



Preference mapping to assess the effect of information on the acceptability of snack bars

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Abstract

Six Brazilian commercial brands of snack bars were chosen to evaluate the importance of packaging, highlighting the potential of health claims on the acceptability of them. One hundred and two consumers evaluated bars in three sessions of acceptance test, using a nine-point hedonic scale: the first with no information about the product, the second containing the packaging of the product and the last with information on health-related claims associated with the consumption of the bar. A Randomized Complete Block Design structured the experiment. The results were analyzed using frequency distribution, internal preference mapping, ANOVA and Tukey test ($p \leq 0.05$). In the blind test, the lower mean acceptance of the seed and protein bars showed the need for sensorial improvement. In the packaging test, the difference between the means show that the packaging of the bars evaluated did not differ on acceptance, differing only from the protein bar. Test with the information showed that information of health claims, for the most part, can positively influence sensory acceptance, even if in some cases there is no sensory pleasure.

Keywords: snack bars; internal preference mapping; consumer; sensory acceptance, packaging.

Practical Applications: Consumers motivated by health issues when consuming snack bars, although hedonic aspects, such as flavor and texture being major determinants on consumption.

1 Introduction

Snack bars represent a specific category associated to the home consumption out, which grows on average 2% per year throughout the world (Nielsen, 2016). From 2013 to 2014, the average growth of the category of cereal bars in Brazil was 7.5% in volume (Souza, 2014).

Brazil is the fourth largest market for healthy products since the year of 2014 (DATAMARK, 2015). Consumers prefer foods with perceived health properties and at the same time convenient for consumption, storage and handle, as well as the snack bars (Ramírez-Jiménez et al., 2018); however, Bucher et al. (2016) defends that being mindful of consuming healthy portion sizes is the key factor to stimulate the consumption of snacks.

Although snack bars category include nutrient-poor products, a lot has been done to introduce new varieties and bioactive components (Pinto et al., 2017), including lentils, soy bean-wheat, oats, brown rice, lentils, flaxseed, sesame or quinoa, with a good sensory acceptability already tested (Aliani et al., 2011; Aramouni & Abu-Ghoush, 2011; Ryland et al., 2010; Suhem et al., 2015). Bamford (2016) points out that, in addition to the increasing inclusion of different nuts varieties in the snack bars composition, it will soon be possible to observe a wider insertion of vegetables as an industry strategy to further boost the snack industry.

There is no consensus among researchers about the factors and motivations that determine in choice for snack bars, but it is known that there is a set of health and non-health factors related to the purchase intention. Mahanna et al. (2009) found that sensory claims were not important to consumers, although calorie elements and the types of bar categories played a vital role in decision making for snack bars. Miraballes et al. (2014) concluded that commercial chocolate bar consumers consider the detailed nutritional information when evaluating the packaging, but they pay more careful attention to distracting elements of the packaging design (colors, pictures, font size). Pinto et al. (2017) report that packaging attributes, price and flavor were the most important factors that influence the purchase intention of snack bars; the verbal elements (e.g. claims) also did not arouse the same attention when in the presence of other distracting elements of the packaging design.

The snack bars market is highly changeable, composed of numerous varieties of bars, in the most varied intrinsic and extrinsic attributes. To the date, in Brazil, there are few studies assessing the affective data of consumers of snack bars and the preference mapping technique was not used for this. Reis et al. (2013) states that it is inappropriate to consider only the hedonic averages of acceptance for each type of product, since it is considered that all consumers have the same behavior,

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disregarding their individualities. It is fundamental to study the perceptions of consumers of this food, especially considering their individualities, promoting for consumers, industry, and stakeholders the links between the sensory perceptions to boost the growth of the sector.

This study aim to assess the acceptance of different types of snack bars based on their sensory attributes and the combination of these with information provided on their packaging, such as health claims. In addition, this work aim to evaluate the

individual perceptions of consumers of snack bars through the preference map technique.

2 Materials and methods

2.1 Samples

Six types of snack bars (A, B, C, D, E and F commercial brands) were acquired from the market in Viçosa, Brazil: seed bar (B), fruit bar (C), protein bar (E), nut bar (F) and two cereal bar (A and D) (Table 1).

