A Preliminary Study for Assessing the Relationship Between Body Image Concern and Health Concern of Consumers of Snack Bars

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Abstract

The relationship between body image concern and health concern has not been extensively studied. In the current study, it was aimed to evaluate this relation based on health-conscious Brazilian individuals, consumers of snack bars. Ninety-nine Brazilian participants, ages 18-55, completed the health consciousness questionnaire (HCQ) and the Body Shape Questionnaire (BSQ). Anthropometric measurements were performed according to established procedures. Health concern (HC) and body image dissatisfaction (BID) were explored as the focus variables in the Focused Principal Component Analysis (FPCA), a graphical method of correlation between a set of variables of interest. BID was higher in individuals more concerned about their body image and individuals with higher waist-hip ratio (WHR) and body fat percentage (BFP) indexes (p<0.05). The clusters made it possible to affirm that there is a close relationship between body image concern and health concern, suggesting that more health-conscious individuals are less dissatisfied with their body image. Health consciousness can contribute to the prevention of severe body image distortions. It is needed to involve policy makers, researchers, industry and government in combating poor food choices and products that deliver false promises to consumers, avoiding serious disorders and public health issues.

1. Introduction

The desire to achieve a normal and culturally acceptable body is often seen as the main driver of food-consumption practices adopted by individuals who are concerned about their body weight [1]. The demand for apparently healthy products such as snack bars is linked more to the pursuit of a desirable silhouette rather than health or well-being concerns [2].

Health-related advertisements sometimes perpetuate the so-called "healthy weight" stereotype that being beautiful and healthy is only achieved by reducing body fat. However, 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 [3-5].

Proven health benefits could lead consumers of snack bars to

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sacrifice price or sensory pleasure for health [6]. Starting from these premises, this study aimed to assess the relationship between body image concern and health concern on consumption of snack bars, using Focused Component Analysis as a graphical method of correlation between a set of variables of interest.

2. Method

2.1. Sample

Since it is an exploratory study, a sample size of 99 participants was deemed appropriate. Participants were recruited via paper flyers distributed on the campus of a large, Brazil, Viçosa public university, online social media advertisements, and snowball sampling, during the winter of 2016.

The criteria for selecting the participants was to consume snack bars at least once a month; therefore, convenience sampling was utilized. Participants were chosen for this work based on past studies showing the tendency of impulsive consumption of caloric bars, motivated by emotional disorders, health concern causing an increase in obesity [6], the influence of front-of-package images and weight loss-related information on purchase intention of snacks bars [2], the development of healthy snacks bars for weight control [7] and indications of health concern and with the body observed in consumers of snack bars [8].

2.2. Instruments

2.2.1. Body Image Concerns

We assessed body image concerns using the Brazilian version of Body Shape Questionnaire (BSQ) [9]. Anthropometric measurements were performed according to established procedures [10]. With Cluster analysis, individuals were differentiated between the variables of the BSQ by the Ward's hierarchical agglomerative method.

2.2.2. Body Image Dissatisfaction

Body image dissatisfaction (BID) was analysed by the silhouettes scale validated for Brazilian adults (Figure 1) [10]. When presented the scale, the participant was asked to answer the following questions: "Which figure better represents your current body, how do you see yourself today?" and "Which figure better represents the body you would like to have?" The difference between the perceived silhouette and the desired silhouette was defined as BID degree.

2.2.3. Health Concern

Before starting the body image evaluation, the participants completed a health consciousness questionnaire (Health Consciousness Scale), in order to evaluate health concern.

The sum of the individual values of each item of the questionnaire of health consciousness was ranged from 0 to 9 [8]. To obtain the values of the explanatory variables (HCS questions), the zero-scale point (0 cm - strongly disagree) to the point marked by the individual on the scale (degree of agreement to the question) was measured by a millimetre ruler. The value of the focus variable (health concern) was obtained from the total sum of the values obtained for each question.

