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What are the motives underlying Brazilians' food choices? An analysis of the Food Choice Questionnaire and its relationship with different sample characteristics

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Abstract

The first aim of this study was to evaluate the psychometric properties of the Food Choice Questionnaire (FCQ)—using the original model—in a sample of 1480 Brazilian adults (69.5% female). The second aim was to rank the reasons underlying the participants' food choices using average FCQ scores and 95% confidence interval. The third aim was to evaluate the relationship between food choice motives and sample characteristics using multiple logistic regression and odds ratios. The validity, the invariance across different groups, and the reliability of the FCQ were confirmed for the sample. Sensory appeal and price emerged as the most important reasons, while ethical concern was the least valued. The factors associated with greater odds of choosing food for specific reasons were being older, female, and a student; practicing physical activity; dieting frequently; self-rating eating quality as good; having a higher body mass index; and having low income.

Practical Applications

Assessing food choice is a complex task, as it encompasses several factors, such as sensory characteristics, health status, income, culture, lifestyle, and cognitive-affective issues; therefore, the use of appropriate tools should be encouraged. The set analyses followed confirmed that the FCQ was an adequate instrument to evaluate the reasons for food choice of the participants who valued strongly the sensory aspects of the foods and presented specific characteristics (e.g., diet practice) that may influence their decisions. These findings may guide future research and clinical interventions aimed at producing food choices that are more oriented to health and well-being.

1 | INTRODUCTION

The clinical and scientific community has become increasingly interested in individuals' eating behavior, especially in knowing why people eat what they eat, that is, the reasons underlying their food choices (Blake et al., 2021; Sproesser, Moraes, Renner, & Alvarenga, 2019). Food choice is a complex multidimensional construct defined as the process by which people acquire, store, prepare, and consume foods and beverages (Blake et al., 2021). This process encompasses individuals' expectations and attitudes about the sensory characteristics of the food (e.g., taste) combined with the influence of nonsensory (e.g., price) and intro-individual (e.g., familiarity) aspects (Veiga, Johann, Lima, Kaushik, & Mitterer-Daltoé, 2021). According to Blake et al. (2021), food choice addresses a set of decisions—whether conscious or unconscious—taken at the time of purchase, during consumption, or at any instance involving "*what*", "*how*", and "*why*"

people eat. Understanding this process is valuable, as it allows identification of biological, physiological, psychological, cultural, and socioeconomic determinants underlying people's food choices, which can support the development of more assertive actions that encourage behaviors aimed at promoting sustainable healthy diets (Blake et al., 2021; Willett et al., 2019).

Although healthy dietary practices help to prevent a range of noncommunicable diseases and other health-compromising conditions (World Health Organization, 2020), this is not the only reason and often not the main reason that people consider when choosing their food (Heitor et al., 2015; Sobal, Bisogni, Devine, & Jastran, 2006; Steptoe, Pollard, & Wardle, 1995). In practical terms, individuals consider a combination of cognitive and affective aspects, consumption preferences and socioeconomic patterns during the food choice decision-making process (Blake et al., 2021; Franchi, 2012). Therefore, exploring the role of each dimension of food choice is important to understand part of individuals' eating behaviors, which can help in developing actions aimed to promote health, sustainability and social well-being (Blake et al., 2021; Sproesser et al., 2019). Furthermore, knowing how food choices are formulated is important to develop innovation products and consumer-related campaigns aiming to improve food systems (Blake et al., 2021; Gama, Adhikari, & Hoisington, 2018).

A popular tool that researchers employ to investigate food selection determinants is the Food Choice Questionnaire (FCQ). This multidimensional measure was originally developed by Steptoe et al. (1995) in the UK to assess the importance perceived by individuals when making their food choices. Unlike a food frequency questionnaire, the FCQ investigates nine factors that may determine people's food choice. The FCQ has been used in different populations (Cunha, Cabral, Moura, & Almeida, 2018), and a considerable number of studies have investigated its psychometric properties and found models adapted to each culture/sample (Markovina et al., 2015). For example, a seven-factor model was found for a Hungarian sample (Szakaly et al., 2018), an eight-factor model was found in Western Balkan Countries (Milosevic, Zezelj, Gorton, & Barjolle, 2012), and a one-factor model was proposed for samples of nine European countries (Onwezen, Reinders, Verain, & Snoek, 2019). Therefore, there is obvious interest in using the FCQ, but in some contexts this instrument still needs to be better studied.

In Brazil, the FCQ has been rarely used probably because the Portuguese version was only published in 2015 (Heitor et al., 2015). To date, few studies (Heitor, Reichenheim, Ferreira, & Castro, 2019; Marsola, Cunha, Carvalho-Ferreira, & da Cunha, 2020; Souza et al., 2020; Sproesser et al., 2019; Veiga et al., 2021) have applied the FCQ in the Brazilian context, and few (Heitor et al., 2019; Marsola et al., 2020; Veiga et al., 2021) have evaluated its psychometric properties (i.e., factorial and convergent validity, and reliability). Marsola et al. (2020) found an eight-factor model of the FCQ to be adequate for Brazilian data. However, this model is distinct from the structure fitted by Heitor et al. (2019), who also used a Brazilian sample. Therefore, investigating the psychometric properties of the FCQ in Brazil is important, as the results found so far are inconsistent. Furthermore, to our knowledge, no Brazilian study has evaluated the instrument's factorial invariance across different groups. This would be relevant to verify whether the operationalization of the instrument (i.e., the ability to estimate the factors underlying the items) is equal or distinct across groups under different observation conditions (Chen, 2007). As gender (Schliemann et al., 2019; Wardle et al., 2004) and occupation (Gama et al., 2018; Pollard, Steptoe, & Wardle, 1998) of the individuals are important when choosing food, it would be interesting to perform an invariance test in these groups.

Moreover, the international literature (Chen, 2011; Clarke & Best, 2019; Gama et al., 2018; Pearcey & Zhan, 2018; Pollard et al., 1998; Schliemann et al., 2019; Steptoe et al., 1995; Wardle et al., 2004) has investigated the association between food choice and demographic, socioeconomic, behavioral, and anthropometric characteristics, as segments of the population differ in their food selection determinants. Steptoe et al. (1995) showed that gender, age, and income influence people's food choice reasons. Subsequent studies highlighted that women place more importance on food choices for weight control and health (Chen, 2011; Pollard et al., 1998; Veiga et al., 2021), while men for price and convenience (Pearcey & Zhan, 2018; Wardle et al., 2004). Other studies have reported that older consumers place more importance on health, mood, natural content, familiarity, and ethical concerns than younger people (Schliemann et al., 2019). Still, individuals classified as obese give more importance to weight control (Schliemann et al., 2019). Therefore, strategies that aim to promote positive outcomes related to food choice should consider the individual characteristics to develop effective actions (Gama et al., 2018; Souza et al., 2020). In Brazil, the relationship between food choice—assessed using a psychometric instrument—and individual characteristics is limited, which opens the space for this investigation.