Table 1. Description of the packaging used in the study.

Product	Front-of-packaging	Back of the packaging
Cereal bar (A)	Cereal bar (Brand A). Flexible packaging with white and orange colors. Information on the front panel in white: brand, "trans- fat and cholesterol free", "source of fiber", "low in saturated fats", light (40% reduction of total fats), 66kcal; in blue: Net Wt. 20 g, cereal bar with banana, oats and honey, contains synthetic flavoring identical to natural, Brazilian industry; in orange: light and banana, oatmeal and honey; in black: cereal bar and expiration date. Illustrations present on packaging: product, banana, honeycomb and honey.	Nutritional information* EV: 3%; CH: 4%; SU: **; ST: **; PO: **; P: 2%; TF: 2%; SF: 2%; MUF: **; PUF: **; DF: 10%; Na: 2%. Ingredients Oat flakes, sugar, glucose syrup, rice flakes, banana raisin, crisp cereals (wheat, rice, corn and oats), banana pulp, palm fat, wheat bran, maltodextrin, honey, malt extract, salt, cinnamon powder, polydextrose (stabilizer), humectant sorbitol and glycerin, antioxidant soy lecithin, flavoring, chlorophyll coloring, natural red 4 and annatto and acidulant citric acid. Contains gluten. Contains soybean. Manufactured in a machine that processes: peanut, nuts, sesame and milk.
Seed bar (B)	Seed bar (Brand B). Flexible packaging in matte red. Information on front panel in white: new packaging, crunchy, "high omega-3 content", "no added sugars", "no preservatives, flavors and colors", "this is not a food low in saturated fats", "this is not a low energy density food", Brazilian industry, 42 kcal; in red: seeds, Net Wt 10 g; in black: seed bar sesame and quinoa. Illustrations present on packaging: seed bar and a container with seeds.	Nutritional information* EV: 2%; CH: 2%; SU: **; P: 2%; TF: 4%; SF: 2%; MUF: **; PUF: **; ω-3: **; DF: 3%; Na: 1%. Ingredients Sesame, quinoa, maltodextrin, iodized salt, natural sweetener isomalt and antifouling sodium bicarbonate. Contains gluten. This product may contain traces of peanut and cashew nuts.
Fruit bar (C)	Fruit bar (Brand C). Bar with strawberry and yogurt flavor coating. Flexible packaging green in color. Information on the front panel in white: strawberry and yogurt, Net Wt. 25 g, 83 kcal, illustrative photos, "gluten-free", "lactose-free"; in green: "Activios", "with Triflora" (in rectangular yellow box); in black: expiration date. Illustrations present on packaging: fruit bar and strawberries.	Nutritional information* EV: 4%; CH: 5%; P: 1%; TF: 5%; SF: 10%; DF: 18%; FOS: **; Na: 1%. Ingredients Dehydrated strawberry, yogurt flavor coating (vegetable fat, maltodextrin, sugar, soy extract, isomalt, soy lecithin emulsifiers and polyglycerol polyricinoleate and natural yogurt flavor), fructooligosaccharides, rice flakes (rice flour, sugar, salt and caramel dye), maltodextrin, glucose, sorbitol, palm oil, hydrolyzed collagen, isomalt, salt, gelatin, tricalcium phosphate, soy lecithin emulsifier, flavoring, carmine cochineal dye and natural antioxidant tocopherol. Does not contain gluten.
Cereal bar (D)	Cereal bar (Brand D). Flexible packaging in white color. Information on the front panel in white color: 78 kcal, "source of fibers"; in yellow and white: "made with whole grains"; in pink: "low-sodium"; in green: cereal bar, hazelnut with chocolate, Net Wt. 20g, contains synthetic flavoring identical to natural, energy value 78 kcal, percentage of daily values based on a 2000 kcal diet, illustrative image. Illustrations present on packaging: hazelnut, chocolate and whole grain symbol and body of a woman in dark green.	Nutritional information* EV: 4%; CH: 4%; P: 2%; TF: 5%; SF: 5%; DF: 10%; Na: 1%. Ingredients Oat flakes, chocolate, wheat flakes, glucose syrup, rice flakes, polydextrose, hazelnut, invert sugar, palm fat, vegetable fat, sugars, cocoa liquor, salt, humectants sorbitol and glycerin, flavoring, antioxidants soy lecithin and tocopherol, acidulant citric acid and natural dye carotene. Contains gluten, contains milk. Contains traces of almond, peanut, cashew nut.