The sum of the individual values of each item of the questionnaire of health consciousness was ranged from 0 to 92. In order for the highest values to correspond to high health consciousness, items 7, 8, 9 and 10 were reversed, subtracting 9 from the score given by the participants. The participants were assigned to three segments, representing low (0 to 47.18), average (47.19 to 76) and high (76.01 to 92) concern for health.
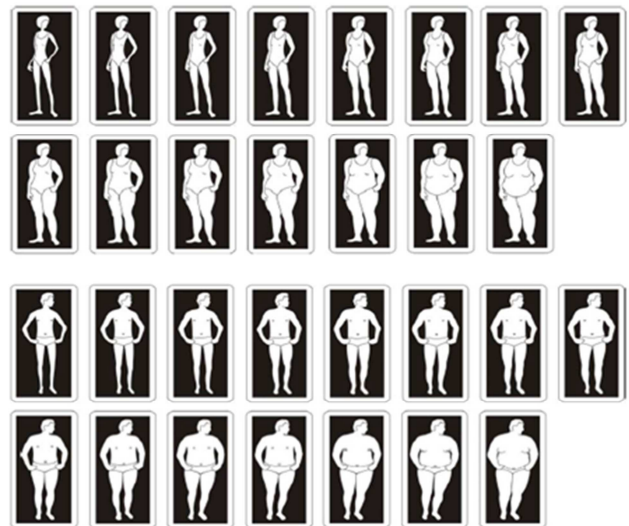

Figure 1. Silhouettes for Brazilian adults. Note: Silhouettes scale displayed in independent cards with width and length of 6.5 centimetres and 12.5 centimetres, respectively [10].

2.3. Exploratory Analysis - Focused Principal Component Analysis (FPCA) with Focus on Body Image Dissatisfaction

General self-esteem has been related to body image dissatisfaction, but most often, they employ simple univariate models for data analysis and interpretation [11]. In this sense, this study also proposed to access the body image dissatisfaction using exploratory techniques such as Focused Principal Component Analysis (FPCA) [12, 13].

Body Image Dissatisfaction (BID) was chosen as the focus variable and it was determined from the difference between the current silhouette (CS) and the desired silhouette (DS), which generated a numerical value, equivalent to the degree

of dissatisfaction. That is, the greater the difference in units, between the current and desired silhouette, the greater the degree of BID. Any value other than zero was attributed to "body image dissatisfaction" (CS - DS ≠ 0).

The other explanatory variables were obtained from bioimpedance measurement (*In Body 230*, Korea): weight (W), fat mass (FM), body mass index (BMI), body fat percentage (BFP), waist-hip ratio (WHR), segmental trunk fat (STF) and muscle mass (MM). The protocol for conducting bioimpedance measurements was followed by all participants.

2.4. Data Analysis

Data processing was done using the Microsoft Excel® program, version 2013, program R (Development Core Team, 2008) and the software Statistical Package for the Social Sciences (SPSS) 20.0®.

3. Results

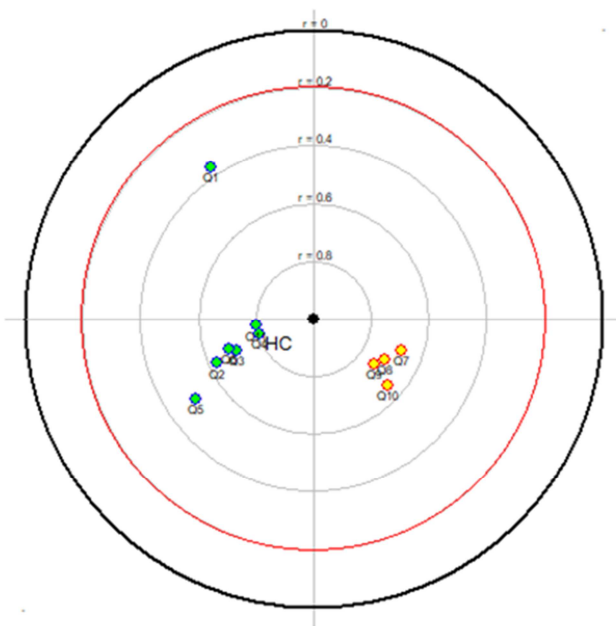## 3.1. FPCA Focused on Health Concern)

Figure 2. FPCA focused on health concern (n = 99). HC – Health concern; Q1 - I have the impression that I sacrifice a lot for my health; Q2 - I consider myself very health conscious; Q3 - I am prepared to live a lot, to eat as healthy as possible; Q4 - I think that I take health into account a lot in my life; Q5 - I think it is important to know how to eat healthy; Q6 - My health is so valuable to me that I am prepared to sacrifice many things for it; Q7 -I have the impression that other people pay more attention to their health than I do; Q8 - I do not continually ask myself whether something is good for me; Q9 - I don't often think about whether everything I do is healthy; Q10 - I don't want to constantly ask myself whether the things I eat are good for me; Q11 - I often dwell on my health. The variables receive different colours according to the type of correlation with the focus variable: yellow (negative correlation) and green (positive correlation). The red line indicates the limit of significance (p <0.05).

