exposure

to foods and eating patterns that contribute to chronic disease risk (Brug, 2008).

From an ecological perspective on health promotion (McLeroy *et al.*, 1988), a more efficient approach could be that the food and nutrition policy makers change their focus from the individual to structural and environmental changes, in order to promote shifts in behaviours without the individual necessarily knowing that they have changed their behaviour (Ogden, 2012). Considering the low-nutritional quality of the foods advertised in promotional circulars as analysed in this and other studies (Martin-Biggers *et al.*, 2013; Charlton *et al.*, 2015; Ravensbergen *et al.*, 2015; Cameron *et al.*, 2017) and that consumers are led to seek out promotions and cost-savings, some authors argue that there is a need to develop policies and directives to address the issues surrounding retailers pricing and promotional strategies (Hollywood *et al.*, 2013).

Charlton *et al.* (Charlton *et al.*, 2015) argue that the focus of regulatory actions in the food sector, traditionally laid upon the industry, be widened to include supermarkets. We suggest that the ratio of unprocessed or minimally processed foods to ultra-processed foods advertised in supermarket circulars could be regulated by a public policy, to promote a higher proportion of unprocessed or minimally processed foods. Change the type of food advertised in supermarket circulars will probably not result, by itself, in straightforward modification of food choices. However, it may be considered as one of many possible environmental interventions to support the behaviour change process.

It was not the aim of this study to evaluate consumer demand for unhealthy food promotions, but to explore one part of the system that is the industry and supermarket push on consumers. People look at the circulars for low prices, so for the disadvantaged, and therefore more price-conscious ones, the food cost component is very important. Hence, they may be the most affected when unhealthy products are advertised in greater proportion.

The extent to which health promotion focuses on individuals and individual choices and ignores the social and organizational context of health-related behaviours may also affect the extent to which we are able to reach specific groups in society (McLeroy *et al.*, 1988).

One of the study's limitations was that images were used as the source of analysis, as ingredients lists were not available for the categorization of the products advertised. Nevertheless, the same approach has been adopted in similar studies (Martins *et al.*, 2013; Bielemann *et al.*, 2015). Absence of ingredients lists was compensated by the application of a conservative criteria (Steele *et al.*, 2016) that may have led to a slight underestimation in

the number of products categorized as ultra-processed. Also, although very little research has been undertaken to investigate the impact of catalogues on consumer food choices, the extensive use of this advertising method by retailers suggest that it is indeed a powerful driver of purchasing decisions. From a public health perspective, this form of marketing warrants increased attention as part of efforts to improve the healthiness of food environments (Cameron *et al.*, 2017).

As a strong point, this is the first study conducted in Latin America that investigated the types of foods offered in supermarket circulars. Additionally, the food categorization currently adopted by Brazilian Dietary Guidelines was employed, allowing for more realistic proposals of interventions.

Cost consideration is an important factor in the food choice process (Sobal and Bisogni, 2009), therefore future research should focus on the price differences between supermarkets that offer healthier foods. Research could also employ qualitative methods to investigate how people use the circulars as a planning and shopping tool.

## CONCLUSIONS AND IMPLICATIONS

The equivalent advertisements of unprocessed or minimally processed foods and ultra-processed foods on the covers of supermarket circulars suggest a situation where supermarkets would be equally stimulating the purchase of healthy and less healthy items. However, in reality supermarkets are stimulating the acquisition of ultra-processed foods, as indicated by the higher prevalence of ultra-processed foods advertisements in the entire circulars. This situation shows that supermarket circulars do not encourage food choices according to what is recommended by the Dietary Guidelines for the Brazilian Population.

## AUTHORS' CONTRIBUTIONS

G.M.R.F., A.C.M. and J.P.d.F. were responsible for designing the project. J.P.d.F. was responsible for collecting, interpreting and analysing the data, and writing the first draft of the manuscript. A.C.M. and G.M.R.F. advised all stages of the study. A.C.M., G.M.R.F., A.M.d.C. and M.D. helped running statistical analysis, writing and revising the final version of manuscript.

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