*Percent daily values are based on a 2000 calories diet; ** Percent daily values not established. EV: energy value; CH: total carbohydrates; SU: sugars; ST: starch; PO: polyols; P: proteins; ω-3: omega 3; TF: total fat; SF: saturated fat; MUF: monounsaturated fat; PUF: polyunsaturated fat; DF: dietary fibre; FOS: fructooligosaccharides; Na: sodium; M: minerals; and V: vitamins (Adapted from Pinto et al., 2017).

Table 1. Continued...

Product	Front-of-packaging	Back of the packaging
Protein bar (E)	Protein bar (Brand E). Flexible packaging in brown, white, silver and purple. Information on the front panel in white: 11g protein (33%), "whey + collagen + soy protein", "protein source", Net Wt. 33 g, flavor chocolate; in black: product designation in two languages (Portuguese and Spanish) and MAXI SPORT; in red: protein. Illustrations present on the packaging: an orange X.	Nutritional information* EV: 7%; CH: 4%; P: 15%; TF: 10%; SF: 17%; DF: 5%; Na: 3%. Ingredients Chocolate flavor coating (sugar, fractionated vegetable fat, whey powder), cocoa powder, skimmed milk powder, cocoa paste, soy lecithin emulsifiers and polyglycerol polyricinoleate and flavoring), sorbitol, whey protein concentrate, hydrolyzed collagen, soy protein isolates, palm fat, fructooligosaccharide, fructose, rice flakes with cocoa, glucose, cocoa powder, malt extract, soy lecithin stabilizer, caramel dye, flavoring, antioxidants BHA and BHT. Contains gluten. May contain traces of nuts, peanuts, nuts and hazelnuts.
Nuts bar (F)	Nuts bar (Brand F). Flexible packaging in black and orange. Information on the front panel in white: "apricot + 7 nuts" written in three different languages (English, Portuguese and Spanish); in black color: "0% glucose syrup", "sweetened with honey", written in three different languages (English, Portuguese and Spanish), Net Wt. 0.88 oz. (25g). This packaging allows you to view the product. Illustration of a green leaf. Unlike the other packaging, this one allows the product to be viewed.	Nutritional information* EV: 6%; CH: 3%; P: 5%; TF: 13%; SF: 5%; DF: 11%; Na: 1%; V: C (3%); M: Fe (38%); Ca (1%). Ingredients Honey, peanut, apricot, almond, toast soy, sesame, sunflower seed, acacia gum, sunflower oil, macadamia, pistachio, Brazil nut, cashew nut, hazelnut, emulsifier: soy lecithin, cinnamon, salt. Does not contain gluten.

*Percent daily values are based on a 2000 calories diet; ** Percent daily values not established. EV: energy value; CH: total carbohydrates; SU: sugars; ST: starch; PO: polyols; P: proteins; ω-3: omega 3; TF: total fat; SF: saturated fat; MUF: monounsaturated fat; PUF: polyunsaturated fat; DF: dietary fibre; FOS: fructooligosaccharides; Na: sodium; M: minerals; and V: vitamins (Adapted from Pinto et al., 2017).

2.2 Acceptance tests

Experimental design

A total of 102 volunteers were recruited to participate in the testing of sensory acceptance, including students and employees of the Universidade Federal de Viçosa (UFV).

Acceptance tests were conducted in individual booths under white light, in three sessions, with an interval of 2 days between each session. In the first session (blind test), consumers tasted the samples served in quadrangular acrylic plates marked with a three-digit random code without obtaining any prior information about the snack bar being evaluated and presented monadically, in each session, in which each sample appeared in each position the same number of times. A Randomized Complete Block Design structured the experiment. Consumers were given evaluation sheets for each sample to record their acceptance of the product. Sensory acceptance in relation to the overall impression was evaluated by the 9-points hedonic scale (1 = dislike extremely, 5 = neither like nor dislike, 9 = like extremely).