In general, individuals showed moderate to high health concerns (76%). The FPCA showed a significant correlation (p<0.05) with the HCS questions (Figure 2). The variables Q7, Q8, Q9 and Q10 have a negative correlation with the focus variable (r>0.6) and therefore receive a yellow colour, that is, the lower the health concern, the greater the agreement with these questions.

The variables Q2, Q3, Q4, Q5, Q6 and Q11 are highly correlated and they form a group, since they are very close in the scatter plot. The visualization of some of the variables becomes difficult due to the proximity between them and the legends generated by the statistical program. Despite this, it is important to note that Q3 and Q6 are closer, indicating a higher correlation between them, i.e., the most health conscious individuals are prepared to live long and make sacrifices if necessary. The proximity of Q3 and Q6 to the other questions indicates that individuals with greater health concern are more aware of their health. On the other hand, the proximity between variables Q8 and Q9 indicates that individuals with less health concern do not often ask themselves if something is good or bad for them, and they do not have the habit of assessing whether their actions are healthy.

The questions Q4 and Q11 are closer to the centre, thus they have higher correlations with the focus variable (r = 0.8), and this shows that the most health-conscious individuals take their health more seriously and frequently focus on it.

Question Q1 is positively correlated with the focus variable, but isolated and segregated from the other groups formed. This indicates that those who are most concerned with health are also the ones who sacrifice the most for it. However, the highest value attributed to this question was 7.8, the lowest value among the questions, indicating that individuals, whether or not concerned about health, do not have the impression that they are totally sacrificing for it.

3.2. FPCA Focused on Body Image Dissatisfaction

The FPCA for BID showed a positive and significant correlation (p<0.05) with BFP, WHR, BFM, BMI, BW and BIC. Individuals with higher percentages of these indexes and with higher BMIs were dissatisfied with their body image. Higher correlation values with the focus variable (r>0.7) were also obtained for the BMI variable, which reflect greater dissatisfaction among individuals who have more body fat and are overweight and/or obese.

3.3. Body Image Concern of Consumers of Snack Bars

Significant differences among the groups were found (p<0.05) in thirty-two of the thirty-four items of the BSQ

(Table 1). The total score (TS) was based on low body image concern (Cluster 1; TS ≤ 110), slight body image concern (Cluster 2; 138≥TS>110) and moderate body image concern (Cluster 3; 167≥TS>138).

Table 1. Averages of the rank scores of the groups obtained by Kruskal-Wallis test, according to the Body Shape Questionnaire (BSQ) items [13].