The aims of this study were (1) to evaluate whether the psychometric properties of the original FCQ model are adequate for a sample of Brazilian adults in terms of factorial, convergent, and discriminant validity, invariance, and reliability; (2) to determine the rank order from the most to the least important motive for the participants' food choice using the FCQ factors; and (3) to identify whether demographic, socioeconomic, behavioral, and anthropometric characteristics of the participants may influence their food choice motives.

2 | MATERIALS AND METHODS

2.1 | Sampling

This was a cross-sectional study. As there are several guidelines to define the sample size and these are not consensual, we decided to use 10 respondents for each parameter estimated in the FCQ factorial model. According to Hair Jr, Black, Babin, and Anderson (2019), this is a generally accepted reason to minimize problems with deviations from normality data. Considering the FCQ structure (i.e., 36 items, 36 items errors, nine factors, and 36 covariance between factors) the sample size—to produce a more stable solution—was defined as 1170 individuals.

2.2 | Participants and procedures

The sample was nonprobabilistic and included both female and male individuals of different ages and income ranges recruited at São Paulo State University (UNESP), Brazil. Only Brazilians over 18 years-old, literate, and who make their own food choice decisions could participate. Pregnant women, blind, elderly (>60 years), individuals in medical treatment for severe diseases (e.g., cancer) and those who self-reported having received a diagnosis (last 12 months) for chronic diseases (e.g., diabetes) were not allowed to participate.

Individuals were invited to participate in the study through professional networks, word-of-mouth in public areas of the university, and via social media (e.g., *Facebook* and *Instagram*), where the aim of the study was briefly described. Thus, the sample included students, staff, professors, and the nonacademic community. Before the fieldwork started, four researchers were trained to conduct data collection. This involved maintaining the same wording to explain the aims and ways of participating and completing the survey.

People interested in the research went to a designated place at the university and received detailed information about the study. All individuals who agreed to participate gave written informed consent, and the study was conducted in accordance with the Helsinki Declaration. Ethical approval was given by the university where the study was developed (C.A.A.E.:88600318.3.0000.5416). The volunteers did not receive any incentive or reward for participation.

Data collection took place between March 2018 and December 2019, from Monday to Friday, at a time defined according to the convenience between the researcher and participant. The individuals completed the research at the University's behavioral nutrition laboratory (UNESP)—using paper-and-pencil—without the presence of the researcher. The laboratory held a maximum of five people seated. The first section of the survey gathered demographic, socioeconomic, dietary practices and perceptions, lifestyle, and anthropometric (weight and height) information, and the second consisted of the items of the FCQ. The time to answer the survey was approximately 10 min and at the end, the volunteer handed the questionnaire to the researcher outside the laboratory.

2.3 | Instrument

The FCQ was developed originally in the English language with 36 items to assess nine determinant aspects of people's food choices, namely: health, mood, convenience, sensory appeal, natural content, price, weight control, familiarity, and ethical concern (Steptoe et al., 1995). Each individual is invited to complete the questionnaire endorsing the statement "*It is important to me that the food I eat on a typical day…*" for each item (e.g., item 26: "*…helps me relax*") by choosing between four responses (1 = not at all important, 2 = a little important, 3 = moderately important, and 4 = very important). The score is calculated for each factor based on the unweighted average. Higher scores indicate that the participant placed greater importance on that factor. The Brazilian Portuguese version of the questionnaire (Heitor et al., 2015) was applied in the present study.

2.4 | Data analysis

Participants were instructed to complete all survey data, therefore, there was no missing data. Mean, median, mode, standard deviation, skewness, and kurtosis were calculated for each item of the FCQ. The absence of a severe violation of the assumption of normality of data distribution was guaranteed for absolute values <3 and 7, respectively, for skewness and kurtosis (Hair Jr et al., 2019; Marôco, 2021).

The psychometric properties of the FCQ nine-factor model (original) were evaluated by different analyses. First, we performed a Confirmatory Factor Analysis (CFA) as recommended by Anastasi (1988) and described by Marôco (2021) for instruments with a theoretical model defined a priori (i.e., previously published dimensionality). CFA allows testing whether a predefined factor structure is valid for a new sample from the same or similar population (Kline, 2016; Marôco, 2021). The method compares estimated variances and covariances of the model, inferred by the factor structure under study, with the variance and covariance matrix observed in the sample (Kline, 2016; Marôco, 2021). In this study, the CFA aimed to evaluate the goodness of fit of the FCQ model to data. Several estimation methods can be used to fit and test the model (for a detailed discussion see Kline, 2016 and Marôco, 2021). In this study, we used the Weighted Least Squares Mean and Variance Adjusted (WLSMV) method, which is often recommended for items measured on categorical data (e.g., 4-point *Likert*-type response scale used in the FCQ; Kline, 2016; Marôco, 2021). The goodness of fit of the model is generally judged from a set of indices that compare the fit of the proposed model with the fit of an independence model (i.e., with all null covariances; Marôco, 2021). For this, the Comparative Fit Index (CFI) and the Tucker-Lewis Index (TLI) are the most used (Marôco, 2021; Schreiber, Nora, Stage, Barlow, & King, 2006). Other indices are estimated from the residuals of the model to evaluate how well it fits a population (see Schreiber et al., 2006). For this, the Root Mean Square Error of Approximation (RMSEA) with 90% confidence interval (CI90%) and the Standardized Root Mean Square Residual (SRMR) are the most used (Marôco, 2021; Schreiber et al., 2006). The fit of the FCQ model to the data was considered good when CFI and TLI > 0.95, RMSEA <0.08, and SRMR <0.07 (Hu & Bentler, 1999; Schreiber et al., 2006). Furthermore, the factor loading (λ) of each FCQ item was estimated to show their degree of correspondence with the factor, with values >0.50 indicating adequacy (Hair Jr et al., 2019).

