

Evaluation of Some Ingredients and Energy Content on Front-of-Pack Cereal Bar Labeling as Drivers of Choice and Perception of Healthiness: A Case Study with Exercisers

Natalia A. Salazar, Susana Fiszman , Carlos E. Orrego, and Amparo Tarrega 

Abstract: The objective of this study was to explore the drivers of choice and perceptions of healthiness that specific ingredient or energy content information displayed on the front-of-pack label of cereal bars triggers among different groups of consumers. The participants (18 to 50 years old), classified as exercisers ($n = 103$, 52 women) or nonexercisers ($n = 101$, 51 women), completed a questionnaire and then rated their interest using images of cereal bars that varied in four characteristics (“With fruit,” “With chocolate,” “High protein,” and calorie content). Conjoint analysis showed that the most important motives were associated with the convenience, pleasure/indulgence and liking dimensions, which did not differ between groups. These were followed by two other motives introduced in this study: energy/physical activity and satiety, in which the exercisers showed a distinctively higher level of interest than the nonexercisers. Chocolate and a low calorie content were the outstanding drivers of interest, at similar levels for both groups. A high protein content claim increased the interest of all participants, but more so for exercisers and for men. Fruit had a low impact on interest, which was only significant for women. These results indicate that front-of-pack label information influences choice in a distinctive way for some targeted population groups.

Keywords: cereal bar, claim, conjoint analysis, perceived healthiness, motive, segmentation

Practical Application: This study contributes knowledge about the impact that front-of-pack label information about certain ingredients and the energy content has on the motives and drivers for snack choices and perceptions of healthiness. The results contribute interesting results on the behavior of some consumer segments, in particular, exercisers and people involved in fitness activities, who are supposed to have special dietary needs.

Introduction

Labelling is one of the sources of information that influences people's expectations concerning what they consume. It is considered an extrinsic source since it is somehow related to the product but is not physically part of it (that is, of that which is tasted or consumed) (Piqueras-Fiszman and Spence, 2015). A large body of research deals with food labeling, especially concerning on-pack nutritional information, which in turn is related to the need to guide consumer choices (Buttriss, 2018). As well as food nutrition issues, a number of other labeling strategies also influence food consumption (Embling et al 2019). Research has also been conducted on the consumer perceptions elicited by labels indicating food attributes such as “organic” (Drexler et al. 2018), “natural” (McFadden & Huffman, 2017), or “locally produced” (Mugera et al. 2017). The influence on consumer perception and choice of

label claims about the presence or absence (with/ content, without/ free) of specific nutrients and ingredients (Hartmann et al. 2018) or their levels (low/ reduced, high/ more) (Tarancon et al. 2014) has also been studied in a number of food products.

From the label, consumers form an impression of a product prior to its consumption. For example, Raghunathan et al. (2006) found that when a food is labeled as “healthy” there is a lower expectation that it is going to taste good. As there is no simple relationship between the health implications of a food and its taste, this relationship owes more to expectation than to rational analysis (Benton, 2015).

Cereal bars are versatile in their formulation and can be designed to address different trends in consumer choices for food intake (sportification, protein, healthiness and snackification) (Kriegel, 2016). Research on cereal bars in recent years has mostly been based on gluten-free formulations (Kaur et al. 2018) and on the development of bars with several new ingredients (Martinelli et al. 2018), focusing on stability during storage, sensory properties and several functionalities, such as delivering satiety or inhibiting rises in blood glucose levels. Studies dealing with the influence of the labeling of this kind of product on consumer perceptions are scarce. A very recent work has studied the effect of nutrient claims (with or without fiber), images of fruit (with or without), and nutritional warnings about excessive content of sugar and saturated fat (with or without) on consumers' healthfulness judgments (Centurion et al. 2019).

JFDS-2018-1828 Submitted 11/13/2018, Accepted 6/3/2019. Authors Salazar and Orrego are with the Dept. de Ingeniería Química, Inst. de Biotecnología y Agroindustria, Univ. Nacional de Colombia Sede Manizales, Campus la Nubia Km 7 Vía al Aeropuerto, Manizales, 170004, Colombia. Authors Salazar, Fiszman, and Tarrega are with the Inst. de Agroquímica y Tecnología de Alimentos (IATA-CSIC), Agustín Escardino, 7. 46980 Paterna, Valencia, Spain. Author Salazar is also with the Facultad de Ciencias Naturales y Matemáticas, Univ. de Ibagué, Carrera 22 Calle 67, Ibagué, 730001, Colombia. Direct inquiries to author Fiszman (E-mail: sfiszman@iata.csic.es).

It is well-established that the information given to consumers has important consequences in terms of their expectations and beliefs (Aaron, Mela, & Evans, 1994). For this reason, some individuals could be more influenced than others by the nature of the labeling (Benton, 2015), depending on their lifestyle, physical condition, and so on. Market segmentation (that is, dividing the market into smaller segments of consumers with distinct needs, characteristics or behaviors) and consumer motives are among the most important concepts utilized in predicting and explaining consumer behavior (Oguzhan et al. 2018). To adapt snack products to the needs of consumer groups, it is important to know their interests and motives for consumption. People's "personal food systems" are driven both by stable motives such as preferences, cultural background, and social norms or attitudes, and by momentary motives such as availability, mood, hunger, convenience or cost (Rozin, 2007). In particular, the motives underlying the selection of snacks have been related to hunger, location, the social/food culture and environment, cognitive factors and hedonic eating (Hess et al. 2016). To the best of the present authors' knowledge, the motives and ingredient-driven choices of particular segments or population groups have not yet been studied.