Items *Cronbach's alpha (αc) = 0.952*	X^2/df	Average rank		
		C1	C2	C3
1. Has feeling bored made you brood about your shape?	15.8	38ᵃ	53ᵇ	73ᵇ
2. Have you been so worried about your shape that you have been feeling that you ought to diet?	56.2	25ᵃ	58ᵇ	88ᶜ
3. Have you thought that your thigs, hips or bottom are too large for the rest of you?	12.0	40ᵃ	53ᵃᵇ	67ᵇ
4. Have you been afraid that you might become fat (or fatter)?	58.8	23ᵃ	59b	88ᶜ
5. Have you worried about your flesh nit being firm enough?	29.5	33ᵃ	54ᵇ	83ᶜ
6. Has feeling full (e.g., after eating a large meal) made you feel fat?	39.4	29ᵃ	57ᵇ	82ᶜ
7. Have you felt so bad about your shape that you have cried?	27.0	41ᵃ	50ᵃ	77ᵇ
8. Have you avoided running because your flesh might wobble?	5.8	47ᵃ	49ᵃ	61ᵃ
9. Has being with thin women made you feel self-conscious about your shape?	45.5	30ᵃ	55ᵇ	88ᶜ
10. Have you worried about your thighs spreading out when sitting down?	29.4	34ᵃ	54ᵇ	78ᶜ
11. Has eating even a small amount of food made you feel fat?	40.4	32ᵃ	54ᵇ	85ᶜ
12. Have you noticed the shape of other women and felt that your own shape compared unfavourably?	19.5	38ᵃ	52ᵃ	78ᵇ
13. Has thinking about your shape interfered with your ability to concentrate (e.g., while watching television, reading, listening to conversations)?	21.6	42ᵃ	49ᵃ	77ᵇ
14. Has being naked, such as when taking a bath, made you feel fat?	54.6	26ᵃ	58ᵇ	86ᶜ
15. Have you avoided wearing clothes, which make you particularly aware of the shape of your body?	25.5	34ᵃ	54ᵇ	78ᶜ
16. Have you imagined cutting off fleshy areas of your body?	20.8	36ᵃ	56ᵇ	66ᵇ
17. Has eating sweets, cakes, or another high calorie food made you feel fat?	52.4	26ᵃ	57ᵇ	90ᶜ
18. Have you not gone out to social occasions (e.g., parties) because you have felt bad about your shape?	16.5	45ᵃ	49ᵃ	69ᵇ
19. Have you felt excessively large and rounded?	36.2	33ᵃ	55ᵇ	80ᶜ
20. Have you felt ashamed of your body?	27.1	35ᵃ	53ᵇ	82ᶜ
21. Has worry about your shape made your diet?	49.1	25ᵃ	59ᵇ	82ᶜ
22. Have you felt happiest about your shape when your stomach has been empty (e.g., in the morning)?	25.8	32ᵃ	57ᵇ	71ᵇ
23. Have you thought that you are the shape you are because you lack self-control?	43.8	27ᵃ	58ᵇ	81ᶜ
24. Have you worried about other people seeing rolls of flesh around your waist or stomach?	54.8	25ᵃ	59ᵇ	87ᶜ
25. Have you felt that it is not fair that other women are thinner than you are?	20.4	43ᵃ	50ᵃ	71ᵇ
26. Have you vomited in order to feel thinner?	8.9	49ᵃ	49ᵃ	57ᵇ
27. When in company have you worried about taking up too much room (e.g., sitting on a sofa or a bus seat)?	6.7	45ᵃ	51ᵃᵇ	60ᵇ
28. Have you worried about your flesh being dimply?	55.5	23ᵃ	62ᵇ	79ᵇ
29. Has seeing your reflection (e.g., in a mirror or shop window) made you feel bad about your shape?	41.7	31ᵃ	55ᵇ	86ᶜ
30. Have you pinched areas of your body to see how much fat there is?	15.7	39ᵃ	51ᵃ	75ᵇ
31. Have you avoided situations where people could see your body (e.g., communal changing rooms or swimming baths)?	21.5	38ᵃ	51ᵃ	81ᵇ
32. Have you taken laxatives in order to feel thinner?	5.4	48ᵃ	50ᵃ	56ᵃ
33. Have you been particularly self-conscious about your shape when in the company of other people?	27.5	35ᵃ	52ᵇ	83ᶜ
34. Has worry about your shape made you feel you ought to exercise?	49.7	24ᵃ	61ᵇ	79ᵇ

Within row, average rank followed by the same letter are not significantly different at p<0.05 according to the Mann-Whitney test, considering completely randomized design, unbalance. P-value adjusted according to the number of comparisons (number of clusters to be compared). Items evaluated by 6-point scale (1 = never; 6 = always), when the lowest averages rank correspond to the lowest concordance. C1: Cluster 1 (n=35), C2: Cluster 2 (n=52) and C3: Cluster 3 (n=12). X^2/df: chi-square difference.

4. Discussion

The results showed high associations with the focus variable, where greater body image concern led to higher degrees of dissatisfaction. Understanding the causes and consequences of these associations is necessary, since studies already point out a relationship between body image concerns and paranoia that can lead people to exacerbate fears of criticism in social interactions and suffer from negative psychological effects such as low self-esteem, poor body image and social isolation [14].

According to Bailey et al. (2017) [15], body image messages in the media usually focus on appearance (e.g., body size and weight) so that customers buy their products to 'feel better' about their bodies. Thus, stereotypical assumptions about body image have been ingrained in many people, which imply that customers might not be primarily focused on health [8]. The literature provides indications that individual who value quality of life and take care of their physical appearance, are more likely to make healthier food choices than less worried individuals are, although these factors are not directly related to health status [16]. In other words, as shown in this study, the most health conscious individuals are prepared to live long and make sacrifices if necessary, but individuals with little concern for health reflect a negligent attitude towards food and health.