After, convergent and discriminant validities were investigated. The convergent validity was investigated to assess whether the set of items for each FCQ factor represents it well (Marôco, 2021). For that, the average variance extracted (AVE) was calculated for each factor using the factor loadings of the items found in the CFA (Fornell & Larcker, 1981; Marôco, 2021). When AVE values >0.50 were found, the convergent validity was confirmed (Fornell & Larcker, 1981; Hair Jr et al., 2019; Marôco, 2021). The discriminant validity was investigated to assess whether the items representing a factor are not strongly correlated with different factors (Marôco, 2021). For that, the determination coefficients (r^2) for each pair of correlated factors were calculated. When r^2 values were lower than the AVE values of the correlated factors, the discriminant validity was established

(Fornell & Larcker, 1981; Hair Jr et al., 2019). Reliability of each FCQ factor was also investigated to ensure the consistency of the measure, that is, whether the instrument reliably measures the factor of interest. For that, the ordinal alpha (α) and omega (ω) coefficients were calculated (Dunn, Baguley, & Brunsden, 2014; Gadermann, Guhn, & Zumbo, 2012). Values between 0.70 and 0.95 represented "satisfactory to good" reliability levels (Hair Jr et al., 2019).

The last stage for psychometric evaluation of the FCQ was the invariance test. This aimed to evaluate whether the FCQ factorial model was equivalent (i.e., with similar theoretical meanings) across different groups, allowing comparison between them. Two invariance tests were performed: one across gender (female vs. male) and another across occupation (students vs. nonstudents) of the participants. For that, we used stepwise multi-group CFA that distinguishes levels of measurement as follows: (a) Configural—assessing whether the set of factors and items are the same across the groups (baseline); (b) Metric—assessing whether the items are measured according to the same scale units (i.e., loadings) across groups; (c) Scalar—assessing whether the items are measured according to the same scale units and locations (i.e., thresholds) across groups; (d) Strict—assessing whether the interrelationships among the factors (i.e., residuals) are the same across groups. Then we compared the difference (Δ) in the values between models for CFI and RMSEA indices following Chen's (2007) recommendations for sample size >300. This author reports that there is invariance when a change of <−0.01 is found in CFI, supplemented by a change of <0.015 in RMSEA. When all values were within the cutoffs, the FCQ model has a strong invariance.

Next, the average scores for each FCQ factor were calculated and compared using 95% confidence interval (CI95%), which allowed us to ascertain the participants' reason for food choice. Afterwards, the participants were grouped into two categories according to their average scores on each factor. The categories were: (1) motive of less (<3.00) and (2) greater (≥3.00) importance to food choice. We selected this cutoff because this was the median value for FCQ items in our sample. This strategy also was used in the original study (Steptoe et al., 1995) of the FCQ to compare groups. Thus, the likelihood of the participants to be or not in a particular category for each FCQ factor (dependent variables)—based on age (reference category [rc]: ≥ 31 years), gender (rc: female), occupation (rc: student), practice of physical activity (rc: yes), dieting frequency for body change (rc: often), self-rated eating quality (rc: good/excellent), anthropometric nutritional status (rc: obesity), and economic level (rc: high) (independent variables)—was determined using multiple logistic regression. This is a technique that uses criterion variables with two categories and predictor variables that can be quantitative or qualitative. The natural log of ratio of the proportion of one category (p) versus the other (1-p, called the logit) is regressed on a linear combination of the k predictor variables. Thus, the model allows testing the significance of predictors in explaining the logit variation of the criterion variable, as in the traditional linear regression model (Marôco, 2021). The odds ratio (OR) was calculated with CI95%. The Exponential of the beta regression coefficients is the OR of the associated variable. It estimates the change in the odds of getting the category of interest vs. the other category of the dichotomic criterion variable per unit of the predictor variable (Marôco, 2021). The significance level used was of 5%.

Analyses were performed using SPSS Statistics for Windows, version 22.0 (Armonk, NY: IBM Corp.) and RStudio, version 1.3.1073 (R Core Team, 2009–2020) with the lavaan (Rosseel, 2012), semTools (Jorgensen, Pornprasertmanit, Schoemann, & Rosseel, 2020), and psych (Revelle, 2019) packages.

3 | RESULTS

A total of 1480 individuals participated in the study (69.50% female). The average age was 25.12 (SD = 6.18, minimum = 18, maximum = 53) years. The average body mass index (BMI) was 24.43 (SD = 4.73, minimum = 13.15, maximum = 57.09) kg/m^2. Details about the sample characterization are provided in Table 1. Table 2 presents the descriptive statistics of the responses to the FCQ items and the factorial loadings found in the CFA. Data distribution was normal (i.e., adequate psychometric sensitivity), and no item had a factor loading below 0.50 (λ: minimum = 0.68, maximum = 0.97).

The results of factorial validity showed adequate indices for the FCQ nine-factor model in the total sample (CFI = 0.96, TLI = 0.95, RMSEA = 0.07 [CI90% 0.06–0.07], SRMR = 0.05). In the same direction, the convergent (AVE = 0.69–0.82) and discriminant validity (r^2 = 0.005–0.484) of the FCQ factors were adequate for the data (see Table 2). Regarding the reliability of the FCQ factors, all had adequate values in both alpha (α = 0.85–0.94) and omega coefficients (ω = 0.77–0.92).

With regards to invariance, we first ensured that the fitted model for the total sample was also adequate for female (CFI = 0.97, TLI = 0.96, RMSEA = 0.06 [CI90% 0.06–0.07], SRMR = 0.05, λ = 0.69–0.98), male (CFI = 0.95, TLI = 0.95, RMSEA = 0.06 [CI90% 0.06–0.07], SRMR = 0.07, λ = 0.66–0.97), students (CFI = 0.97, TLI = 0.96, RMSEA = 0.06 [CI90% 0.06–0.07], SRMR = 0.06, λ = 0.63–0.99) and nonstudents samples (CFI = 0.96, TLI = 0.96, RMSEA = 0.07 [CI90% 0.06–0.07], SRMR = 0.06, λ = 0.73–0.97). Next, we performed the multigroup analysis and the data are shown in Table 3. The FCQ nine-factor model exhibited strong invariance across females and males and across students and nonstudents.

Figure 1 shows the average scores and the confidence intervals for each FCQ factor. Sensory appeal (3.47 [CI95% 3.44–3.51], SD = 0.61) was the most important reason for the participants' food choice, and price (3.30 [CI95% 3.26–3.33], SD = 0.69) was the second most important. Subsequently, the importance of food choice was equally attributed to health (3.08 [CI95% 3.05–3.12], SD = 0.71) and convenience (3.07 [CI95% 3.03–3.11], SD = 0.82). Afterward, mood (2.81 [CI95% 2.77–2.85], SD = 0.83) and natural content (2.72 [CI95% 2.68–2.77], SD = 0.89) were similarly important for food choice, as well as natural content and weight control (2.65 [CI95% 2.61–2.70], SD = 0.94), and weight control and familiarity (2.58 [CI95% 2.54–2.62], SD = 0.81). Ethical concern (2.15 [CI95% 2.10–2.20], SD = 0.89) was the least important reason for food choice.