In the second session (packaging test), the acceptance of the packaging of the samples served in session 1 was evaluated. This procedure allowed the consumer to evaluate packaging attributes such as color, brand and nutritional information.

In the third session (test with the information), the acceptance of sample bars whose front of packaging were fixed in a frame-like apparatus, containing information describing the claims on the packaging (Table 2), was evaluated. The consumers were asked to taste and judge the bars, knowing that the sample came from the same packaging presented. Thus, in session 3 two informations were provided: the product to be tasted corresponds to the

packaging presented and the descriptive information refers to the claims on the packaging.

Intrinsic and extrinsic product characteristics are becoming more relevant, because they provide a complete and realistic overview of how consumers perceive products (Asioli et al., 2017; Oliveira et al., 2017). The interest of this study was to evaluate the importance of packaging attributes and the influence of claims on the acceptance of snack bars. Thus, instead of presenting all the packaging in the third session, it was decided to provide only the front of the packaging, leading the consumer to direct his/her gaze towards the alleged information. Therefore, the relationship between sessions 2 and 3 was disregarded, since the packaging was presented differently in each of these sessions.

Analysis statistics

The analysis of frequency the distribution for the hedonic scores obtained in the three sessions were performed according to pre-established acceptance intervals (Vidigal et al., 2011):

- Acceptance zone: scores of 6-9 (located between the hedonic terms "like slightly" and "like extremely"), indicating that consumers liked the sample;
- Rejection zone: scores of 1-5 (located between the hedonic terms "dislike extremely" and "indifferent"), indicating that consumers disliked the sample.

The analysis of variance ($p < 0.05$) and Tukey's test were performed to compare the means, when studying the types of bars within each session and in the comparative study of the acceptance of the samples between the sessions (Della Lucia et al., 2010).

Table 2. Information presented to participants on the health claims described on the packaging of the analyzed bars (Pinto, 2017).

<i>Cereal bar (A)</i>
“Trans-fat free” – Fat associated with increased LDL-cholesterol levels and increased risk of cardiovascular disease.
“Source of fibers” – Fibers improve intestinal transit, reduces blood glucose levels, levels of total cholesterol and LDL-cholesterol.
“Light” – This food has a 40% reduction of total fat.
<i>Seed bar (B)</i>
“High omega-3 content” – Fatty acid associated with reduced total cholesterol, increased HDL-cholesterol and relief of symptoms of rheumatoid arthritis and inflammatory bowel disease.
“No added sugars” – Sugars are caloric supplements that, if consumed in excess, can lead to problems like diabetes, high blood pressure, obesity and cavities.
“No preservatives, flavorings and colorings” – Food additives intended to preserve and enhance flavor, odor or color. Adverse effects such as allergic reactions and hyperactivity are associated with these substances.
<i>Fruit bar (C)</i>
“With Triflora” – Triflora is a compound containing fructooligosaccharide, a molecule of plant origin that assists in proper bowel functioning.
“Gluten-free” – Gluten is a vegetable protein, present in cereals like wheat. Its exclusion is necessary for individuals with celiac disease, allergies or sensitivity to the nutrient, resulting in inflammation.
“Lactose-free” – Lactose is a sugar from milk that provides energy to cells and acts in synergy with calcium, improving its fixation. Lactose intolerant individuals should avoid sugar because it causes diarrhea, flatulence, and bloating.
<i>Cereal bar (D)</i>
“Made with whole grains” – Whole grains contain all parts of the whole grain, including vitamins, minerals and nutrients and have a higher fiber content than refined cereal.
“Low-sodium” – Sodium acts in the transport of many nutrients in the small intestine and kidneys in the normal functioning of nerve and muscle cells. Excess sodium may lead to increased water retention and blood pressure.
“Source of fibers” – Fiber improves intestinal transit, reduces blood glucose levels, levels of total cholesterol and LDL-cholesterol.
<i>Protein bar (E)</i>
“Collagen” – A fibrous protein that contains essential and non-essential amino acids in the body and is responsible for building bone, cartilage, tendon and skin tissues.
“Soy protein” – Protein with amino acids essential to the body, associated with the reduction of blood cholesterol and the incidence of coronary diseases.
“Whey protein” – Whey protein that has high nutritional value and high content of amino acids, calcium and bioactive peptides.
<i>Nuts bar (F)</i>
“0% glucose syrup” – Glucose syrup is a composition of sugars with the function of sweetening and joining the cereals of the bars. Excessive consumption of these sugars can lead to hyperglycemia and diabetes.
“Sweetened with honey” – Honey is composed of simple carbohydrates that provide energy to the body. It is rich in vitamins, minerals and amino acids.
“Apricot” – Fruit rich in beta-carotene and vitamin C, which play a role in antioxidant action in the body. In addition, apricot contains iron, vitamin A, vitamin E, potassium and fiber.

