



Food cravings among Brazilian population



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ABSTRACT

This study aimed to develop and validate a Brazilian version of the Food Craving Inventory (FCI-Br), adapted to the cultural-gastronomic context of Brazil, and to explore this behavior among adult Brazilians. The Study 1 population consisted of 453 adults from all regions of Brazil. Participants responded to a preliminary form of the instrument online. Exploratory factor analysis revealed an FCI-Br presenting 23 items and three factors: High Fat, Sweet Food and Traditional Meal. The FCI-Br overall reliability was considered adequate ($\alpha = 0.82$), as were each of the sub-scales. The food items receiving higher average scores from the application of the instrument were chocolate (3.14 ± 1.28 ; women) and bread (2.94 ± 1.44 , men). A significant association was observed between the specific-craving for Sweet Food and female respondents. Most participants reported experiencing more frequent episodes of food craving when alone (68.0%; $n = 391$) and during the afternoon (32.2%; $n = 127$) or evening (43.8%; $n = 173$) hours. Application of the FCI-Br in a population of 649 university students (Study 2) demonstrated a good adjustment of the model developed according to the Confirmatory factor analysis ($\chi^2/df = 2.82$, CFI = 0.94; TLI = 0.93; RMSEA = 0.06). The current findings indicate that the FCI-Br has adequate psychometric properties to measure craving behavior with respect to specific food groups in the resident population of Brazil. The results of this study also shed light on the importance of considering the cultural diversity of a population when investigating eating behaviors.

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1. Introduction

Food craving is a relatively common behavior, especially among young adults (Pelchat, 2002; Preedy, Watson, & Martin, 2011). From this perspective, one of the most used questionnaires used to evaluate food craving behavior is the Food Craving Inventory (FCI) (White, Whisenhunt, Williamson, Greenway, & Netemeyer, 2002), which assesses cravings directed to specific foods.

Thus, by using the FCI, it is possible to identify possible patterns of foods and/or food groups that are more related to food cravings, allowing a new understanding of the context in which this behavior

is expressed (Nicholls & Hulbert-Williams, 2013; White & Grilo, 2005). For example, cravings for sweet foods and those rich in carbohydrates would tend to be more related to episodes of binge eating, while fatty foods cravings mediate processes related to obesity (Joyner, Gearhardt, & White, 2015).

It has to be said that, depending on the cultural-gastronomic context, there may be significant differences in the types of craved foods (Lobera, Bolanos, Carbonero, & Blanco, 2010; Preedy et al., 2011). For example, although in many western countries there is a prevalence for chocolate craving (Preedy et al., 2011), in Japan the prevalent craving is for rice (Komatsu, 2008) and in Egypt it is for salty types of food (Parker, Kamel, & Zellner, 2003).

In this context, it is also suggested that regional peculiarities can modify even “typical” characteristics of food craving behavior, such as sex differences. Thus, in Western cultures, it is expected that females experienced more chocolate craving than males (Van Gucht, Soetens, Raes, & Griffith, 2014). However, contrary to American individuals, no differences (cultural measures controlled)

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were found in chocolate cravings between Spanish males and females (Osman & Sobal, 2006).

For this reason, the creators of the Food Craving Inventory (White & Grilo, 2005; White et al., 2002) recommend that, depending on the geographical location and cultural aspects/characteristics of the study population, adaptations/adjustments must be made to the instrument, mainly to avoid underestimating results.

Thus, the current study aimed to develop and validate a Brazilian version of Food Craving Inventory (FCI-Br), as well as perform a preliminary characterization of this behavior among Brazilian adults. Based on results from previous studies (Komatsu, 2008; Nicholls & Hulbert-Williams, 2013), we predicted that the FCI-Br would be present substantial differences compared to the original FCI, in order to reflect gastronomic and cultural aspects that characterize Brazil.

2. Materials and methods

2.1. Overview

The study protocol included three phases: Preliminary Study, Study 1 and Study 2. The purpose of the Preliminary Study was to prepare the list of food items that would compose the preliminary version of the FCI-Br. In the Study 1, the goal was to develop the FCI-Br and explore food cravings behavior characteristics of the Brazilian population. Finally, in the Study 2, the validity of the instrument developed during the Study 1 was examined. This protocol was adapted from studies that elaborated the Japanese (Komatsu, 2008) and British (Nicholls & Hulbert-Williams, 2013) versions of the FCI.

A Committee for Research Ethics approved the current study protocol and all of the participants signed informed consent statements (Study 2) or expressed their consent via an electronic platform (Preliminary Study and Study 1), before submitting their answers. Inclusion criteria were having been born in, and living, in Brazil at the time of data collection. Exclusion criteria included being younger than 18 years of age and/or not having fully completed the requested responses to the FCI-Br. Volunteers were recruited through research disclosure on the social network Facebook® and electronic mailing list (Preliminary Study and Study 1) or by personal approach in common areas of the university (Study 2). The study participants did not receive any sort of financial or academic compensation.