TABLE 1 Characteristics of the sample

Characteristic	Sample *n* (%)
Age	
18–20 years	373 (25.2)
21–25 years	569 (38.4)
26–30 years	270 (18.3)
31 years and more	268 (18.1)
Gender	
Male	451 (30.5)
Female	1029 (69.5)
Marital status	
Single	1207 (81.6)
Married	241 (16.3)
Divorced	31 (2.0)
Widowed	1 (0.1)
Occupation	
Student	802 (54.2)
Nonstudent	678 (45.8)
Race	
Asian	35 (2.4)
White	1096 (74.1)
Mixed	281 (19.0)
Black	68 (4.5)
Physical activity practice	
No	624 (42.2)
Yes	856 (57.8)
Have you ever been dieting to body change?	
Never/rarely	452 (30.5)
Sometimes	693 (46.8)
Often	335 (22.7)
How do you assess the quality of your daily eating?	
Poor/regular	504 (34.1)
Normal	507 (34.3)
Good/excellent	469 (31.6)
Anthropometric nutritional status	
Underweight	60 (4.1)
Normal weight	891 (60.2)
Overweight	356 (24.1)
Obesity	173 (11.6)
Schooling of the head of the family	
Incomplete elementary school	45 (3.0)
Primary school only	102 (6.9)
Junior school only	163 (11.1)
High school	514 (34.7)
University	656 (44.3)
Economic level (average household income[a])	
Very low (R$ 813.56)	13 (0.9)
Low (R$ 2424.19)	276 (18.6)
Middle (R$ 7938.67)	773 (52.2)
High (R$ 22716.99)	418 (28.3)

Note: 1 USD = 5.58BRL—exchange rate in October 2021 (https://www.bcb.gov.br/conversao).
[a]Brazilian Criteria 2020.

Table 4 presents the relationships found between the independent variables and the FCQ factors. For age, older people were more likely than younger to choose foods for reasons of health (p = .001–.017), natural content (p < .001), weight control (p = .001–.018), and ethical concern (p = .013–.041). Females were more likely than males to choose foods for motives of health (p = .025), mood (p < .001), convenience (p < .001), sensory appeal (p = .009), natural content (p < .001), weight control (p < .001), familiarity (p = .006), and ethical concern (p = .011). The students were more likely than the participants who reported having another occupation to choose foods for convenience (p = .015) and price (p = .032). In contrast, students were less likely to choose foods due to natural content (p = .005), weight control (p = .024), and ethical concern (p = .045). Individuals who practiced physical activity were more likely to choose foods for motives of health (p = .011), natural content (p < .001), and weight control (p < .001).

Still, people who reported dieting frequently to promote body change were more likely to choose foods for motives of health (p < .001), mood (p = .040), convenience (p = .019, p = .024), and weight control (p < .001), and less for sensory appeal (p = .003, p = .004) and ethical concern (p = .008). The individuals who rated their eating as good/excellent were more likely to choose foods for motives of health (p < .001) and natural content (p < .001) and less for convenience (p < .001) and sensory appeal (p = .029). For anthropometric nutritional status, participants classified as obese when compared with the other groups were more likely to choose foods for mood (p = .001–.010), sensory appeal (p = .025), natural content (p = .033), weight control (p = .001), familiarity (p = .018, p = .002), and ethical concern (p = .031, p = .005). Finally, higher-income people were less likely to choose foods for convenience (p = .029), price (p = .002, p < .001), weight control (p = .017), and ethical concern (p = .009, p = .036).

4 | DISCUSSION

Due to the complexity of evaluating food choice, the use of appropriate tools is essential. Thus, the first aim of this study—to present data on the validity, invariance, and reliability of the original FCQ model to the Brazilian sample—confirmed the adequacy of the instrument used. The second aim helped to rate the reasons with greater and lesser importance for participants' food choices and could assist development of interventions and campaigns to change dietary practices, especially regarding sensory characteristics of foods. From the third aim, significant relationships were found between food choice and sample characteristics, which indicates the groups that need more attention. These findings can guide researchers, health practitioners, policymakers, and others to understand and improve people's food choices.

The first aim of this study was to examine the psychometric properties of the FCQ in a Brazilian sample. Although this is well documented in Europe (Cunha et al., 2018), in Latin America, especially in Brazil, few studies have attempted to test this instrument. Our study

TABLE 2 Descriptive statistics of items of the Food Choice Questionnaire, factorial loadings, average variance extracted, and reliability of data

Factor	Item	Mean	Median	Mode	*SD*	Skewness	Kurtosis	λ	AVE	α	ω
Health	22	3.07	3.00	3.00	0.89	−0.62	−0.47	0.85	0.71	0.93	0.91
	29	3.36	4.00	4.00	0.79	−1.07	0.43	0.91			
	10	3.32	4.00	4.00	0.80	−1.00	0.32	0.93			
	27	2.87	3.00	3.00	0.91	−0.33	−0.77	0.74			
	30	2.86	3.00	3.00	0.97	−0.34	−0.96	0.82			
	9	3.01	3.00	3.00	0.91	−0.52	−0.65	0.81			
Mood	16	2.74	3.00	4.00	1.07	−0.27	−1.19	0.89	0.71	0.92	0.92
	34	2.69	3.00	4.00	1.08	−0.21	−1.25	0.94			
	26	2.78	3.00	4.00	1.05	−0.31	−1.14	0.92			
	24	2.53	3.00	3.00	1.04	−0.03	−1.18	0.68			
	13	2.85	3.00	3.00	1.01	−0.43	−0.95	0.83			
	31	3.25	3.00	4.00	0.87	−1.02	0.26	0.79			
Convenience	1	3.17	3.00	4.00	0.91	−0.80	−0.37	0.93	0.82	0.94	0.90
	15	3.09	3.00	4.00	0.94	−0.66	−0.65	0.97			
	28	3.04	3.00	4.00	0.96	−0.59	−0.76	0.92			
	35	2.93	3.00	4.00	1.02	−0.55	−0.87	0.83			
	11	3.10	3.00	4.00	0.94	−0.74	−0.47	0.86			
Sensory appeal	14	3.45	4.00	4.00	0.73	−1.22	0.90	0.90	0.76	0.92	0.89
	25	3.37	4.00	4.00	0.79	−1.09	0.46	0.92			
	18	3.38	4.00	4.00	0.79	−1.15	0.71	0.92			
	4	3.69	4.00	4.00	0.56	−1.86	3.36	0.75			
Natural content	2	2.59	3.00	2.00	1.02	−0.02	−1.14	0.85	0.80	0.92	0.77
	5	2.96	3.00	3.00	0.92	−0.44	−0.81	0.94			
	23	2.62	3.00	2.00	1.01	−0.03	−1.12	0.89			
Price	6	3.25	3.00	4.00	0.81	−0.83	−0.03	0.92	0.76	0.89	0.85
	36	3.19	3.00	4.00	0.86	−0.73	−0.38	0.90			
	12	3.46	4.00	4.00	0.71	−1.24	1.19	0.79			
Weight control	3	2.54	2.00	2.00	1.02	0.01	−1.12	0.91	0.82	0.93	0.86
	17	2.67	3.00	3.00	1.05	−0.19	−1.17	0.91			
	7	2.75	3.00	3.00	1.01	−0.24	−1.08	0.90			
Familiarity	33	2.92	3.00	3.00	0.91	−0.47	−0.60	0.84	0.69	0.85	0.82
	8	2.79	3.00	3.00	0.98	−0.32	−0.93	0.87			
	21	2.03	2.00	1.00	1.02	0.66	−0.70	0.77			
Ethical concern	20	1.87	2.00	1.00	1.00	0.87	−0.40	0.89	0.79	0.88	0.87
	32	1.88	2.00	1.00	1.06	0.90	−0.51	0.92			
	19	2.70	3.00	4.00	1.05	−0.19	−1.19	0.84			