The t-test for paired samples was used to detect significant differences ($p<0.01$) between the scores obtained for the acceptance of snack bars when compared the package test and the blind test (Session 2– Session 1), and the information test and blind test (Session 3 –Session 1). The relationship between Sessions 2 and 3 was disregarded, since the package was presented differently in each session.

In order to obtain the Internal Preference Mapping, the acceptance data were arranged in a matrix of samples (in rows) and consumers (in columns); then, the covariance matrix was evaluated. The results were expressed as scatterplots of samples and individual consumers in relation to the first two principal dimensions (Vidigal et al., 2011).

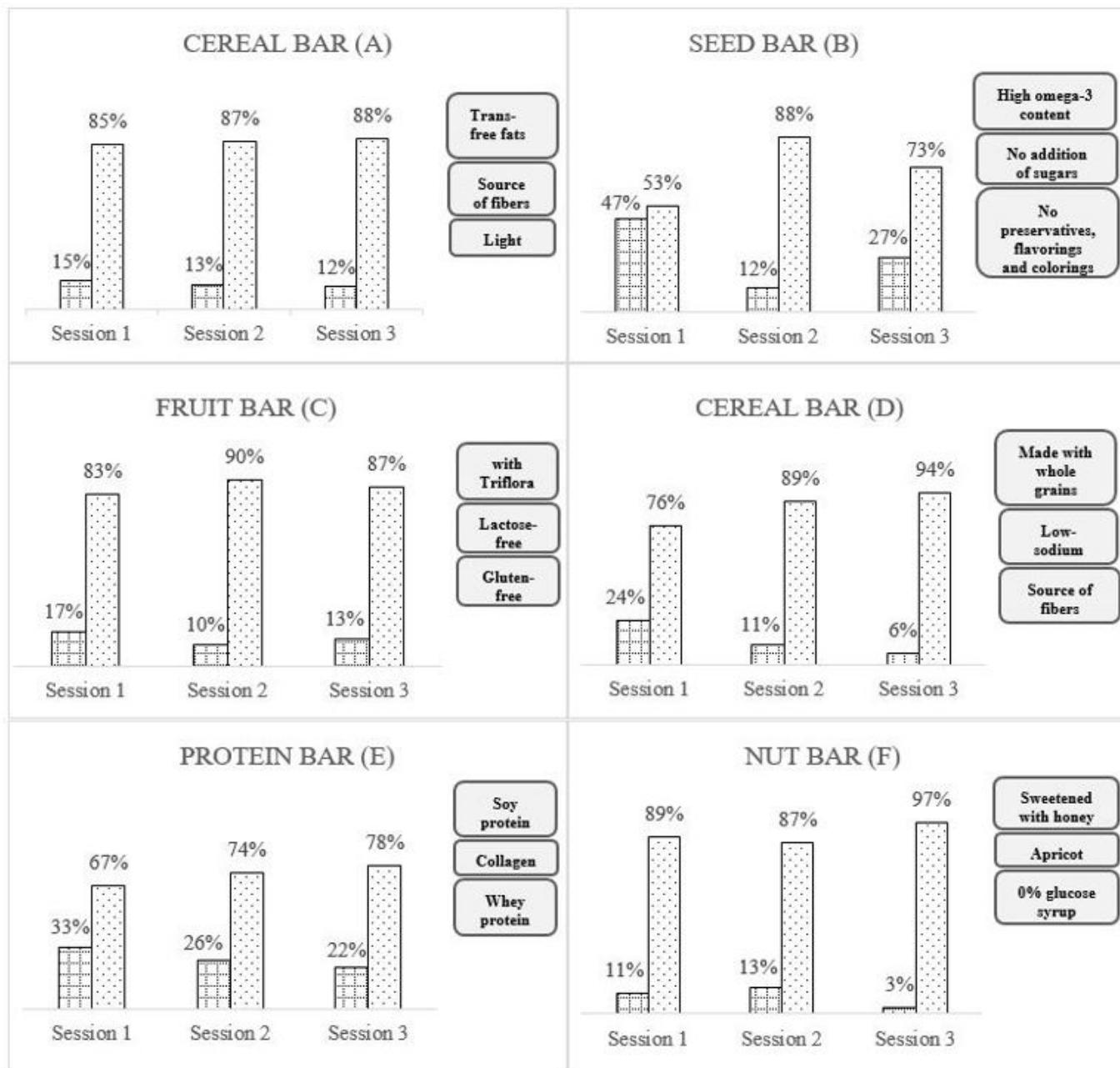
The data were processed with the aid of Microsoft Excel® 2013 and SAS software, version 9.4, licensed to the Federal University of Viçosa.

