



RESEARCH ARTICLE

What Grabs Our Attention Most to Consume A Snack Bar In Brazil? Following Trends In Choice of Snack Bars To Boost Market For Healthier Options

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Abstract:

Background:

Health can be a key factor in the choice of foods. Aligned with health trend, literature concerning the snack bars shows that improvements have been made in the snack foods' nutritional values by modifying their nutritive composition, making them healthy, natural and safe.

Scope and Approach:

This pilot study aimed to discuss the trends for snack bars in Brazil, focusing on the insights to improve this food category's competitiveness.

Methods:

A self-administered survey was made on different days and times, in the city of Viçosa, Brazil, during the winter of 2016, to assess how 408 consumers perceive snack bars and from this perspective link industry, consumers and other stakeholders, considering their attitudes and health perceptions on these foods.

Conclusion:

Consumers consider the body concern, health benefits, health concerns, convenience and habits to guide their purchase decisions. Cereal and fruit bars were mentioned as the most consumed, while nut and protein bars should be more affordable, maintaining prices that are more attractive for all. Overall, the results showed that more information on sensory aspects, health and ingredient content leads to higher purchase intentions. However, consumers also demand larger portion size and lower price. The expected results corroborated world consumer trends, proposing more healthy, diverse and accessible snack bars to low-income people. It would be interesting to provide older consumers with the background knowledge needed in order to choose healthier varieties of these foods.

Keywords: Snack bars, Portion size, Health, Older consumers, Body concern, Trends in snacking, Cereal and fruit bars.

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1. INTRODUCTION

The role of the stakeholders who aim to promote health consists to gather the socio-cultural and historical contexts, to know the emerging technologies and their applications and to understand people's attitudes and acceptance of, mitigating negative consequences of food choice and promoting the successful implementation and commercialization of food [1, 2].

There is no consensus among researchers about the factors and motivations that determine the choice of snack bars, but it is known that there is a set of health and non-health factors related to the purchase intention. Nevertheless, the influence of package position, package information, health claims, nutrition content and the effectiveness of this food in human health has been studied widely [2 - 7]. If industry is to produce products that match consumer needs, a better understanding of the factors affecting individual variation in perception is needed [8].

Snack bars represent a specific category associated to the home consumption out, which grows on average 2% per year throughout the world [9]. From 2013 to 2014, the average growth of the category of cereal bars in Brazil was 7.5% in volume [10]. According to ABRE [11], the chips and snacks market will grow by 40% by 2018. From 2012 to 2014, 1,136 new snacks were launched in Brazil, being the corn/wheat snacks (1) those that had the greatest number of launches, followed by chestnuts and peanuts (2), potatoes (3) and cereal bars (4). The segment of healthy foods grew 98% over the last five years in Brazil, surpassing the United Kingdom and Germany, making Brazil the fourth largest market for healthy products since the year of 2014 [12].

Although snack bars category includes nutrient-poor products, a lot has been done to introduce new varieties and bioactive components [2], including high content of antioxidants, fibers, essential fatty acids and amino acids [13], with the potential of being healthy to consumers even after processing. Bamford [14] 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 a strategy to further boost the snack industry; and, therefore maintain the consonance with the healthy trend, motivating consumers concerned with health. This differentiation has already been highlighted by the Kind Snacks, a company that was consolidated in the United States and which has currently been gaining market sales in the United Kingdom with the introduction of snack bars of the lines 'nuts and fruit' and 'nuts and spices'.

Reports of Boustani *et al.* [15] showed that cereal bars were perceived as healthy; however, it is necessary to understand the gap between the consumer's perceptions about the desired benefits and the real benefits that the product offer, even if the consumer is favorable to food innovations which enhance the quality and nutritional value of food [16].

Literature concerning the snack bars has shown that improvements have been made on the snack foods' nutritional values by modifying their nutritive composition, aligning then with terms as healthy, natural and safe, with potential to be considered functional foods [5, 17 - 24]. Several studies also showed that industry is able to develop nutritious snack bars, made from oats, brown rice, lentils, flaxseed, sesame or quinoa, with an already tested good sensory acceptability [22, 25 - 27].

2. RELATED STUDIES CONCERNING HEALTHIER SNACK BARS

A healthy lifestyle is an important trend that shapes everyday actions, while the packaging influences the behavior of the consumers [28]. Food choices are often habitual and do not involve a great deal of time or a deep cognitive process that leads the consumer to thoroughly evaluate the information presented in food [29].

Some consumers do not have enough time and want something they can eat quickly that will delay the hunger for a certain amount of time, while others are overweight and think that eating a bar or two instead of a meal will help with weight control [7]. The desire to achieve a normal, culturally acceptable body is often seen as the main driver of food-consumption practices adopted by individuals who are concerned about their body weight [30]. The intention to demand products apparently healthier is also linked to the pursuit of a desirable silhouette rather than health or well-being concerns [31]. Therefore, greater concerns about weight do not necessarily lead to healthy habits or health consciousness, but the adoption of healthy behaviors such as healthy eating and physical activity, motivated by health concerns can promote positive self-image [32].

Due to a growing concern about the increase on consumer behavior of snacking on anytime of the day, researchers have identified interest in study of the potential of snacks as healthy food, because risk of weight gain and obesity is associated with meals skipping, such as breakfast [33]. Currently, studies showed an increased frequency of snacking in

Western societies, which reinforces the need to improve the communication and to know the consumers preferences, encouraging healthier food choices [34 - 36].

Layman [37] states that the market for bars, is in constant growth, and it has been leading the industry to diversify the range of sensory aspects and to invest in the fortification with nutrients and in the development of products to specific audiences. In addition, while health increases its importance, convenience, taste and price will remain as key factors in choosing a food.