Abbreviations: λ, factorial loading; α, ordinal alpha coefficient; ω, omega coefficient; AVE, average variance extracted.

showed adequate factorial validity of our data to the original FCQ model. This result corroborates in part with the literature, since some studies have found that the original model is adequate (Dikmen, İnan-Eroğlu, Göktaş, Barut-Uyar, & Karabulut, 2016; Heitor et al., 2019; Januszewska, Pieniak, & Verbeke, 2011; Markovina et al., 2015) while others contradict it (Eertmans, Victoir, Notelaers, Vansant, & Van den Bergh, 2006; Marsola et al., 2020; Milosevic et al., 2012; Szakaly et al., 2018). These differences may be associated with the fact that eating is strongly influenced by the cultural context between and within countries (Cunha et al., 2018; Pearcey & Zhan, 2018). In Brazil, Heitor et al. (2019) fitted the FCQ to a sample of 502 adults of both genders after allowing covariance between two pairs of residual items. On the other hand, Marsola et al. (2020) excluded five items from the FCQ and reorganized the distribution of the remainder into eight factors to fit the instrument in a sample of 525 adults of both genders. Unlike these studies, our research did not change the FCQ factorial

TABLE 3 Fit measures for measurement invariance of the Food Choice Questionnaire across gender (female vs. male) and occupation (students vs. nonstudents) of the participants

		Gender				Occupation			
Invariance	**Constraints added**	**CFI**	**ΔCFI**	**RMSEA**	**ΔRMSEA**	**CFI**	**ΔCFI**	**RMSEA**	**ΔRMSEA**
A. Configural	Baseline no-constraints								
B. Metric	Factor loadings	0.964	0.000	0.062	0.001	0.963	0.001	0.063	0.001
C. Scalar	Thresholds	0.964	0.001	0.063	−0.002	0.964	−0.001	0.064	−0.002
D. Strict	Residuals	0.965	0.001	0.061	−0.001	0.963	0.000	0.062	−0.001

Abbreviations: Δ, difference between comparison models; CFI, comparative fit index; RMSEA, root mean square error of approximation.

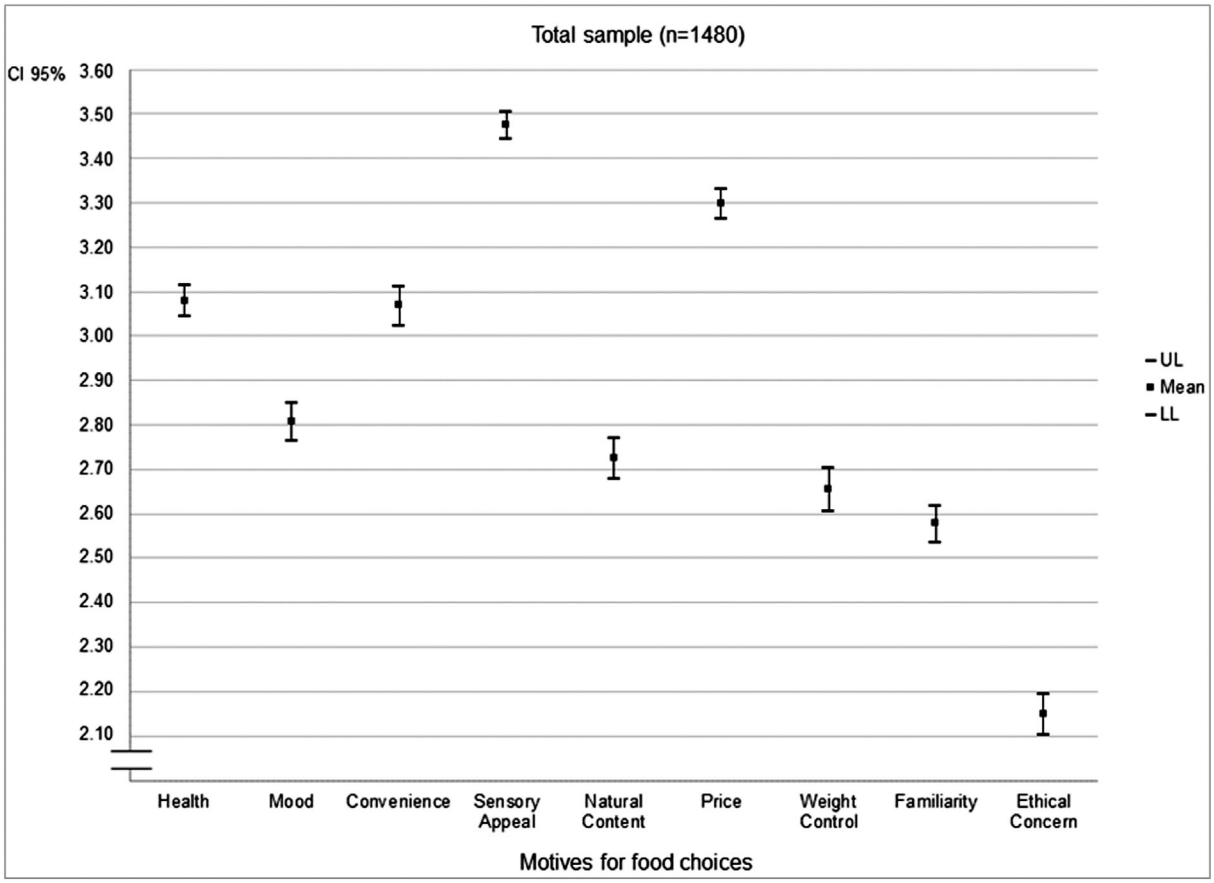

FIGURE 1 Confidence intervals for each factor in the Food Choice Questionnaire according to the mean scores. [C] 95%, 95% confidence interval; UL, upper limit; LL, lower limit

model. The larger sample size employed in our study may explain these disparities. Moreover, Marsola et al. (2020) used a seven-point response scale instead of four as originally proposed, which makes direct comparison of results unfeasible. Cunha et al. (2018) conducted a systematic review on 71 studies that applied the FCQ and found that more than 60% of the articles changed the response scale of the instrument, which could explain the disagreement.