This authors' hypothesis was that people who regularly take exercise would think in terms of health and performance when making food choices, since they would look for nutrition to support their active lifestyles (Volmer 2018). For this reason, motives related to energy, recovery after exercising, and satiety were included in the study, along with other factors, in order to assess their impact as potential drivers of interest in cereal bar consumption by exercisers. Following the same reasoning, "High protein" and other front-of-pack labelling claims such as energy content were investigated to ascertain whether they affect exercisers in a distinctive way. Accordingly, four variables (and some of their combinations) were selected for inclusion in the cereal bar labeling: "High protein," "With chocolate," "With fruit," and two energy contents (90 or 200 kcal). Each ingredient belongs to a different category of foods with different functionalities. "With fruit" invokes healthiness, because the term "fruit" symbolizes healthiness (Suetterlin & Siegrist, 2015). "With chocolate" is a taste factor, since chocolate is well-recognized as an indulgent ingredient, and a study made in Germany has identified preferences for bars containing chocolate (thanks to its sensory attributes) compared to fruit bars (Kim et al., 2016). "High protein" promotes muscle tissue growth and repair, and also satiety. According to the British Nutrition Foundation (2015), protein requirements for regular participants in sports and exercise (like swimming/running or going to the gym on a regular basis) may be slightly higher than for the general sedentary population, in order to promote muscle tissue growth and repair. Also, the International Society of Sports Nutrition (Jäger et al., 2018) has stated that while it is possible for physically active individuals to obtain their daily protein requirements through the consumption of whole foods, supplementation is a practical way of ensuring the intake of an adequate quality and quantity of protein. Finally, the calorie content information has a direct relation to perceived healthiness that could exert a strong influence on behavior (Wegman et al., 2018). In addition, taking into account that women generally show a tendency to make healthier food choices and are much more concerned about the importance of food choice and eating behavior (Arganini et al., 2012), a gender-specific approach was also considered important.

Therefore, the objectives of this work were (1) to determine the individual motives for eating cereal bars as a snack and the response to some product characteristics displayed as front-of-pack claims

and (2) to investigate whether these two aspects varied between people who did and did not take exercise and between men and women.

The consumers, who were classified according to their physical activity and gender, first completed a questionnaire about motives for cereal bar consumption and then rated their interest in twelve cereal bars which varied in four different combinations of characteristics.

Materials and Methods

Participants

The participants were recruited in Valencia (Spain) and its surroundings. As the recruitment aimed to include exercisers, part of the recruitment was specifically conducted in social environments attended by them: in gyms and the sports facilities of the University of Valencia. The inclusion criteria were: ages between 18 and 50 years, and cereal bar consumers (at least once a week). Participation was entirely voluntary and individual written informed consent was obtained from the participants. Two hundred and forty seven people completed the questionnaire. Responses from 204 were finally included, so that half of the study population were exercisers and half were women, and all the groups had a similar age distribution. The participants received a monetary gift for taking part.

Survey

Sporting or physical activity. The first part of the questionnaire assessed the frequency and type of physical activity undertaken by each consumer. Two questions were selected from different surveys related to energy/physical activity (European Commission, 2014; Gillman et al. 2001; Lowry et al. 2000), with some modifications. Question 1 was: How often do you take exercise or practise a sport for a total of at least 30 min per day? The respondents chose between 7 options: (a) 5 times a week or more, (b) 3 to 4 times a week, (c) 1 to 2 times a week, (d) 1 to 3 times a month, (e) Less often, (f) Never, (g) Don't Know. Question 2 was: Which type of exercise or sport do you do? The possible answers were: (a) basketball, swimming, tennis, cycling, running, football, rugby or similar, (b) toning exercises such as push-ups, sit-ups, weight lifting or similar, (c) Pilates, yoga, walking, moderate cycling, dancing, or similar, (d) other, and (e) none of the above.

To classify the participants, answers (a) and (b) from question 2 were considered vigorous activity and (c) was considered moderate physical activity. The participants were classed as exercisers when they practiced a moderate physical activity 3 or more times a week or a vigorous physical activity at least once a week.

Motives for eating cereal bars. The second part of the questionnaire asked the participants about their reasons for choosing cereal bars as a snack. This part of the questionnaire was designed considering twelve food choice factors. Ten of the factors were adapted from Phan and Chambers (2016a) and Steptoe et al. (1995) as follows: Convenience, Natural content, Weight control, Health, Pleasure/Indulgence, Liking, Social image, Familiarity/Habits, Price and Visual appeal. Additionally, two other factors were included: Energy/physical activity and Satiety. In total 23 items were listed, as each factor could cover more than one item (Table 1).

The participants were asked to "Think about the reasons why you eat or would eat a cereal bar" and then indicate how much

Table 1–Items (23) grouped by the 12 factors used to assess the motives related to cereal bar choice, in response to “When I choose to eat a cereal bar I do it...” (adapted from the Food Choice Questionnaire (Stephens et al. 1995).