Up until now, improving healthy eating remains a difficult task, and current efforts have not resulted in substantial effects [38]. Balance-minded consumers are often willing to write their own definitions of “healthy” based on occasion and need-state [39]. On the other hand, low-health consciousness individuals have been the subject of recent studies, because they are less motivated to adopt healthy food choices, being more influenced by hedonic pleasure, which contradicts their motivation to eat healthy [38, 40, 41]. Research is evolving, but it is unknown how consumers interpret “healthiness” and “nutritiousness” terms, because generally they focus more on the type of food consumed rather than the amount of nutrients [42 - 44]. Unfortunately, the means to connect health and consumer are used mainly for marketing purposes [44, 45]. False or merely advertising statements made about a product, may mislead consumers into thinking that a product is good for their health, when in fact it contains significant amounts of sodium, fats, additives or sugars [44, 46].

Although several studies have tried to defend that warning labels can be a good strategy in reducing the key substances or ingredients demand (*i.e.* energy, saturated fat, sugars and sodium) [47 - 49]. Currently the literature has obtained more results through the study of health consciousness and its relationship with hedonic symbols, providing less intrusive approaches to achieve more healthful food consumption [38, 50]. In other words, one can argue that it seems more important to observe the health consciousness than their familiarity with the food, being possible to adopt different strategies between high-HC and low-HC individuals, when it comes to mitigate the negative consequences of food choice. Buhrau *et al.* [38] found that among low-HC individuals, presenting a healthy food item in picture (*vs.* text) format results in more favorable hedonic evaluations of that item and increases consumption intentions.

Starting from these premises, researchers consider important to promote the effectiveness of communicating nutrition information to improve health based food selection, leading to choose variety of products that improve intake of essential nutrients and adequate portion sizes [44]. Concentrating attention on green marketing is an important tool for sustainable development and for the satisfaction of the consumers and policy makers concerned about questions related to environmental education and health. The literature indicates consumers who are more aware of health make healthier choices [41, 50 - 52].

Stephoe *et al.* [53] developed the food choice questionnaire with the aim of predicting general food choice. Nine dimensions were identified: health, mood, convenience, sensory appeal, natural content, price, weight control, familiarity and ethical concern.

Personal pleasure and nutrition are among the five most present necessities when it comes to the consumption of snack products [9]. For consumers snack bars should become more enriched, providing a balanced nutritional profile of components that include fibers, oleaginous and whole grains [54]. First of all, nutritional and energy bars has been developed to meet the consumer market for women, athletes and others [55]. Palazzolo [56] reports that cereal bars arose because of a greater need to combine convenience and health. Among the attributes, it is included the type of cereal, the carbohydrate selection, the enrichment with nutrients and their stability during processing, being the fiber content the main differential for this product [57].

Studies have shown that consumer consider flavor and texture to be the most important factors in choosing snack bars, but non-sensory attributes as price, health, nutrition content and claims that demonstrate a self-directed benefit may affect flavor perception and to overlap to the sensory characteristics [2, 7, 58].

Pinto *et al.* [2] report that package attributes, price and flavor were the most important factors that influenced the purchase of snack bars; the presence of omega-3s, sugars, preservatives, flavorings and colorings on package of snack bars were the most preferred claims. Miraballes *et al.* [7] have been argued that consumers of meal-replacement bars only paid careful attention to nutritional information in the absence of distracting elements of the package design (colors, pictures, font size). In a previous study by the authors Fiszman *et al.* [59], health benefit-related images were positively associated with “natural”, “organic” shapes; explicit images like a tape measure evoked a vivid, direct association with the “slimming” concept. Mahanna *et al.* [60] found that sensory claims and types of bar categories

were not crucial to consumers, although calorie elements played a vital role in decision making for snack bars.

The aim of the current study was to assess how consumers perceive snack bars and to promote for consumers, industry, and stakeholders the links between the market perceptions, attitudes towards snack bars and health perceptions related to consumers. It is hoped that these findings permit to boost this market segment, emphasizing their potential of being a healthy food to consumers. This study is exploratory in its nature and does not aim to test an existing theory or model.

3. METHODOLOGY

The study was guided in the cross-sectional, exploratory and descriptive nature, conducted according to the guidelines laid down in the Declaration of Helsinki and the Committee on Ethics in Human Beings Research approved all procedures. Data collection was made based on the consumer intercept method at places, such as supermarkets, gyms, natural products store, emporium and convenience stores, with the maximum geographical scattering and socioeconomic scattering of target consumers [46], in the city of Viçosa, Brazil, during the winter of 2016.

The survey application was made on both weekdays and weekend days, in different times, taking good care to vary days and shifts (morning, afternoon and evening), in the same place of application. In addition, in order to avoid possible mistakes that could impair the quality of the research we performed a pretest before handing out the official questionnaire [46]. The pre-test did not identify any question that needed to be modified, because all respondents perceived and understood clearly the questions content; we assessed internal validity of questionnaire by Cronbach's alpha (α).

Surprisingly though, of the 1081 individuals invited to the interview, only 37.7% called themselves consumers of snack bars. Due to the exploratory nature of this study, a sample size of 408 was chosen as adequate [61] and each respondent took on average 8 minutes to answer the questions. Previous similar surveys reported that the importance of making this food more attractive to the consumers should be reinforced [2, 62]. Varied reasons for non-consumption were presented in this study, such as ‘because I do not quench’, ‘because I do not like’ and ‘because I do not have a habit’. Other reasons included ‘no habit’ (28%), ‘do not like’ (26%), ‘expensive’ (8%), ‘high sugar content’ (5%), ‘prefer fruit’ (3%) and ‘others’ (30%) that include ‘diabetic’, ‘media influence’, ‘poor in nutrients’, ‘unattractive’, ‘medical/nutritionist recommendation’, ‘artificial’, ‘low fibers’ and ‘very industrialized’.