The adequate convergent and discriminant validity of the FCQ factors found in our study corroborates others (Eertmans et al., 2006; Pieniak, Verbeke, Vanhonacker, Guerrero, & Hersleth, 2009; Veiga et al., 2021) with similar results. However, these studies used different methodologies and heterogeneous factorial structures of the FCQ, which requires caution in comparisons. Corroborating our findings, Veiga et al. (2021) also found in a sample of Brazilian adults good values of AVE in all FCQ factors. Furthermore, previous works (Januszewska et al., 2011; Steptoe et al., 1995) support our discovery of low and medium correlations between the factors of the FCQ confirming the discriminant validity. Previous studies (Januszewska et al., 2011; Markovina et al., 2015; Pieniak et al., 2009) have evaluated invariance of the FCQ across different countries; however, to our knowledge, none of them compared female vs. male and students vs. nonstudents. We found strong invariance across all groups

TABLE 4 Multiple logistic regression estimates for characteristics of the participants (independent variables) influencing food choices (dependent variables)

Characteristic (x)	Motives for food choice[a] (y)								
	Health $\alpha = -2.315$	Mood $\alpha = -.674$	Convenience $\alpha = -.674$	Sensory appeal $\alpha = -1.631$	Natural content $\alpha = -1.625$	Price $\alpha = -1.194$	Weight control $\alpha = -1.427$	Familiarity $\alpha = -.137$	Ethical concern $\alpha = .807$
	Odds ratio [95% confidence interval] (βx)								
Age group									
(≥31 years[b] vs.)									
18–20 years	2.08* [1.36–3.18] (.730)	0.91 [0.62–1.34] (−.094)	1.21 [0.81–1.81] (.194)	1.13 [0.64–1.98] (.120)	2.58* [1.71–3.90] (.947)	1.10 [0.68–1.76] (.094)	1.95* [1.29–2.93] (.666)	1.22 [0.82–1.81] (.196)	1.78* [1.13–2.81] (.577)
21–25 years	1.61* [1.09–2.36] (.474)	0.94 [0.67–1.32] (−.065)	1.07 [0.75–1.53] (.071)	0.89 [0.54–1.47] (−.116)	2.06* [1.43–2.97] (.723)	1.10 [0.73–1.67] (.100)	1.54* [1.08–2.21] (.433)	1.25 [0.89–1.77] (.226)	1.49* [1.02–2.17] (.396)
26–30 years	1.61* [1.09–2.38] (.476)	1.19 [0.84–1.69] (.177)	1.22 [0.85–1.74] (.199)	1.04 [0.63–1.72] (.041)	1.96* [1.35–2.85] (.675)	0.85 [0.56–1.31] (−.157)	1.66* [1.15–2.39] (.506)	1.37 [0.96–1.95] (.314)	1.64* [1.11–2.41] (.493)
Gender									
(Female[c] vs.)									
Male	1.33* [1.04–1.72] (.288)	1.56* [1.23–1.97] (.442)	1.54* [1.21–1.96] (.432)	1.55* [1.12–2.16] (.441)	1.90* [1.48–2.44] (.641)	1.04 [0.78–1.39] (.043)	2.14* [1.66–2.75] (.760)	1.41* [1.10–1.80] (.344)	1.47* [1.09–1.96] (.382)
Occupation									
(student[c] vs.)									
Nonstudent	0.86 [0.64–1.15] (−.151)	0.93 [0.71–1.22] (−.073)	1.41* [1.07–1.87] (.347)	1.19 [0.80–1.75] (.172)	0.67* [0.50–0.88] (−.407)	1.44* [1.03–2.00] (.363)	0.72* [0.54–0.96] (−.327)	0.95 [0.72–1.26] (−.049)	0.72* [0.52–0.99] (−.331)
Physical activity practice									
(yes[c] vs.)									
No	1.37* [1.08–1.75] (.316)	0.83 [0.66–1.05] (−.183)	1.04 [0.82–1.32] (.041)	0.89 [0.63–1.27] (−.111)	1.65* [1.29–2.10] (.500)	1.10 [0.83–1.46] (.095)	1.66* [1.30–2.11] (.504)	0.89 [0.71–1.13] (−.112)	1.13 [0.85–1.49] (.119)
Diet to body change									
(often[c] vs.)									
Never/Raraly	2.12* [1.47–3.05] (.750)	1.40* [1.02–1.93] (.338)	1.49* [1.07–2.09] (.401)	0.50* [0.32–0.78] (−.689)	1.00 [0.72–1.41] (.004)	1.16 [0.79–1.71] (.149)	2.92* [2.08–4.11] (1.073)	0.84 [0.61–1.17] (−.174)	0.59* [0.40–0.87] (−.522)
Sometimes	1.97* [1.43–2.73] (.680)	1.32* [1.00–1.75] (.281)	1.40* [1.05–1.88] (.338)	0.57* [0.39–0.84] (−.555)	1.06 [0.79–1.42] (.056)	0.95 [0.68–1.34] (−.046)	1.87* [1.39–2.50] (.624)	1.20 [0.90–1.60] (.183)	0.98 [0.69–1.38] (−.023)
Self-rated eating quality									
(good/excellent[c] vs.)									
Poor/regular	3.97* [2.92–5.40] (1.378)	0.88 [0.67–1.15] (−.132)	0.51* [0.38–0.68] (−.671)	0.78 [0.53–1.16] (−.245)	3.48* [2.59–4.68] (1.248)	0.90 [0.64–1.26] (−.108)	1.33 [0.99–1.78] (.283)	0.97 [0.73–1.29] (−.028)	1.25 [0.90–1.74] (.223)
Normal	2.08* [1.54–2.82] (.734)	0.94 [0.72–1.23] (−.062)	0.62* [0.48–0.82] (−.472)	0.66* [0.45–0.96] (−.423)	1.89* [1.43–2.50] (.638)	1.09 [0.79–1.51] (.088)	1.20 [0.91–1.59] (.184)	0.99 [0.76–1.31] (−.005)	1.22 [0.89–1.67] (.197)
Antropometric nutritional status									
(obesity[c] vs.)									
Underweight	0.75 [0.38–1.45] (−.291)	2.34* [1.24–4.41] (.850)	1.08 [0.56–2.06] (.075)	1.47 [0.52–4.13] (.387)	1.86 [0.95–3.64] (.621)	0.55 [0.23–1.31] (−.601)	4.17* [1.84–9.43] (1.427)	2.21* [1.14–4.27] (.793)	2.41* [1.08–5.37] (.880)