Item number	Factors and items
	Factor 1 – Convenience
1	because it is practical and easy to carry
2	because it is easy to store
	Factor 2 – Natural Content
3	because it is natural
4	because it is organic
	Factor 3 – Weight control
5	because it helps me control my weight
6	because it does not make me gain weight
	Factor 4 – Health
7	because it allows me to maintain a balanced diet
8	because it is healthy
	Factor 5 – Energy/physical activity*
9	because it gives me energy
10	because it helps me recover after exercising
	Factor 6 – Satiety*
11	to not feel hungry until the next meal
12	because it is satiating
	Factor 7 – Pleasure/indulgence
13	because I enjoy it
14	in order to indulge myself
15	in order to reward myself
	Factor 8 – Liking
16	because I crave it
17	because I like it
18	because it tastes good
	Factor 9 – Social Image
19	because my friends like it
20	because it is trendy as a snack
	Factor 10 – Familiarity/Habits
21	because it is what I usually eat
	Factor 11 Price
22	because it is affordable
	Factor 12 – Visual Appeal
23	because the presentation is appealing (e.g. packaging)

*Factors added specifically in this study.

they agreed with each of the 23 items using a 5-point scale (1 = strongly disagree, 5 = strongly agree).

Conjoint analysis. To evaluate the interest in cereal bars and perception of their healthiness, four different characteristics (each at 2 levels) were assessed by conjoint analysis: (1) *F*, fruit (“With fruit” or no mention), (2) *P*, protein (“High protein” or no mention), (3) calories (“200 kcal” or “90 kcal”), and (4) *Ch*, chocolate (“With chocolate” or no mention). Illogical combinations of effects were excluded from the model (for example, a cereal bar labelled “With fruit” + “High protein” + “With chocolate” + “90 Kcal”). The 12 logical combinations were *FPCh200*, *FP200*, *FP90*, *FCh200*, *FCh90*, *F90*, *PCh200*, *P200*, *P90*, *Ch200*, *Ch90*, and *90*.

Images of each of the 12 cereal bars were displayed monadically on the screen of an electronic device (Figure 1). For each image, the participants were asked to observe the label displayed on the screen and indicate how much they were interested in the product, using a 7-point scale (1 = I’m not interested at all, 7 = I’m very interested), and how healthy they considered the cereal bar, again using a 7-point scale (1 = not at all healthy, 7 = very healthy).

The scores were collected using a computerized data system (Compusense Five, CSA, Computerized Sensory Analysis System, Compusense Inc., Guelph, ON, Canada).



Figure 1–Two examples of the cereal bar labels presented on the screen. A: sample 1, B: Sample 12.

Data analysis

The mean ratings and significant differences between statements were analyzed through nonparametric analysis by Kruskal–Wallis and Dunn’s tests at a 5% significance level. Kruskal–Wallis analysis was also used to assess the inter-group differences (between male/female and exerciser/nonexerciser subjects).

For each of the four groups considered (grouped by gender and level of exercise), a single factor ANOVA (sample label) was used to analyze the variations in the values for interest in consumption and perception of healthiness elicited by the different cereal bar images presented, and Tukey’s test ($\alpha = 0.05$) was used to determine the significance of differences among values.

ANOVA considering four factors (fruit, chocolate, protein and calories) and their binary interactions was used to obtain the regression models explaining the consumers’ interest and perception of healthiness. The significance of each effect was determined and the utility values of each considered level (fruit, chocolate, high protein, and low calorie) was obtained as the corresponding b-coefficient in the regression model.

Results

Classification of exercisers and nonexercisers

The 204 participants were classified as exercisers ($n = 103$, 52 women) and nonexercisers ($n = 101$, 51 women), depending on the frequency and type of sport or physical activity in which they engaged (see Section “Sporting or physical activity”).

Motives for consuming cereal bars

The level of agreement with reasons for choosing a cereal bar was significantly different across all the participants (Kruskal–Wallis test, $P < 0.001$) (Figure 2). The most prominent motives were those associated with the Convenience and the Pleasure/liking factors. They were followed by the new factors included in this study: Energy/physical activity and Satiety (Table 1).

The analysis of motives by groups of participants (exerciser men, nonexerciser men, exerciser women and nonexerciser women) showed that the opinions of the exercisers did not vary significantly from those of the nonexercisers except for the motives “Because it gives me energy” ($P = 0.027$), “Because it helps me recover after exercising” ($P = 0.010$) and “Because I like it” ($P = 0.039$). Figure 3 shows the percentage of consumers in each