3 Results and discussion

The information on health claims positively influenced consumer acceptance of snack bars. When given information, the phrases “I would buy due to the information” and “even

though it is bad, I would buy” reinforce the hypothesis that information interfered effectively in acceptance. The comparison between the blind test and the test with the information reveal an increase in the percentage of consumers who liked the snack bars (scores between 6 and 9) (Figure 1).

Information on the seed bar and cereal bar (D- known brand) had greatest influences on acceptance, since it increased 20% and 18%, respectively, on the percentage of consumers who gave scores above 6. Among the claims, “high omega-3 content” and “low in sodium” stood out, which means that consumers of snack bars may be more engaged, limiting the consumption of foods that are high in sodium and interested in products with satisfactory levels of omega-3. Kallas et al. (2014) also perceived the influence of information “enriched with omega-3”, where consumers preferred meat enriched with beneficial fatty acids, even with a higher amount of visible fat. Past studies showed that consumers assessed low sodium foods favorably, being more likely to purchase lower sodium products in relation to non-sodium options (Wong et al. 2013); however, Mendoza et al. (2014) argue that interventions aimed at engaging food manufacturers to reduce the amount of sodium



■ Hedonic scores between 1 and 5, □ Hedonic scores between 6 and 9.

Figure 1. Frequency of hedonic scores for the six bars in the three sessions (session 1: blind test, session 2: packaging test, and session 3: test with the information).

added to processed foods would further assist consumers in lowering their sodium intakes.

Despite the benefit of the information for the seed bar, 47% of consumers disliked the product in session 1, the highest rejection frequency in the blind test; the most frequent comments for the seed bar included “hard bar”, “bitter after taste” and “dry”. However, 88% of consumers liked the product in the packaging test, demonstrating the need to improve the sensory quality of the product. The protein bar had also a similar behavior,

where 33% of the respondents reported hedonic scores from 1 to 5 (blind test). Despite the chocolate flavor being one of the most preferred flavors of the consumers, the protein bar was associated with expressions such as “bitter aftertaste” and “very bad taste”.

In session 3, the nuts and cereal bars (D) accounted for almost all consumers who liked the product, 97% and 94%, respectively. The greater acceptance of the bar containing nuts or fruits, in relation to the other samples, can be attributed

to varieties of nuts, giving a unique texture and almond; the presence of apricots and other fruits also remind the idea of being a more natural (Pinto et al., 2017). Cereal bar (D) comes from a well-known and established brand, containing claims that satisfy the demands of most consumers (e.g. sodium, fiber and whole grains), which probably explains the importance given to this bar.