The respondents were randomly selected, approached to participate in a self-administered questionnaire, consisting of exploratory nature questions, composed by five sections: sociodemographic data, individual aspects of the consumers, consumer behavior in choice of snack bars, motivations for consumption and importance of claims on package of snack bars (Table 1). In order to avoid bias concerning the choices, in each issue, non-hierarchical circular cards of symmetric dimensions were provided. During the questionnaires application, care was taken to vary the cards position.

Table 1. Summary of issues presented to consumers of snack bars.

Identification (‘Sociodemographic’ section) Gender Age Education Income Occupation
Closed-ended questions
(‘Individual aspects of the consumers’ section) Frequency of consumption Most consumed snack bars ¹ Places for purchase ¹
(‘Consumer behavior in choice of snack bars’ section) Most observed attributes in purchase ² Habits associated with consumption ¹ Preferences for the consumption of snack bars ³
Open-ended questions
(‘Motivations for consumption’ section) Reasons why you consume as cited snack bars Reasons that would increase the consumption of snack bars
Importance of claims in snack bars ⁴

Note. ¹Questions with the possibility to mark more than one answer. ²Questions with given answers according to order of importance. ³Issues evaluated in Likert-type scale (3 point: 1- ‘Strongly agree’; 2- ‘I don’t agree or disagree’; 3- ‘Strongly disagree’). ⁴Issues evaluated in unstructured scale of nine centimeters (0 cm – Little importance; 9 cm – Too much importance).

The demographic characteristics showed a sample composed of females (68%) and younger people aged between 18 and 25 years (40%), income between 1 and 5 salaries (55%) (The wages in May 2016 was considered R\$ 880.00) and incomplete higher education (35%). Regarding the professions, most of the entries referred to students (44.6%), public officials (11.3%), self-employed (8.3%) and homemakers (7.4%). The option 'others' (13%) included the least expressive percentages, corresponding to the profession of dentist, veterinarian, physiotherapist, architect, hairdresser, physical educator, engineer, household worker, manager and driver.

4. ANALYSIS

The study involving correspondence analysis has received greater visibility through McEwan *et al.* [63] who described in detail the associations between sensory evaluators and food attributes. Since then, correspondence analysis have been successfully used, assessing purchase intentions and understanding the sensory science of foods [64 - 70].

The consumers were asked which types of snack bars they consumed the most and the reasons why they are driven to consume them. Researchers transcribed the expressions or themes associated with each of the main snack bars looking for patterns in the data from similar responses. In this way, the correspondence between snack bars (cereal, fruit, seed, nut, protein, energy and biscuit) and descriptive terms (reasons for the consumption of each type of snack bars) was assessed. Intentions to purchase snack bars were also investigated from age and gender.

To access motivations for consumption of snack bars, Pearson correlation analysis ($p < 0.05$) was conducted in SAS® software using PROC CORR command. The authors, based on previous studies [59, 60, 71 - 77], generated the issues. The issues asked to respondents to assess preferences for consumption of snack bars based on three-point Likert scales are as follow:

- You consume snack bar because it is a healthy food
- You consume snack bar because it is a nutritious food
- You consume snack bar because you want to lose weight
- You consume snack bar by being dissatisfied with my body
- You consume snack bar due to practicality or convenience
- You consume snack bar because it's a habit
- You consume snack bar because you have health problems
- You consume snack bar by medical or nutritionist recommendation
- You consume snack bar because you like the taste
- You consume snack bar to provide/repose nutrients before/after physical activity
- You consume snack bar, but you avoid them as they contain a lot of calories

In the pre-test the elderly showed some fatigue and difficulty assessing the issue on five-point Likert scales, reason why the three-point Likert scales were preferred. In addition, due to the number of items evaluated in the same question, the three-point scale showed itself more objective, less confusing and less exhaustive for these consumers. Therefore, in the final stage, the authors chose to use the three-point Likert scale, even though this could lead to statistical bias.

With the Cluster analysis, consumers were differentiated between the scores obtained. The hierarchical method of agglomerative Ward was chosen as a measure of distance, since the sample size is moderate, not exceeding 1000 observations [78]. The measuring instrument chosen was of dissimilarity, based on the Euclidean distance between each pair of observations, so that larger distances indicated higher dissimilarity [79]. Descriptive analysis of the clusters formed was performed.

The degree of importance of the specific claims on package of snack bars were assessed using the unstructured scale of nine centimeters (0 cm - little importance; 9 cm - too much importance) (Table 2), considering that the unstructured scale can provide a wider range of scores for consumers [80]. The choice of most important claims was based on recent findings using the effect of claims on health decision [7, 81, 82].

- Rate the importance of claims on package of snack bars, reflecting your judgment.

The results were analyzed by the principal component analysis (PCA) (PROC FACTOR SAS), expressed as scatterplots of importance of the claims in relation to the first two principal dimensions, easily understandable and visible form [46].

Table 2. Claims assessed on the unstructured scale of nine centimeters (0 cm – Little importance; 9 cm – Too much importance). (N = 408).