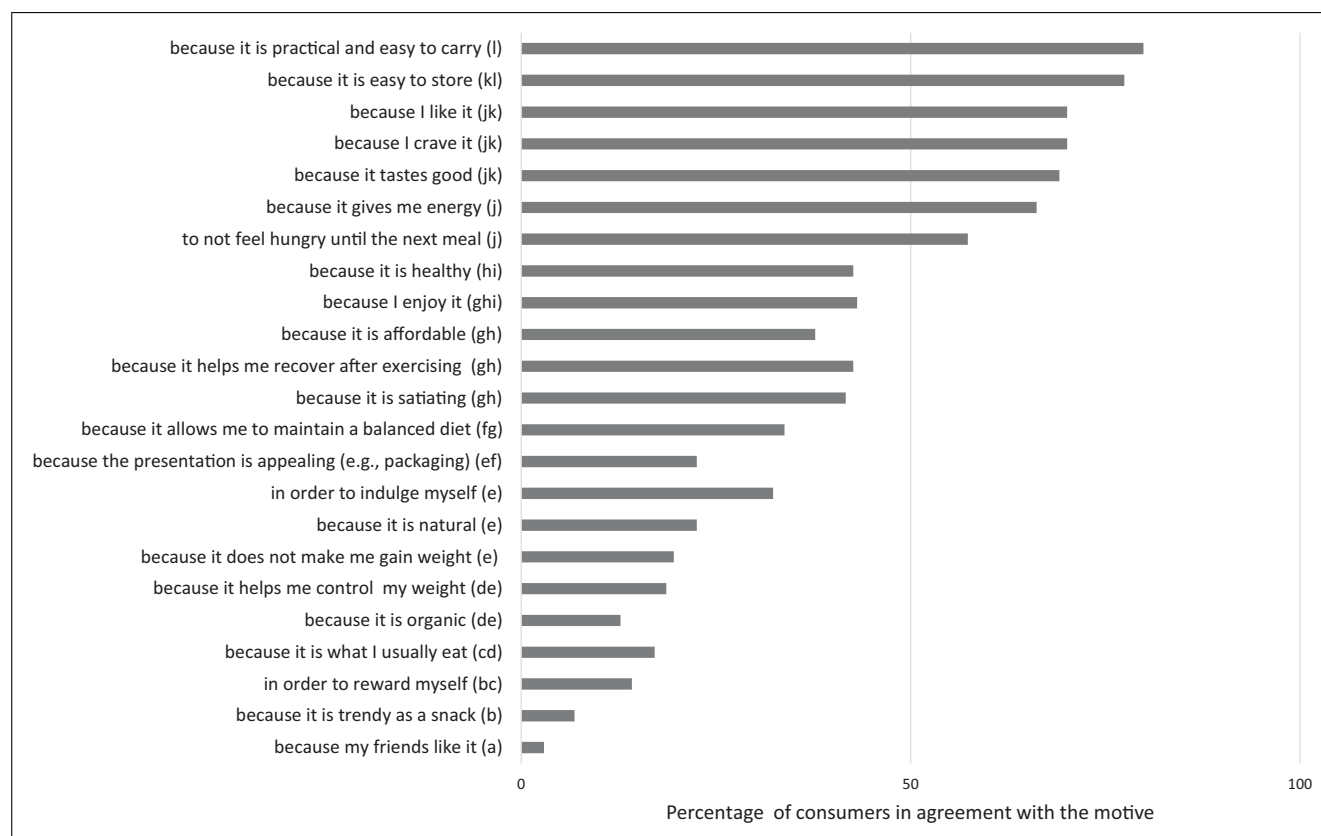


Figure 2—Percentage of consumers in agreement (selected options 4 “agree” and 5 “strongly agree”) with the motives for choosing a cereal bar.

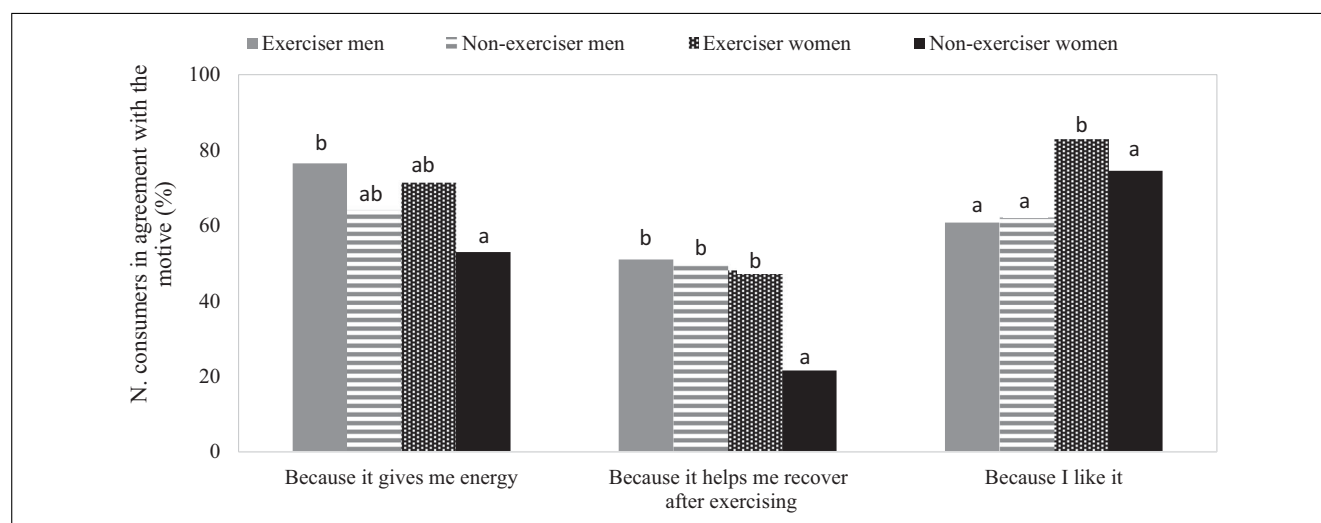


Figure 3—Percentage of consumers that selected options 4 (“agree”) and 5 (“strongly agree”) for the three motives that showed significant differences between the four groups (exerciser men, nonexerciser men, exerciser women and nonexerciser women). Bars not sharing the same letter within the same motive indicate significant differences between groups according to the Dunn’s test at a 5% significance level.

group that selected options 4 and 5 (“agree” and “strongly agree,” respectively) for these three motives.