For protein bars, information and claims such as soy protein, whey protein and collagen raised the scores from 6 to 9 in 11% (test with information). The demand for collagen has grown due to promises of benefits to the body and rejuvenation. The recent trend towards the utilisation of collagen and their derived biomaterials to develop the various functional food is gaining momentum (Pal & Suresh, 2016), but it is crucial to understand the interaction between collagen and/or compounds with functional potential and other components of the foods, in order to evaluate the bioavailability. It is important to emphasize that this is a priority issue for snack bars, since the processing of this food involves high temperatures that can cause loss of bioactive components or impairment of bioavailability.

The fruit bar had a higher percentage of acceptance in all three sessions and a smaller difference between sessions 1 and 3 (4%). The claims of the **nut (F) and cereal (D) bars** included quantity of sodium, sugar, omega-3s, fiber and fats that possibly are more relevant to consumers than gluten and lactose. In addition, the presence of Triflora associated with good intestinal functioning and the design similar to a well-known probiotic may have positively influenced its acceptance, although not significantly (Table 3); scientifically health claims, such as the prebiotic 'Triflora', generate credibility but are not always more attractive and effective in communicating with the consumer (Aschemann-Witzel & Grunert, 2015).

Despite the flavor and texture being the most important factors in choosing snack bars, price remains a differential in choice; but health, nutrition content and claims will become increasingly important, especially if there is a self-directed benefit, since may affect flavor perception and overlap the sensory characteristics (Di Monaco et al., 2005; Miraballes et al., 2014; Kim et al., 2016; Pinto et al., 2017).

In the preference mapping, the first principal component (PC1) explained 37,72%, 28,23% and 38,73% of data variance, while the second (PC2) explained 28,29%, 23,83% and 23,70%, obtaining 66%, 52% and 62% of the variance between samples for acceptance for the blind test, packaging test and test with the

information, respectively. In all sessions, the two components were able to discriminate the majority of the variation of the data.

Figure 2 shows that in all three sessions, the spatial separation of samples is approximately composed of two groups that differ with respect to acceptance (First group: nut, fruit and cereal bars; second group: seed and protein bars). In session 1, nut and cereal bars (A) located in the first quadrant where there is a higher concentration of consumers, were the most accepted, followed by cereal and fruit bars (fourth quadrant). Despite the highest mean of acceptance for the fruit bar (Table 3), it was observed that consumers concentrated more around the cereal bar (A), which justifies the importance of individual perceptions. Seed and protein bars, the second group, were the least accepted among the six samples, being the bitter taste reported frequently to both.

The mean scores for the different samples (Table 3) show that the options are good market alternatives and generally contain good extrinsic characteristics, since the packaging test showed that the samples presented average scores between 6 and 8. **The results of the t-test showed that the bars that had a non-significant increase in mean acceptance score were those that received the highest mean acceptance in the blind test.** However, although the information has generated a positive impact to the point of removing the seed bar from the region of sensorial rejection, it does not imply acceptance or repurchase in a real purchase situation, since consumers prioritize the intrinsic characteristics, especially flavor and texture; but in many situations, it can represent the sacrifice of sensory pleasure for health. It is important to analyze whether effects of attitudes towards snack bars would be modulated by health choice; consumers may not be willing to sacrifice sensory pleasure for any other attribute of food (Vidigal et al., 2011). From such information is possible to suggest the improvement or innovation around texture of snack bars (e.g. freeze-drying fruit for formulation) and to encourage the development of exotic and uncommon flavors from bioactive ingredients to boost the market of snack bars.

Regarding the evaluation of information on health claims, many past studies confirm our findings of the influence of health information on the consumers' acceptance, emphasizing the importance of non-sensory characteristics on food choice (Di Monaco et al., 2005; Ares et al., 2010; Vidigal et al., 2011; Milagres et al., 2014); a more current trend that proves that consumers of snack bars are increasingly concerned about health (Mahanna & Lee, 2010).

Table 3. Averages of acceptance of the six bars evaluated in the blind test (a), packaging test (b) and test with the information (c).