Items ($\alpha_c = 0.813$)	Mean \pm SD
Trans-fat free (TFF)	7.2 \pm 2.4
Gluten-free (GF)	3.7 \pm 3.2
Lactose-free (LF)	3.4 \pm 3.3
Light or diet (LD)	4.5 \pm 3.3
Low-sodium (LS)	7.0 \pm 2.6
No added sugars (NS)	6.4 \pm 2.8
Source of proteins (SP)	7.1 \pm 2.2
Source of omegas (SO)	6.1 \pm 2.8
Low in saturated fats (LSF)	7.1 \pm 2.3
No preservatives, flavorings and colorings (NPFC)	6.0 \pm 3.1

5. RESULTS

Consumers were asked about the importance they give to certain criteria at the time of purchase. On 32.0% of responses, taste and texture were the most important attributes at the purchase intention, followed by nutritional and health information (26.4%), price (18.5%), variety of grains (11%), brand (5.3%), practicality and convenience (3.8%), portion size (2.2%), packaging (0.7%) and others (0.2%).

Many consumers complained about the lack of creativity in terms of flavor diversification among industries, justifying their preference for fruits or other types of food, as they are also able to supply the practicality.

With the correspondence analysis, after accounting for answers related to the most consumed types of snack bar and the reasons for their consumption, ten main descriptive associations were identified with the seven types of bars established by the researcher:

- A greater quantity or variety of nutrients
- Healthier
- To ally to physical exercise
- Medical recommendation/nutritionist or diet
- More affordable price
- Good to the intestine
- Loss or maintenance of weight
- High fiber content
- Less amount of calories
- High protein content

As shown in Fig. (1), the first dimension accounted for 74.23% of the total inertia or the data total variation, and the second dimension 11.21%, totaling 85.44% of the accumulated percentage required for the explanation of the data variation. The value of the Chi-square test is equal to 114.11 and significant ($p < 0.01$), indicating that there is association between the types of snack bars and descriptive attributes. The bars 'protein' and 'energy' are the main contributor variables of dimension I (higher values in the dimension I), making up 85% of the inertia. For the dimension II, 'nuts' and 'cereal' are the main contributors and explain 69.6% of its inertia .

The consumer's perceptions revealed, through the perceptual map, that apparently five groups were formed between snack bars and descriptive attributes. The cereal bars are more available to the consumer at the purchasing places, having more affordable prices and being able to offer a greater quantity of fiber content, which is appropriate for good intestinal function (group 1). Seed, cookie and fruit bars are considered healthier, associated with less amount of calories and loss or maintenance of weight (group 2). Nut bars are associated with a greater amount or variety of nutrients (group 3), whereas the protein bars (group 4) and energy (group 5) are linked to higher protein content and to physical exercise, respectively.

Under the premise that consumers of snack bars have different preferences, especially in relation to age and gender, it is not surprising that older female respondents are more likely to observe non-sensory factors (*e.g.* such as grains variety and health information). On the other hand, it is more notorious that sensory factors (*e.g.* taste), price and portion size are associated with female and male respondents aged between 18 to 35 years and older male respondents

(Fig. 2). On the other hand, the spatial separation shows the disparity between male and female respondents aged from 26 to 35 years, where male respondents highlighted a greater interest in issues for health, practicality or convenience.

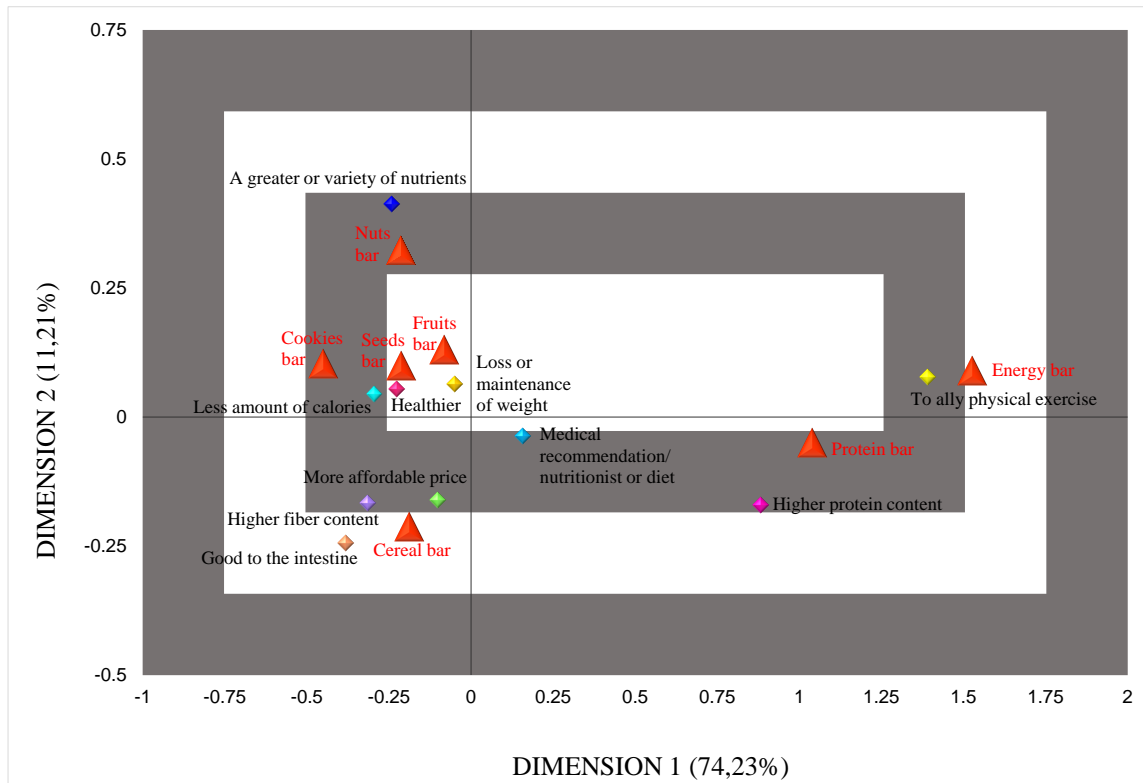
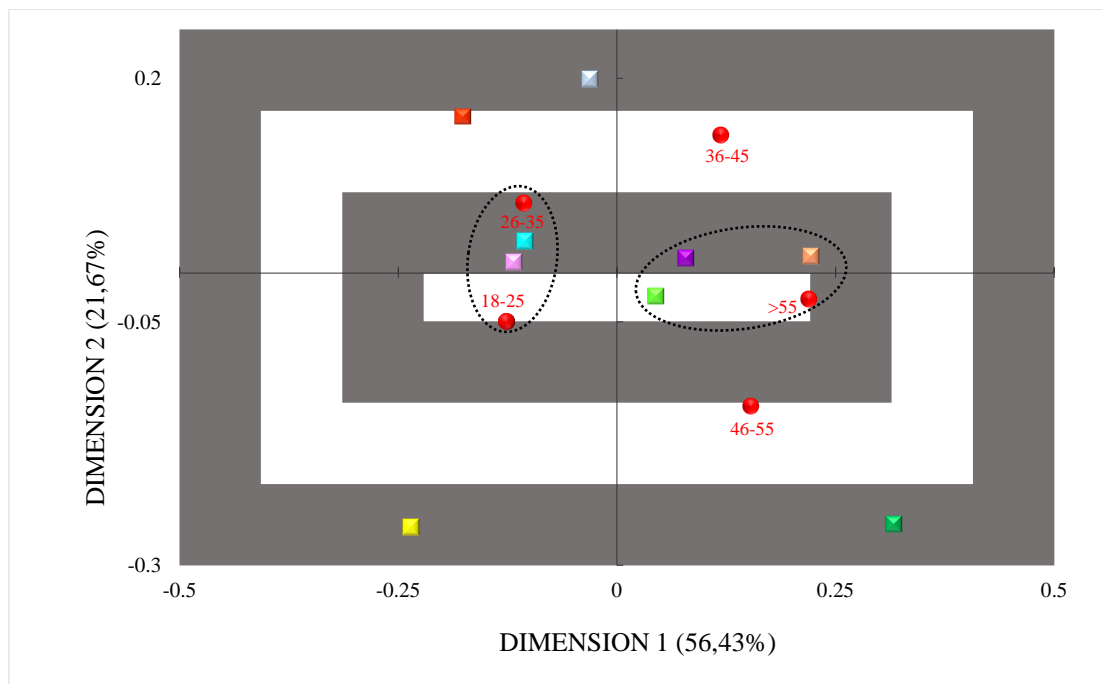