“Because it gives me energy” was an important motive mentioned by all four groups, but was higher for exercisers than nonexercisers and higher for men than women. Nonexerciser women tended to disagree with the motive “Because it helps me recover after exercising,” while exercisers (men and women) and nonexerciser men presented a high level of agreement with this statement.

Finally, the motive “Because I like it” was more important for women than for men.

Influence of the characteristics displayed on the label (fruit, chocolate, calorie content, and high protein) on interest in the cereal bars

The interest values varied significantly among the 12 image labels (Table 2). Sample *P200* elicited the lowest interest in all

Table 2—Mean values and standard deviations (in parentheses) for interest (7-point scale) in the 12 cereal bar images among the participants, grouped by physical activity and gender.

Characteristics displayed on the cereal bar label*	Grouping factor: Physical activity		Grouping factor: Gender	
	Nonexercisers	Exercisers	Men	Women
FPCh200	4.4 bcde (1.5)	4.7 abc (1.5)	4.5 bc (1.4)	4.6 cde (1.5)
FP200	4.2 efg (1.4)	4.3 de (1.6)	4.2 cdef (1.5)	4.2 fg (1.5)
FP90	4.6 abc (1.5)	4.8 ab (1.5)	4.6 ab (1.6)	4.8 bc (1.5)
FCh200	4.3 def (1.5)	4.3 de (1.7)	4.1 def (1.5)	4.4 ef (1.6)
FCh90	4.9 a (1.3)	4.7 abc (1.7)	4.4 bcd (1.6)	5.1 a (1.4)
F90	4.6 abc (1.4)	4.5 bcd (1.5)	4.3 bcde (1.5)	4.7 cd (1.4)
PCh200	4.7 ab (1.4)	4.6 bcd (1.5)	4.6 ab (1.5)	4.6 cde (1.4)
P200	3.9 g (1.4)	3.9 f (1.6)	4.0 f (1.5)	3.8 h (1.5)
P90	4.3 cdef (1.5)	4.4 cde (1.5)	4.3 bcdef (1.5)	4.4 efg (1.5)
Ch200	4.5 bcd (1.5)	4.4 cde (1.4)	4.4 bcd (1.5)	4.4 def (1.5)
Ch90	4.9 a (1.5)	4.5 a (1.4)	4.8 a (1.5)	5.0 ab (1.4)
90	4.1 fg (1.4)	4.1 ef (1.6)	4.0 ef (1.5)	4.1 g (1.5)

Within each column, mean values that do not share the same letter are significantly different according to a single factor (sample) ANOVA for each population group and a post-hoc Tukey test ($\alpha = 0.05$).

*Information displayed on the front-of-pack labels: F, With fruit; P, High protein; Ch, With chocolate; 90, 90 kcal; 200, 200 kcal.

four groups, while the sample arousing the greatest interest varied depending on the group considered. Sample *Ch90* presented one of the highest interest values in all the groups (Table 2).

To evaluate the impact of each factor ("With fruit," "High protein," "With chocolate," and calorie content) on the participants' interest in consuming cereal bars, ANOVA was applied to obtain the regression model that explained their interest as a function of these factors, firstly across all participants and then by physical activity or gender, comparing the two groups in each pair (exercisers/nonexercisers and men/women).

The interest across all the participants was affected significantly by the four cereal bar front-of-pack information labels studied ($P < 0.001$). Analyzed by groups, interest increased for Fruit, High protein, Chocolate, and Low calorie content, though the magnitude of the effects differed in each group (Figure 4).

The effect of "With fruit" was low although significant for the exerciser and nonexerciser groups ($P = 0.048$ and $P = 0.049$, respectively). Regarding gender, this effect was low and only significant for women ($P < 0.0001$).

The claim *High protein* increased the interest in the cereal bar. The effect was significant for the exerciser ($F = 22.19$, $P = 0.003$), and for the nonexerciser groups ($F = 6.288$, $P = 0.046$), although these F values indicated a stronger effect for active people. Regarding gender, this claim increased the interest of both men and women but the utility values were much higher for men (Figure 4).

Chocolate and *Low calorie* content were the two label claims that most increased the interest in all participant groups (Figure 4). Their impacts had positive and high utility values, and were similar in magnitude. The utility values of both claims were found to be similar for the exerciser and nonexerciser groups, but women showed greater interest than men in both claims (Figure 4).