Snack bar	Tukey test			Paired Samples t-test	
	Mean scores			<i>p</i> -value	
	Session 1	Session 2	Session 3	Session 2 – Session 1	Session 3 – Session 1
A	6.8 ^{a,b}	6.9 ^{a,b}	7.0 ^{b,c}	0.51^{ns}	0.173^{ns}
B	5.4 ^c	7.3 ^a	6.5 ^c	<0.0001**	<0.0001**
C	7.0 ^a	7.3 ^a	7.3 ^{a,b}	0.147^{ns}	0.053^{ns}
D	6.5 ^{a,b}	7.0 ^a	7.1 ^{b,c}	0.0015**	<0.0001
E	6.0 ^{b,c}	6.4 ^b	6.5 ^c	0.135^{ns}	0.0016**
F	7.2 ^a	7.1 ^a	7.9 ^a	0.695^{ns}	<0.0001

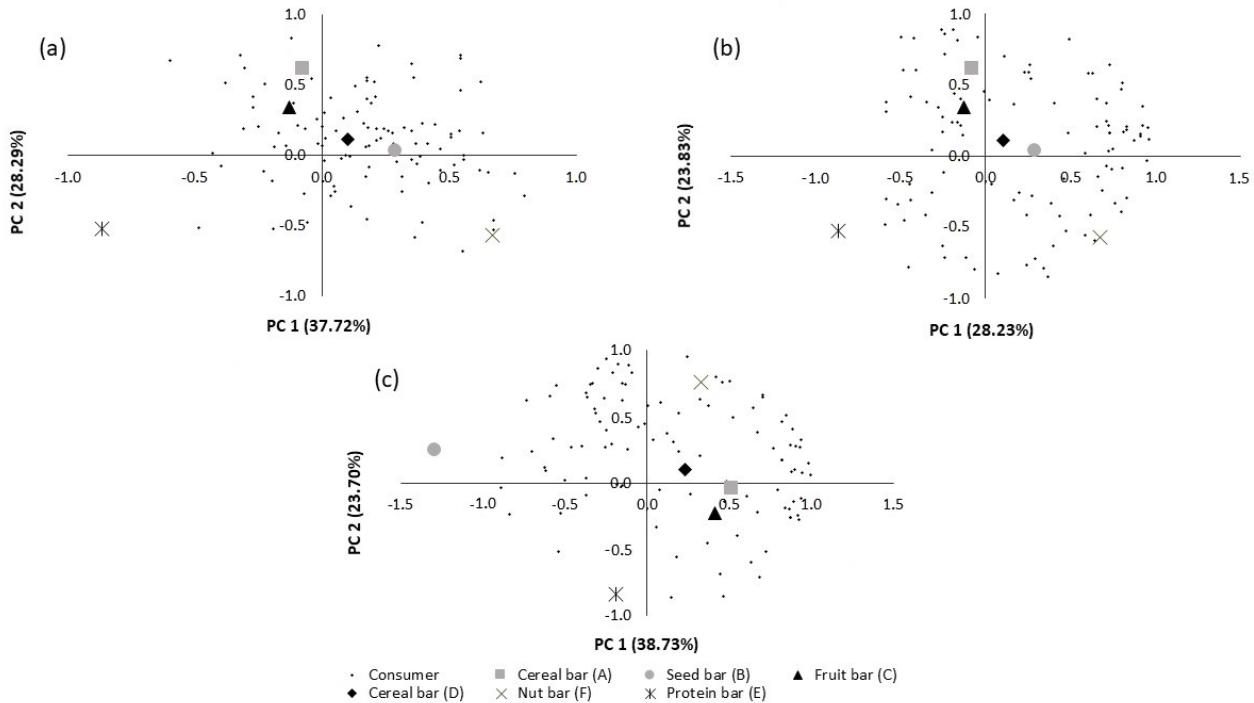


Figure 2. Preference mapping for six bars assessed in the blind test (a), packaging test (b) and test with the information (c).

4 Conclusion

It is necessary to improve the sensorial quality of the other types of bars on the market, in addition to the improvement of price, because generally nuts bars are the most expensive to consumers, despite the better acceptance in this research.

The research approach was regional and the results may not be generalizable for all consumers of snack bars. However, the content reveals similarities in world consumer trends, highlighting on healthiness. The information on health claims has positively influenced acceptance, proving that food bars have the potential to be a healthy and functional food. Moreover, it stimulates the industry to insert healthier snack bars and encourages policy makers to understand how people value the health-related factors on food choice.

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