TABLE 4 (Continued)

Characteristic (x)	Motives for food choice[a] (y) Health α = −2.315	Mood α = −.674	Convenience α = −.674	Sensory appeal α = −1.631	Natural content α = −1.625	Price α = −1.194	Weight control α = −1.427	Familiarity α = −.137	Ethical concern α = .807
	Odds ratio [95% confidence interval] (βx)								
Normal weight	0.88 [0.60–1.28] (−.131)	2.01* [1.40–2.87] (.697)	0.96 [0.66–1.38] (−.044)	1.90* [1.08–3.34] (.644)	1.50* [1.03–2.18] (.406)	1.05 [0.68–1.62] (.048)	1.40 [0.97–2.02] (.336)	1.74* [1.22–2.47] (.553)	1.77* [1.19–2.63] (.571)
Overweight	1.04 [0.70–1.55] (.040)	1.65* [1.13–2.42] (.502)	1.07 [0.73–1.59] (.071)	1.10 [0.60–2.02] (.093)	1.26 [0.85–1.88] (.235)	0.98 [0.62–1.56] (−.018)	1.16 [0.78–1.71] (.144)	1.28 [0.88–1.86] (.249)	1.14 [0.75–1.73] (.133)
Economic level[b] (high[c] vs.)									
Very low	0.41 [0.10–1.61] (−.894)	1.19 [0.38–3.73] (.174)	1.54 [0.50–4.82] (.435)	1.33 [0.28–6.41] (.287)	0.95 [0.29–3.14] (−.052)	1.25 [0.39–4.03] (.225)	1.17 [0.35–3.89] (.161)	0.93 [0.30–2.92] (−.071)	0.41 [0.13–1.32] (−.890)
Low	0.88 [0.62–1.24] (−.133)	0.99 [0.71–1.36] (−.015)	0.81 [0.58–1.13] (−.213)	0.82 [0.52–1.31] (−.196)	0.74 [0.52–1.04] (−.307)	0.55* [0.37–0.81] (−.604)	0.66* [0.47–0.93] (−.419)	0.84 [0.61–1.17] (−.170)	0.59* [0.40–0.88] (−.522)
Middle	0.90 [0.69–1.18] (−.104)	0.99 [0.77–1.27] (−.011)	0.75* [0.58–0.97] (−.285)	0.76 [0.54–1.08] (−.273)	0.84 [0.64–1.09] (−.179)	0.51* [0.38–0.68] (−.682)	0.82 [0.63–1.06] (−.199)	1.06 [0.82–1.37] (.056)	0.71* [0.52–0.98] (−.343)

Note: $Logit\ (y) = \alpha + \beta x_1 + ... + \beta x_n$. $^*p < 0.05$.

[a]Motives of less (average score < 3.00) or greater (average score ≥ 3.00) importance to food choice, according to the factors of the Food Choice Questionnaire (FCQ).

[b]Average household income (October 2021: 1 USD = 5.58BRL): Very low = R$ 813.56, Low = R$ 2424.19, Middle = R$ 7938.67, High = R$ 22716.99.

[c]Reference category used in the logistic regression analysis.

compared, revealing that the operationalization of the instrument to investigate food choice was maintained in different conditions. This does not mean that individuals share the same reasons for choosing food, but that the FCQ can be considered an instrument with certain theoretical equivalence across different groups. However, this should be confirmed in other cultures. About the reliability of the FCQ, we found good coefficients corroborating both international (Carrillo, Varela, Salvador, & Fiszman, 2011; Dikmen et al., 2016; Eertmans et al., 2006; Januszewska et al., 2011; Markovina et al., 2015; Milosevic et al., 2012; Pieniak et al., 2009; Steptoe et al., 1995) and Brazilian literature (Heitor et al., 2015; Heitor et al., 2019; Sproesser et al., 2019; Veiga et al., 2021). Therefore, the FCQ factorial model used was valid and reliable to evaluate the reasons underlying the participants' food choices.

To achieve the second aim, we calculated the FCQ average scores and found that sensorial appeal occupied the leadership position. Cunha et al. (2018) demonstrated that the order of these reasons varies between countries. However, studies with European and US samples supported our findings (Carrillo et al., 2011; Dikmen et al., 2016; Eertmans et al., 2006; Januszewska et al., 2011; Markovina et al., 2015; Milosevic et al., 2012). Furthermore, Souza et al. (2020), Marsola et al. (2020), and Veiga et al. (2021) found similar results to ours, revealing that the sensorial appeal is an important factor for food choice of the Brazilian population. These findings may help health educators, such as nutritionists, psychologists, sports coaches, and other professionals to model individual and collective interventions based on sensory characteristics of food. However, as reported by Prescott (2017), sensory and consumer surveys have shown that the sensory properties of a food are important, but not sufficient to explain choice. In this sense, sensory and consumer science has increased the inter-disciplinary nature of the field beyond measuring liking/acceptability/preference, also covering aspects such as emotions, culture, social interaction, and attitudes, which should be considered by the experts. This will probably contribute to deepen existing knowledge and to understand individual differences about consumer decision making regarding food choice (Bernal-Gil, Favila-Cisneros, Zaragoza-Alonso, Cuffia, & Rojas-Rivas, 2020; Jaeger et al., 2017; Pagliarini et al., 2021; Pramudya et al., 2019).

Ethical concern was the least important reason for participants when making their food choices, which corroborates the literature (Cunha et al., 2018; Januszewska et al., 2011; Markovina et al., 2015). The ethical concern factor evaluated in the original FCQ (Steptoe et al., 1995) encompasses items related to environmental protection ("*is packaged in an environmentally friendly way*"), country of origin labeling of food ("*has the country of origin clearly marked*), and political issues ("*comes from countries I approve of politically*"), which were not important to the participants in the food choice. Lindeman and Vaananen (2000) showed that ethical concern related to food choice may be related to other issues (e.g., animal welfare, personal growth, and religion). This can be evaluated in future studies to better understand the relationship between ethical concern and food choice in different contexts.