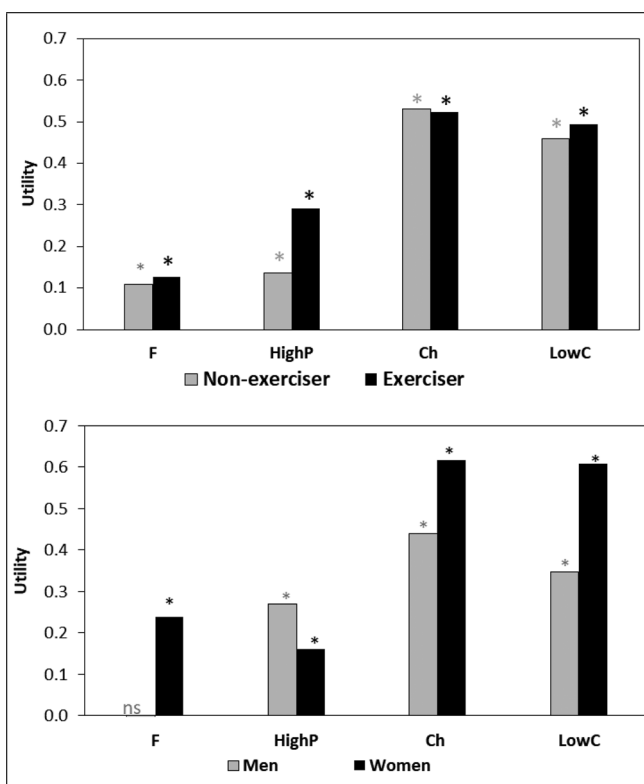


Figure 4—Mean utility values of interest in cereal bars. F: "With fruit"; HighP: "High protein"; Ch: "With chocolate"; LowC: "90 Kcal". On the top of the bars: (*) and (n.s.) indicate that the effect on acceptability was significant and not-significant, respectively, according to ANOVA ($\alpha = 0.05$).

Table 3—Mean values and standard deviations (in parentheses) for perceived healthiness (7-point scale) of the 12 cereal bar images among the participants, grouped by physical activity and gender.

Characteristics displayed on the cereal bar label*	Grouping factor: Physical activity		Grouping factor: Gender	
	Nonexercisers	Exercisers	Men	Women
FPCh200	4.2 de (1.2)	4.0 c (1.2)	4.1 c (1.2)	4.1 ef (1.2)
FP200	4.4 cd (1.3)	4.4 b (1.3)	4.5 b (1.3)	4.3 de (1.3)
FP90	4.9 a (1.3)	5.0 a (1.1)	5.0 a (1.3)	4.9 a (1.1)
FCh200	4.1 ef (1.3)	3.8 c (1.2)	4.0 c (1.3)	3.9 fg (1.2)
FCh90	4.6 bc (1.2)	4.5 b (1.3)	4.5 b (1.2)	4.6 bc (1.3)
F90	4.9 a (1.2)	5.0 a (1.1)	5.0 a (1.2)	4.9 a (1.2)
PCh200	4.2 de (1.4)	3.9 c (1.2)	4.1 c (1.4)	4.0 fg (1.2)
P200	4.4 cd (1.3)	4.5 b (1.3)	4.6 b (1.4)	4.3 de (1.3)
P90	4.7 ab (1.3)	5.0 a (1.2)	4.9 a (1.3)	4.8 a (1.2)
Ch200	3.8 f (1.3)	3.8 c (1.4)	3.9 c (1.3)	3.8 g (1.3)
Ch90	4.4 c (1.2)	4.5 b (1.3)	4.5 b (1.2)	4.4 cd (1.2)
90	4.9 a (1.3)	4.9 a (1.3)	5.0 a (1.3)	4.8 ab (1.2)

Within each column, mean values that do not share the same letter are significantly different according to a single factor (sample) ANOVA for each population group and a post-hoc Tukey test ($\alpha = 0.05$).

*Information displayed on the front-of-pack labels: F, With fruit; P, High protein; Ch, With chocolate; 90, 90 kcal; 200, 200 kcal.

Influence of the characteristics displayed on the label (fruit, chocolate, calories, and protein) on the perception of healthiness

Sample *Ch200* was considered the least healthy while samples *FP90*, *F90*, *P90*, and *90* were chosen as the healthiest alternatives (Table 3). This indicates that healthiness was mainly attributed to a low calorie content and “*With chocolate*” was not associated at all with healthiness.

To evaluate the effect of the four characteristics included in the front-of-pack claims, ANOVA was applied to obtain the regression model explaining the variations in perceived healthiness. Figure 5 shows the mean utility values of these four characteristics.

The effect of the label claim “*With fruit*” was not significant ($F = 2.21$, $P = 0.181$) across all the participants. Among the groups, women were the only one to show a slight association ($F = 5.54$, $P = 0.05$) between “*With fruit*” and healthiness.

High protein had no significant effect ($F = 4.871$, $P = 0.063$) on perceived healthiness across all participants, and its effect differed between groups. For the exercisers the effect was low but significant ($F = 13.717$, $P = 0.008$), while it was not significant ($F = 0.657$, $P = 0.44$) for the nonexercisers, indicating that this claim increased the perception of healthiness for people engaged in sports or physical activities, as hypothesized in this study. By gender, *High protein* was not significant as a factor influencing perceptions of healthiness for men ($F = 2.62$, $P = 0.150$) but was significant for women ($F = 5.91$, $P = 0.045$).

Low calorie content (“90 Kcal”) was the information displayed on the label images that presented the significantly highest positive utility value for the perception of healthiness in all the groups (Figure 5).

With chocolate also presented high utility values, but in this case they were negative. The perceived healthiness decreased because