Fig. (1). Perceptual map of descriptive attributes and snack bars: correspondence analysis.



(a)

Fig. 2 cont.....

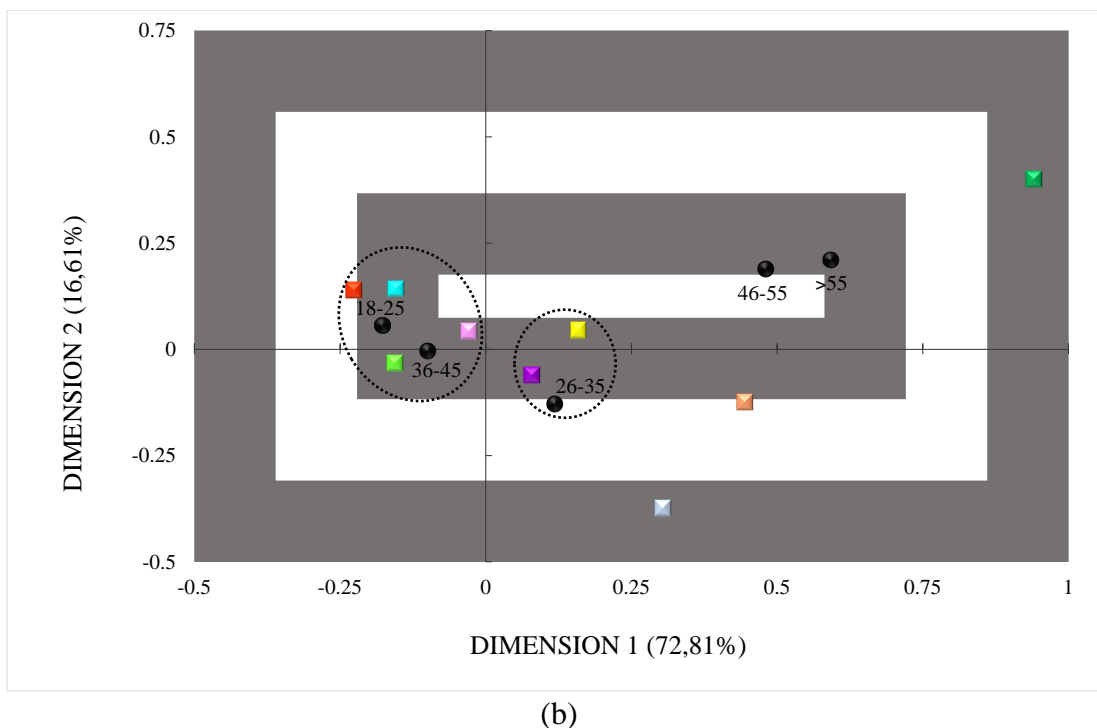


Fig. (2). Correspondence analysis between the most important criteria observed at the time of purchase: relationship with age and gender of the respondents. (a) Female gender and different ages (red) (b) Male gender and different ages (black). The age is represented by colors corresponding to the gender of the respondents (18 to 25 years; 26 to 35 years; 36 to 45 years; 46 to 55 years; more than 55 years)

Informally, many respondents reported not being satisfied with the standard portion size (something around 25 to 30 grams), stating that this quantity does not satisfy their hunger and, therefore, would not compensate the cost/benefit.