Despite the health concern variable being not significant (Figure 3), it cannot be affirmed that health concern does not interfere with the degree of body image dissatisfaction, since

most of the individuals in this sample showed a moderate degree of health concern; it would be interesting the compare carefree and health-conscious individuals in order to evaluate the significance of this association. The concern for health induces healthier food choices, increases perceived well-being and reinforces satisfaction in nutritional choices; there is a greater propensity of the individual to adopt behaviors more protective of their health, because he/she is concerned about having a balanced diet and living a healthy lifestyle [17]. Nevertheless, such concern can also generate greater body image dissatisfaction because the individual is more demanding towards himself/herself and concerned with having a perfect health. On the other hand, little awareness of one's own health can make the individual more likely to follow fads, which consequently interfere negatively on self-image perception, favoring the adoption of trends and diets that promise a perfect body.
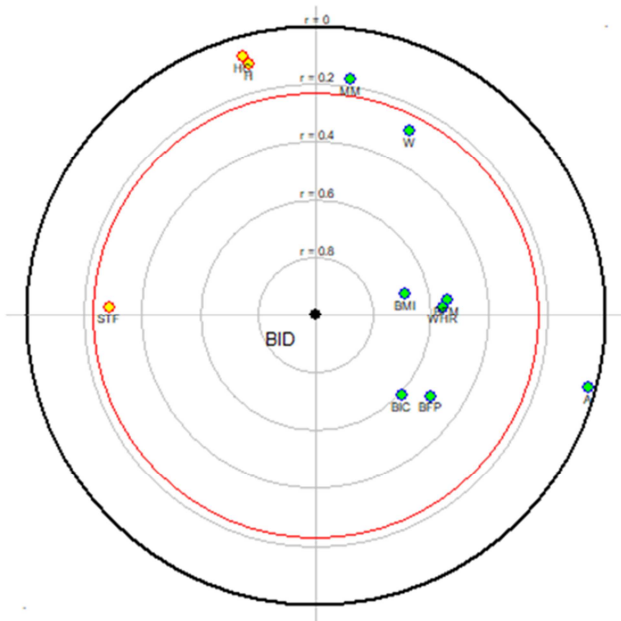

Figure 3. FPCA focused on body image dissatisfaction (n = 99). BID – body image dissatisfaction; H – height; A - age; STF - segmental trunk fat; BMI - body mass index; BFM - body fat mass; MM - muscle mass; W - weight; BFP - body fat percentage; HC– health concern; WHR - waist-hip ratio; BIC – body image concern. The variables receive different colours according to the type of correlation with the focus variable: yellow (negative correlation) and green (positive correlation). The red line indicates the limit of significance (p<0.05).

A study showed that participants with medium to low BMI were more dissatisfied with their body weight and, consequently, focused more attention on figures that portrayed higher body fat [18]. Some individuals in this sample were dissatisfied with their body images due to high BFM, despite having a normal weight. In both cases (low and high body fat mass), this study revealed that the higher the body weight and BFM, the greater the self-image dissatisfaction.

As shown in Figure 3, there is a disparity between BFP and BW, tending to a negative correlation; this is explained by the fact that there were individuals with BFM within the normal range of variation with normal weight and elevated BFP, at the same time as individuals with elevated BFM, normal or elevated weight, and elevated BFP. Therefore, the ratio of BFM to the individual's weight directly interferes with BFP.

From the FPCA, BMI was close to the variables BFM and WHR, forming a group where the correlation between these variables is close to 1. These findings justify the need to incorporate WHR as anthropometric index to predict body image dissatisfaction. WHR is strongly associated with abdominal fat, which, in turn, is associated with an increased risk of developing cardiovascular disease [19]. Several studies have reported that WHR influences the perceptions of women and men attractiveness, and the effects of BMI and WHR on the perceptions of attractiveness are interdependent and should be studied simultaneously rather than in isolation [20, 21].

The limitations of the present study ought to be considered in the assessment of these results. As an exploratory study, the sample size is not representative of the population; for future studies, it is preferred that random data be collected from a cross regional or a cross-national sample in order to enhance generalization. However, the number of respondents was deemed sufficient for an exploratory study of this magnitude.

5. Conclusion

The findings suggest a relationship between body image concern and health concern: health-conscious individuals are less dissatisfied with their body image. Thus, health consciousness can contribute to the prevention of severe body image distortions. More studies on the relationship between carefree and health-conscious individuals can corroborate the validity of the findings.

It is needed to involve policy makers, researchers, industry and government in combating poor food choices and products that deliver false promises to consumers, avoiding serious disorders and public health issues.

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