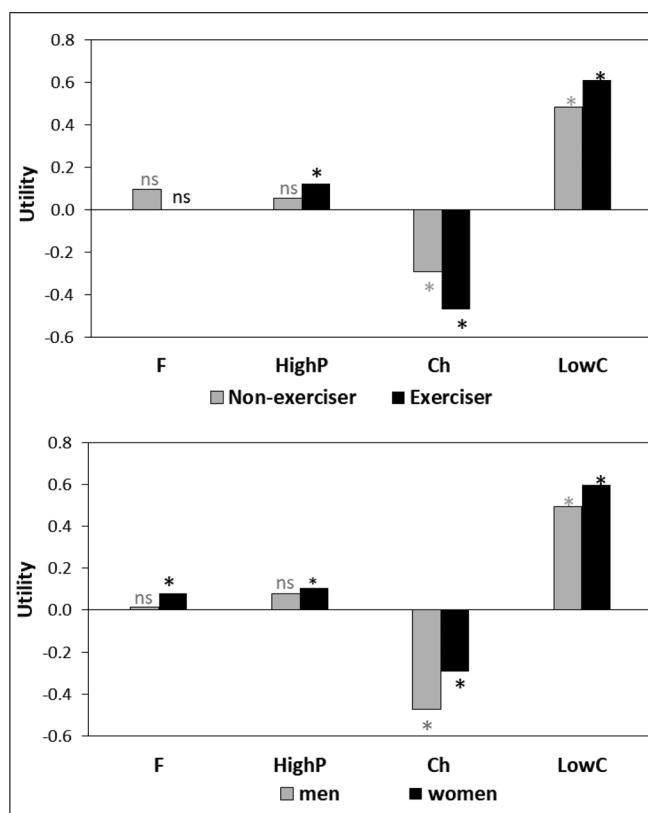


Figure 5—Mean utility values of perceived healthiness of cereal bars. F: “With fruit”; HighP: “High protein”; Ch: “With chocolate”; LowC: “90 Kcal”. On the top of the bars: (*) and (n.s.) indicate that the effect on perception of healthiness was significant and not-significant, respectively, according to ANOVA ($\alpha = 0.05$).

of the *With chocolate* claim in all the groups, but the magnitude of this negative effect was higher for exercisers than for nonexercisers, and higher for men than for women (Figure 5).

Finally, it was interesting to contrast the awareness of perceived healthiness with the interest in choosing a cereal bar. The results showed that it does not matter that people associate “*With chocolate*” with less healthy cereal bars, as all the groups showed interest in choosing the bars with chocolate. This result is in accordance with the results of the survey, where the percentage of participants in agreement with motives related to liking was significantly higher than with motives related to healthiness.

Discussion

Motives for consuming cereal bars

The main motive for consuming cereal bars across all the population groups studied was Convenience (practical, easy to carry and store). This was an expected result, since cereal bars are convenient food items (Roberts, 2009) by nature. Carrillo et al. (2011) identified the convenience factor as the second choice among the nonsensory factors evaluated for healthy eating.

The second motive in importance was Pleasure/liking (liking, craving, and good taste) (Figure 2). Phan and Chambers (2016b) found that liking was the strongest motive that drove people to select a snack for consumption. Previous studies have also reported the importance of these motives in active people: Birkenhead & Slater (2015) suggested that some factors such as convenience and taste are important to athletes (not exactly the exercisers of this study), but it remains unclear whether they place the same degree of importance on these factors as the population in general, although this seemed to be the case in this results.

Importantly, Energy/physical activity and Satiety – the two new motives included in this study – were the next most important motives, especially for exercisers and men (Figure 3). These results would seem to confirm, in part, the present authors’ initial hypothesis that motives related to energy and recovery after exercise would be potential drivers for exercisers to choose cereal bars. However, Pleasure/liking were stronger motives, indicating the relative importance of physical activity-related motives. and women seemed not to be as motivated as men by the physical activity factor. A previous study by Whiteman (2017) stated that physical activity could alter men’s dietary preferences while the dietary preferences of women are likely to remain unaffected by exercise.

Influence of the characteristics displayed on the label (fruit, chocolate, protein, and calorie content) on interest in the cereal bars

The general interest of the participants increased with *Fruit*, *High protein*, *Chocolate*, and *90 kcal* declared on the front-of-pack cereal bar label images, although the magnitude of each factor differed in each group (Figure 4).

In this study, the importance of “*With fruit*” on the label did not differ according to the physical activity of the participants but was higher for women. This particular interest for fruit among women was also highlighted in a clustering study on individual fruit- and vegetable-related perceptions (Simunaniemi, Nydahl, & Andersson, 2013), where women were in the “positive” group regarding fruit consumption whereas men were in the “indifferent” one.

The exercisers found bars labelled “*High-protein*” of more interest than the nonexercisers did (Figure 4). This finding would

imply that physically active people are aware of the benefits of protein (muscle growth and recovering after exercise) and can be related to the interest in this motive found in the first part of this study (Figure 2). According to Van der Zanden et al. (2014), protein is important in the diet of exercisers, and protein-enriched food may be considered a type of functional food. The exercisers’ interest in *High protein* in this study could also be related to their interest not only in muscle growth and recovery but also in the satiating effect of protein (Figure 2). This nutrient is a source of amino acids, which are involved in almost all biological processes, and can lead to a greater sensation of satiety; both benefits help to achieve optimal performance during physical activity (ILSI, 1999; Morell & Fiszman, 2017). Regarding *Satiety*, products perceived as high in protein are expected to provide a higher level of satiety, among other factors (Bilman, van Trijp, & Renes, 2010), which might be related to the interest in *High protein* among the exercisers, who could be aware of this feature of proteins, and also to the satiety motive declared on the questionnaire.

Interestingly, sample *P200* elicited the lowest interest in all four groups, while *P90* aroused the interest of all the groups (Table 2), which indicates that the participants, even exercisers who showed interest in a *High-protein* content in a cereal bar (Figure 4), would not appreciate a high energy content, and it would seem that they do not realize that protein can contribute calories.