5.1. Motivations For The Consumption Of Snack Bars

The motivations corroborate the attitudinal trends of food consumption found in Brazil, similar to the principal global food trends designed in 2018: self-care, individuality, trust, stress and sustainability [39, 83].

5.1.1. Motivated by the Body (Cluster 1)

Regarding consumption, 56.3 percent consume snack bars at least twice a week. Of the 87 respondents, 74.7 percent were female, age at the average of 33 years, 73.2 percent had higher education and at least 33.7 percent had complete college degree. In general, they are undergraduate students and self-employed, with income between 3 and 5 wages (28.7%), and between 5 and 8 wages (26.4%), respectively.

5.1.2. Little Motivated by the Set of Factors (Cluster 2)

This group corresponds to 121 respondents (30% of respondents) with average age of 30 years old, with the most expressive number of male respondents (38%). The educational level reveals that at least 95.9% have completed high school, being the majority with higher education in the same group (44.6%). In general, they are students, civil servants and self-employed. The monthly income ranges from 3 and 5 wages (33.9%).

It is worth noting that the latter are usually more expensive and, possibly, its percentage is associated with greater purchasing power of the group, in addition to the consumption due to the presence of nuts that contains beneficial fats to the health.

5.1.3. Motivated by the Health Benefits (Cluster 3)

This group agree that they consume snack bars because it is nutritious and healthy, but not because they have health problems or by professional recommendation. Composed of 139 consumers (34% of respondents), with 66.2% of female respondents and an average age of 39 years, the largest among the groups. In general, they are students, public service workers (14.4%) and homemakers (10.8%). The family income of this group is predominantly greater than five salaries (40.3%) and the educational level is represented, for the most part, by the complete or incomplete higher education (59.7%).

5.1.4. Motivated by Health and Practicality (Cluster 4)

This is the smallest group, composed of 61 individuals (15% of respondents), with 70.5% of female respondents. The average age is 36 years and the family income of this group is around 1 to 5 incomes (57.4%). When it comes to educational level, the majority has complete higher education (29.5%) and complete high school (24.6%). They are students (42.6%), self-employed (34.4%) and homemakers (6.6%).

The percentage of individuals who consume on a weekly basis is high (73.7%), being 31.1% corresponding to individuals who consume from 5 to 7 times a week, with expressive percentage of individuals who consume protein and energy bars (11%), and higher proportion of preference for the consumption of fruits bar (34%) in relation to cereal bars (31%).

This group demonstrates that its consumption can be influenced by medical advice or any health problem. So being either a change on their prescribed diet or the simple fulfillment of their physiological need may cause an abrupt decline in consumption.

5.2. Claiming Health in Snack Bars

Factor analysis performed on the data (Fig. 3), showed that the spatial separation of claims indicates that there is the formation of three groups that differ with respect to importance degree for consumers. The bi-plot shows a strong correlation between fats (trans-fat free and low in saturated fats) and sodium, indicated by the cluster formation on the bottom right side; it emphasizes the better importance of these claims on the package of the snack bars. Although it is unclear how lay consumers and experts define and interpret “healthiness” and “nutritiousness” terms of various foods [44], one statistical tendency was observed from the connection between importance of the source (proteins and omegas) and importance of the absence (sugars, preservatives, flavorings and colorings) of certain nutrients in a second cluster. The absence of gluten and lactose were less important than the other claims, and there may be few individuals intolerant or influenced by food fads that gave greater importance to nutrients, slightly raising respective standard deviations.

6. DISCUSSION AND IMPLICATIONS

This study is one of the first to demonstrate that different consumer groups could inform new trends for reformulating snack bars, with connection between snack bars and health perceptions. Consumers were claim sensitive and concerned about price. The more respondents can pay for nut and protein bars, the more likely they will access a healthier snack food, because these snack bars were negatively associated with “more affordable price”, but positively related to “higher content of nutrients and proteins”.

Snack bars are practical and easy to carry, however, many respondents justified their consumption not being so frequent due to preferring fruit or natural sandwiches, considering them less expensive, healthier, and more nutritious as well as providing greater satiety. Miraballes *et al.* [7] revealed that consumers of meal bars have not demonstrated any relationship between “meal replacement” and “satiating” claims, being them clearly distinct and negatively correlated. To boost the consumption of healthier snack bars, the provision of nutrients for a complete meal and link between “satiating” and “reasonable price” are needed [2].

Bucher *et al.* [35] reported that currently little is known about set of determinant criteria for evaluating snack foods, but is probable that portion size may be relevant, although it is still unclear if consumers consider portion size for assessing healthiness or unhealthiness of these products. The results of Finkelstein *et al.* [84] showed that a healthy eating, when imposed, generated higher hunger ratings after people consumed a small snack food with a label that emphasized the healthfulness; but the people who perceive that they have chosen to eat healthy did not show any increase in hunger. Indeed, it seems likely to exist a relationship between health perceptions and portion size,

suggesting that more frequent healthy food intake is associated with greater sensitivity to increasing portion sizes on unhealthy foods [35, 85].