2.2. Preliminary Study

To elaborate the Brazilian version, an evaluation of the 25 food items included in the FCI second version (White & Grilo, 2005) were performed. As a result were excluded 10 items (fried chicken, sausage, cinnamon rolls, fried fish, cookies, pancakes or waffles, chips, rolls, cereal, donuts and brownies) not considered to be representative of typical eating habits in Brazil.

Of the remaining food items, two were modified: the option biscuits was converted in two items (cookies and sandwich cookies), and sandwich bread was shortened to just “bread”. Then, similar to the procedure used to develop the original FCI (White et al., 2002), 19 new foods were included on the basis of

literature review about food cravings and Brazilian food habits (açai¹, frosted cake, pastel², hot-dog, shrimp, barbecue, coxinha³, doce de leite⁴, feijoada⁵, goiabada⁶, lasagna, nutella/hazelnut cream, popsicle, popcorn, condensed milk pudding, quibe⁷, salty packaged snacks, sushi/sashimi, sweet pie). Next, the food items list was subjected to a relevance evaluation by two nutritionists and a psychologist.

During 30 days this preliminary version of the FCI-Br was available via the internet using Google™ Docs and were accessed by 259 volunteers (191 females and 68 males).

As the original version (White et al., 2002), the FCI-Br begins with a short definition of food cravings behavior, followed by the question “Over the past month, how often have you experienced a craving for the food listed below?”. Each of the foods listed was evaluated using a five point Likert scale ranging from: “(1) never” to “(5) almost every day”. The total score of each FCI subscale was calculated by adding the scores obtained for each item that comprised it. Participants could also make suggestions of other frequently craved foods, which were not included in the preliminary FCI-Br.

After evaluating the answers, 9 food items (quibe, hot-dog, sushi/sashimi, Popsicle, popcorn, Nutella/hazelnut cream, frosted cake, rice and goiabada) were excluded because they presented higher percentages (>65.0%) of “never” or “rarely” responses, lower percentages (<3.5%) of “almost every day”, and/or were considered less relevant in the Brazilian clinical context of food cravings, by the research team.

According to suggestions from the participants, two food items were renamed (barbecue/grilled meat and feijoada/beans) and 3 new food items (brigadeiro⁸, farofa⁹ and cheese) were added. To be included in the FCI, the food item and/or its ingredients must be readily available throughout Brazil, without any notable seasonal fluctuations.

2.3. Study 1

In this phase, the version of the FCI-Br developed during the Preliminary study phase was made available on-line during 90 days, on the Google™ Docs platform. The study sample consisted of 453 respondents (363 females and 90 males), with an average age

² *Brazilian Pastel* consists of a half-circle or rectangle-shaped thin pastry crust with assorted fillings, fried in vegetable oil. The result is a crispy, brownish fried pie. In Wikipedia: The Free Encyclopedia. Retrieved from https://en.wikipedia.org/wiki/Pastel_%28food%29.

³ *Coxinha* is chopped or shredded chicken meat, covered in dough, molded into a shape resembling a chicken leg, battered and fried. In Wikipedia: The Free Encyclopedia. Retrieved from <https://en.wikipedia.org/wiki/Coxinha>.

⁴ *Doce de Leite* is a confection prepared by slowly heating sweetened milk to create a substance that derives its taste from the Maillard reaction, changing flavour and colour. In Wikipedia: The Free Encyclopedia. Retrieved from https://en.wikipedia.org/wiki/Dulce_de_leche.

⁵ *Brazilian Feijoada* is prepared with black beans and a variety of salted pork or beef products. Feijão is the beans (not only black beans) prepared without the addition of the meat. In Wikipedia: The Free Encyclopedia. Retrieved from https://en.wikipedia.org/wiki/Feijoada#Brazilian_feijoada.

⁶ *Goiabada* is a conserve made of guava and sugar. In Wikipedia: The Free Encyclopedia. Retrieved from <https://en.wikipedia.org/wiki/Goiabada>.

⁷ *Quibe* is a dish made of bulgur (cracked wheat), minced onions and finely ground lean beef with Middle Eastern spices (cinnamon, nutmeg, clove, allspice). The best-known variety is a torpedo-shaped fried croquette. In Wikipedia: The Free Encyclopedia. Retrieved from <https://en.wikipedia.org/wiki/Kibbeh>.

⁸ *Brigadeiro* is a Brazilian delicacy made from condensed milk, powdered chocolate, butter and chocolate sprinkles to cover the outside layer. In Wikipedia: The Free Encyclopedia. Retrieved from <https://en.wikipedia.org/wiki/Brigadeiro>.

⁹ *Farofa* is a toasted cassava flour mixture, though variants are made with manioc flour, and flavors can vary. In Wikipedia: The Free Encyclopedia. Retrieved from <https://en.wikipedia.org/wiki/Farofa>.

¹ “*Açaí in the bowl*” is a dish made of frozen and mashed açai palm fruit. It is served as a smoothie in a bowl or glass and is commonly topped with granola and banana, and/or mixed with other fruits and guaraná syrup. In Wikipedia: The Free Encyclopedia. Retrieved from https://en.wikipedia.org/wiki/A%C3%A7a%C3%AD_na_tigela.

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