These findings highlight the importance of adapting claims to be reliable and informative. In this case, for example, they should not only highlight the benefits of protein, both for recovering after exercise and for delivering satiety, but should also indicate that its energy load is similar to that of sugar.

Chocolate and *Low-calorie* claims on front-of-pack cereal bar labels were the two factors that aroused the highest interest in all the groups (Figure 4).

Regarding *Chocolate*, this is not a surprising result, and it leads to the conclusion that the highest interest among participants is related to the expected sensory characteristics of the product, which in turn is related to pleasure and indulgence (Parker et al. 2006). Other studies on cereal bars using sensory analysis have found that consumers prefer chocolate flavors despite their not being the healthiest option (Arruda Pinto et al., 2017). This result is clearly connected to the finding, in the first part of this study, of a high degree of agreement with cereal bar consumption motives such as “I like it,” “I crave it,” or “It tastes good” (Figure 2).

The high interest in the *90 kcal* options could be related to the motive “Because it is healthy.” Vasiljevic et al. (2015), who studied label preferences for chocolate and cereal bars, found that the respondents rated the chocolate bar as tastier and more desirable in comparison with the cereal bar; however, as a healthy option they chose cereal bars.

This chocolate/low calorie dichotomic interest is the result of very different motives for consumption: chocolate associated with pleasure and enjoyment and low calories associated with being good for the health. A number of studies have reported that consumers are generally not willing to sacrifice sensory pleasure for health benefits (Vidigal et al. 2011).

To sum up: in general, interest in the characteristics displayed on the front-of-pack of the cereal bars studied tended to coincide with that of the general population, except for a higher interest shown by exerciser men in *High protein*, which would indicate that this information can act as a special driver for consumption of this kind of bar by the physically active segment of the population.

Perception of healthiness of the cereal bar samples

Sample *Ch200* was scored as the least healthy by all the respondents. This result clearly showed that a high calorie content along with chocolate (even without knowing the amount) was not considered a healthy option (Table 3).

At the other extreme, four samples containing only 90 kcal (*F90*, *P90*, and *FP90*) were all considered the healthiest (Table 3) highlighting the importance of a low calorie content for consumer perceptions of healthiness. These four samples included “*With fruit*” or “*High protein*” or both or none of these characteristics on their labels, but not chocolate, which indicates that this ingredient is not related to health in the mind of consumers. Similarly, in a study with indulgent cookies, Tarrega et al. (2017) found that the samples considered the healthiest were the cookies that did not contain chocolate, regardless of their calorie content (displayed as nutritional facts). Results along the same lines were obtained by Crofton et al. (2013), who reported that consumers (students, young adults, and older adults) considered a snack healthy when it contained, among other factors, a low level of calories.

The results of this study regarding perceptions of healthiness, combined with those for interest in consuming these cereal bars, reflect the explanation given by Jiraporn et al. (2016): that consumers envision dietary choices as a tradeoff, consuming “virtuous” foods to attain health goals or “vice” foods to indulge.

The present results on the perception of healthiness elicited by the cereal bar labels would appear to indicate that although people who take exercise show some interest in *High protein*, they do not seek to meet these needs through cereal bars, or are able to “sacrifice” this need when they find something more tasty or indulgent, or with a low calorie content.

Finally, it should be noted that a potential—although not central—limitation of this study is that social desirability bias could lead to the participants’ overestimating their level of physical activity in order to appear sporty and fit.

Conclusion

This study confirmed the strong effect of front-of-pack claims concerning food. Conjoint analysis made it possible to identify the signals of preferences elicited by a number of cereal bar characteristics displayed on labels, allowing the expectations of specific consumer segments (exercisers) to be met. A distinctive interest in *High protein* was identified as a potential driver of choice for this specific population group, especially among men, as long as this ingredient did not involve a large rise in calorie content. Conversely, the main interest—apart from low energy—was for *Chocolate*. These preferences were found not only for exercisers but for the whole study population (exercisers and nonexercisers). This clearly indicates, in line with previous results (Hwang et al. 2016), that better strategies are needed to aid consumers (exercisers in the present case) to make good food choices.

The present results do not completely confirm the initial hypothesis that a *High protein* claim would be an important driver of interest and consumption for exercisers because they are aware of their nutrition needs and are health conscious. To correct this situation, Energy/recovering after exercise and Satiety claims associated with protein should probably be explained better and in more detail, to capture the interest of this segment of the population more strongly and so that it is seen as a healthy nutrient, giving a good, strong motive for choosing the product. Further studies could be based on reinforcing information about the role of protein in muscle tissue repair after exercising and about satiety-related items and their impact in different population groups.

Acknowledgements

The authors are grateful to the Spanish Ministry of the Economy and Competitiveness (AGL-2016-75403-R), to the regional government (Generalitat Valenciana Project Prometeo 2017/189), to the COLCIENCIAS (Project 647–2014 “Apoyo a Doctorados Nacionales-Colombia”) Convocatoria para la movilidad internacional de la Univ. Nacional de Colombia 2016 to 2018, and to the Fondo Regional de Tecnología Agropecuaria, FONTAGRO (project ATN/RF-16111 RG) for financial support. They would also like to thank Mary Georgina Hardinge for English language editing assistance.

Authors’ Contributions

Authors Salazar and Tarrega carried out the experiment and performed the statistical calculations. Authors Salazar, Fiszman, and Tarrega wrote the manuscript with support from Orrego.

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