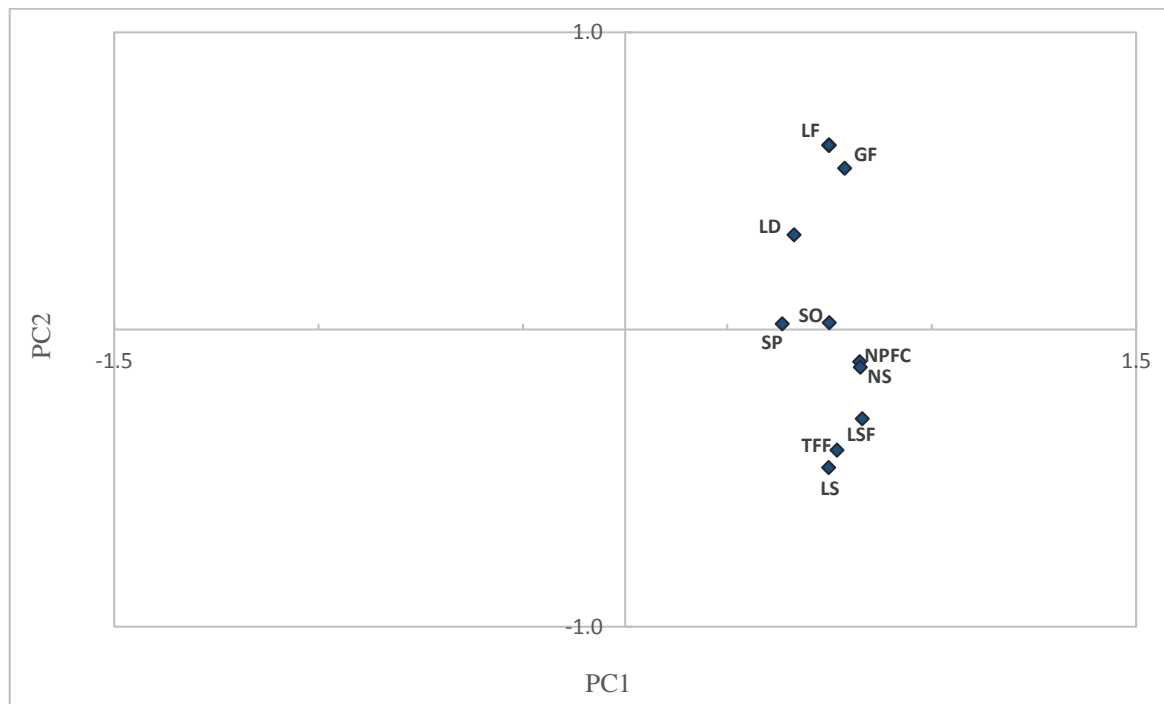


Fig. (3). Principal component loadings plotted for importance of claims on package for snack bars. The first two principal components PC1 (x-axis) and PC2 (y-axis) explained 42.7% and 18% of the variability, respectively. Claims abbreviations are NPFC = No preservatives, flavorings and colorings; GF = Gluten-free; LF = Lactose-free; LD = Light or Diet; LS = Low in sodium; LSF = Low in saturated fats; NS = No added sugars; SP = Source of proteins; SO = Source of omegas (3, 6 and 9); TFF = Trans-fat free.

Young people demonstrated to be less worried about health issues and reflected more their personal tastes. Rezende *et al.* [86] concluded the attitude of eating out originates from younger individuals, with more elevated educational level and financial incomes. Boncinelli *et al.* [49] evaluated the student perceptions of chocolate bars and concluded that the information regarding the high caloric content had little effect on respondents' choice, even when they did not show any familiarity with the food. Simply put, preferences for tastes are too essential for many consumers and wellbeing can be implicit to the effect that eating habits are healthy enough [87]; they may not be willing to sacrifice sensory pleasure for any other attribute of food [88]. Tordoff *et al.* [89] reported that although people can be well aware that they do not eat healthily, they are still likely to assess their diet as being healthy enough as long as they feel good [87]. By understanding this tendency, Mintel [39] observed that 41% of UK snacking consumers agree that snacks high in sugar or salt, considered unhealthy, are fine as part of a balanced diet.

Older individuals, on the other hand, demonstrated to care more about health information and variety of grains, but they represented the smallest share of consumers who have a habit of consuming food bars, which is probably explained by lack of consumption habit of this food. In a study of Pettigrew *et al.* [90], older consumers preferred healthy food choices in terms of prioritizing fruit, vegetables, protein sources, and complex carbohydrates, but had little change in eating habits in their earlier years. Surprisingly though, men consumers aged from 26 to 35 years were also most interested in nutrients and health information than female consumers of the same age group. Thus, new insights are needed to explore the new trends on comportment of the male consumers, since this study contradicts past studies proposing that male consumers are not as concerned about health issues as women are. It is important to analyze whether effects of attitudes towards snack bars would be modulated by health choice, because they can be very distant from the actual purchase situation.

Hoefkens *et al.* [91] concluded that the perception of quality nutrients affects purchase decision, and this is most noticeable among the elderly, women, and individuals on diet and health-conscious. In our study, consumers have placed a significantly value on health claims presented to them. There is a steady upward trend, where it is observed an increasing demand for food due to omegas and protein content, in addition to the components commonly avoided in

food studies (*e.g.* sugars, fats and sodium). Rizk *et al.* [85] reported that fat and fiber content are predominant when women judging the healthiness of foods. Crofton *et al.* [92] realized that consumers who sought healthier snacks expected to find low levels of calories, fat, salt and sugar, as well as high levels of whole grains, oats, bran, nuts, seeds, legumes and fruits, being more interested in the fiber, cholesterol and omega 3 contents. Pinto *et al.* [2] found that the information on protein, omega-3s, sugars, preservatives, flavorings and colorings had the potential to improve significantly the acceptability of seed and protein bars. The preference for absence of coloring, flavors and sweeteners occur because additives are seen as signs of more processed and unhealthy food [2, 93].

Unfortunately, to the date, snack bars are less preferred than healthier options, because they combine highest price with lowest satiety. Therefore, many efforts should be made to lead the consumers of snack bars to believe their healthy image [2] and being mindful of consuming healthy portion sizes is the key factor to stimulate the consumption of these snacks [35]. In line with other studies, our study does not corroborate the thought: “if it tastes good, then it unhealthy for you” [89], because we believe that this kickback is result of a culture that has established itself due to the open gaps that were not filled by the industry. “Appreciating that good taste is not inevitably linked to obesity raises a glimmer of hope for the food industry: Good taste can be used to attract consumers to nutrient-sparse foods without concern that this will adversely influence body weight” [89].

Despite the intuitive empirical support to confirm these findings, our research cited that the linking between body concern and consumption of snack bars is real. On the other hand, the averages of the values attributed to the component variables of the obtained factors reveal that many consumers are not totally in agreement with the healthiness of snack bars (Table 3). Several studies in the past showed the effectiveness of cereal bars in weight loss, but little is known about the long-term effects [19 - 20, 24]. Aspects such as form, size of the product and health claims influence beliefs about snack bars, helping to internalize the idea that this food helps in weight loss. Therefore, greater concerns about weight do not necessarily lead to healthy habits or health consciousness, but the adoption of healthier behaviors such as healthy eating and physical activity, motivated by health concerns can promotes positive self-image [32].

Once consumers of snack bars are motivated to health, one can promote the healthier choices for this category of products. Thus, it is necessary promoting more healthful snack choices and sustainable nutrition education because it seems likely that eating snacks between main meals satisfy energy and nutrient requirements, in addition to favor lower energy density food choices, which result in a wider variety of foods being included in the diet [38].

Our findings suggest managerial implications for new marketing strategies for snack, because taste and texture remain as key factors in choosing a snack food. From such information is possible to suggest the improvement or innovation on snack bars' texture (*e.g.* freeze-drying fruit for formulation) and to encourage the development of exotic and uncommon flavors from bioactive ingredients. Mintel [39] report that European consumers are open to trying food and drink with unusual texture; this information can be useful for industries around the world, since texture is one of the most important sensory attributes in the consumption of snacks.

Table 3. Motivational correlation in purchase intention for snack bars.

Variables	M	SD	Pearson's Correlation											
			HF	GF	NF	LW	DB	PC	H	PA	MN	HP	C	
Healthy food (HF)	1.51	0.619												
Good flavor (GF)	1.41	0.609	0.129**											
Nutritious food (NF)	1.44	0.608	0.598**	0.150**										
To lose weight (LW)	2.29	0.829	0.124*	-0.010	0.098*									
Dissatisfied with the body (DB)	2.49	0.738	0.108*	-0.042	0.063	0.602**								
Practicality/convenience (PC)	1.15	0.445	-0.145**	-0.093	-0.164**	0.046	0.09							
Habit (H)	2.13	0.794	0.131**	0.054	0.076	0.119*	0.110*							
Physical activity (FA)	2.18	0.849	0.186**	0.025	0.235**	0.138**	0.087	-0.098						
Medical or nutritionist recommendation (MN)	2.54	0.776	0.034	-0.004	0.084	0.259**	0.184**	-0.043						
Health problems (HP)	2.89	0.417	0.031	-0.010	0.109*	0.060	0.094	-0.074	0.071	0.245**	0.245**	0.080	-0.002	
Calories (C)	2.54	0.717	-0.011	0.030	0.021	0.041	0.033	-0.094	-0.043	-0.002	0.041	0.024	0.024	

Note. Variables evaluated in Likert-type scale (3 point: 1-'I strongly agree'; 2-'I do not agree nor disagree'; 3-'I strongly disagree'). p-values significant: **p < 0.01 *p < 0.05.

From the consumer research reviewed above, it becomes clear that is necessary to develop interventions according dietary needs with advancing age [90], in order to encourage modifications in choice for snack bars. It is therefore

necessary to increase the participation of older people as consumers of snack bars. Most particularly, it would be interesting to enhance the retail stores to better accommodate older people's needs [90] and to promote health education activities, providing information on snack bars that can provide older consumers with the background knowledge needed in order to choose healthier varieties of these foods.

The use of technology in food store would also be important, allowing a better interaction with consumers. The personalization present in the new technologies could draw in more consumers, especially the younger consumers, because companies and retailers can target individuals based on their habits and preferences both in the store and online, considering consumer insights on purchases and their online activities [39].

CONCLUSION

It was possible to find different market niches for snack bars and to assert the need to increase the participation of older people as consumers of snack bars. Likewise, it is not possible to generalize the results because our sample is of convenience, but the results corroborate the purpose of the study with its preliminary character.

The price proved to be a very important factor at the time of purchase, of great influence in the differentiation of types of snack bars found in the market. This represents a challenge for the food industries, in the sense of uniting the affordable price to the portions size, being able to promote an increase in the consumption of nut, protein and energy bars. Protein and nut bars are still unknown by the general public and are not so consumed as the cereal bars.

In general, those who buy snack bars as a habit are also moved by convenience, but they do not always prioritize health and body concern. In contrast, those who consume snack bars due to the amount of nutrients can have some dissatisfaction with the body, and usually prioritize health, being able even to give up the sensory attributes at the expense of it. The findings stimulate the industry to insert new products in this category, with more healthy, diverse and accessible foods to low-income people.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

All procedures involving human subjects were approved by the committee on Ethics in human beings Research of the federal University of Viscosaana was registered at Plataforma Brazil (n^o1.581.561).

HUMAN AND ANIMAL RIGHTS

No Animals were used in this research. All human research procedures followed were in accordance with the ethical standards of the committee responsible for human experimentation (institutional and national), and with the Helsinki Declaration of 1975, as revised in 2013.

CONSENT FOR PUBLICATION

Informed consent was obtained from all the participants.

CONFLICT OF INTEREST

The authors declare no conflict of interest, financial or otherwise.

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