The final analyses of our work encompassed the regression models to answer the third aim. The first result found that older individuals (i.e., ≥31 years, 18.1%—see Table 1) valued health, natural content, weight control, and ethical concern when choosing food more than younger people, which corroborates the literature (Marsola et al., 2020; Schliemann et al., 2019; Steptoe et al., 1995; Szakaly et al., 2018). Marsola et al. (2020) highlight that older people are more concerned with the function of food to prevent diseases, as well as promote health and weight control. Szakaly et al. (2018) found that ethical concern was a decisive factor among middle-aged people (30–60 years) when choosing food. Thus, age can be a relevant characteristic to understand part of the reasons underlying food choice. However, as our sample was predominantly young adults (i.e., 18–30 years old, 81.9%), we suggest that future studies investigate the relationship between age and food choice using a balanced sample between young adults, older adults, and elderly people.

We found that women, compared with men, were more likely to choose foods for several reasons. The literature (Januszewska et al., 2011; Marsola et al., 2020; Pearcey & Zhan, 2018; Pollard et al., 1998; Schliemann et al., 2019; Szakaly et al., 2018; Veiga et al., 2021; Wardle et al., 2004) corroborates our data, revealing that women prioritize mood, weight control, and health when choosing foods. According to Schliemann et al. (2019), the difference between genders involves a web of physiological (e.g., hunger), social (e.g., negative body image), and psychological (e.g., anxiety) aspects, with women being more affected. In addition, Wardle et al. (2004) suggest that women are more involved with the preparation of meals and the process of food purchasing than men. Our results do not suggest that men placed little or no importance when choosing food, but rather that women had more expressive scores and deserve special attention.

Related to the participants' occupation, we found that the students, compared with nonstudents, placed more importance on price and convenience and less on natural content, weight control, and ethical concern when choosing foods. Pollard et al. (1998) showed that British students assigned more importance to choosing foods for price than those who reported having another occupation. Vilaro et al. (2018) also found similar results in college students from eight US universities. Price is probably an important factor in students' foods choice, as this group is young and does not have a stable income. Szakaly et al. (2018) reported that Hungarians under 30 years old were more likely to choose foods due to the convenience of preparation. In our sample, 802 participants were students and 97.4% of this group were < 30 years old; therefore, we suggest that future studies control age variable to verify more deeply the relationship between students' occupation and food choice. Faced with pressure to excel academically and housing arrangements (e.g., live alone or with peers), students choose to consume foods that are easier to prepare and are inexpensive (Garcia, Sykes, Matthews, Martin, & Leipert, 2010), leaving aside concerns, such as natural content, weight, and ethical issues. In this way, students may be susceptible to inappropriate food choices. Therefore, strategies (e.g., educational programs to promote literacy in food and nutrition) can be developed to empower individuals to find solutions that benefit both academic performance and health.

Participants who reported practicing physical activity were more likely to choose foods based on health, natural content, and weight control. This is consistent with the results of Georgiou et al. (1996), which reported that US young adults who exercise placed more importance on eating nutritious foods than nonexercisers. Generally, physically active individuals have a great concern with health and physical performance (Thurecht & Pelly, 2020), and this probably reflects their interest in natural content (Georgiou et al., 1996; Savu, Gheorghiu, Trandafir, Serea, & Barna, 2019; Torstveit, Johansen, Haugland, & Stea, 2018) and weight control (Georgiou et al., 1996) when choosing foods. On the other hand, food choice for weight control may be associated with body image concerns, which can lead to disordered eating behaviors (Coelho, Giatti, Molina, Nunes, & Barreto, 2015; Kristjansdottir, Sigurethardottir, Jonsdottir, Thornorsteinsdottir, & Saavedra, 2019). Therefore, health promoters should encourage physical activity; however, messages targeting weight-consciousness should not provoke a negative body perception.

Most participants reported having already dieted for body change and the higher the frequency of this behavior, more foods were chosen for health, weight control, mood, and convenience and less for sensory appeal and ethical concern. Corroborating our findings, the literature (Clarke & Best, 2017, 2019; Jallinoja, Niva, Helakorpi, & Kahma, 2014; Wardle et al., 2004) demonstrates that diet can be seen by dieters as effective for losing weight and promoting health. However, the practice of diets, especially restrictive ones, can negatively influence people's life (Franchi, 2012) and explain the greater importance placed on mood and convenience, since dieters can choose foods to control their emotions (Martins, da Silva, Maroco, & Campos, 2021). Unlike our study, Clarke and Best (2019) showed that dieters did not see the time and effort involved in preparing meals as barriers to choosing foods. However, this result was found in Australian individuals between 18 and 72 years old (a different sample from the present study in terms of culture and elderly participants), which may be one of the reasons for the disparity in the findings.

The opposite importance found for health and sensory appeal among dieters indicates a conflict between these two reasons. Generally, individuals classify food in two categories, the first describes with attributes of natural, freshness, and wholesomeness, and the second is considered pleasant, but inappropriate (Franchi, 2012; Krystallis, Arvanitoyannis, & Kapirti, 2003). This corroborates our findings, showing that dieting and perceiving the quality of eating as good/excellent instead of producing positive results may promote a negative relationship between the individual and food (e.g., a sense of frustration at liking foods that are potentially unhealthy). Restrictive or higher quality diets aimed at health or body change are often associated with overlooking of the sensory characteristics of the foods (e.g., having bitter taste due to some vegetables and lack of flavor due to low amount of salt and fat). Therefore, counseling interventions should promote cautions food choices from sensory stimulation based on desirable taste and sensation to achieve health and well-being (Cox, Hendrie, & Lease, 2018; Franchi, 2012). In relation to the low

ethical motivation placed by dieters when choosing foods, Clarke and Best (2019) also found a similar result, but this is unclear why. We speculate that dieters consume more natural foods that are free of pesticides and additives and produce little solid waste.

Still, our study showed that self-rated eating quality as good/excellent increased the likelihood of choosing foods for reasons of health and natural content and decreased for reasons of convenience and sensory appeal. These findings corroborate the literature. Kourouniotis et al. (2016) found that 82% of the sample of Australian university students rated taste as being essential for food choice, which was associated with a poor diet quality. Carvalho, Barros Filho, Barros, and Assumpção (2020) found in a sample of Brazilian adolescents who perceived their diet as poor/very poor had a lower intake of fresh foods and greater of ready-to-use products (considered potentially less healthy and easy to consume). However, the overall quality of the diet of the participants was poor, even among those who thought that their diet was good/very good. This shows that people who report having a "good diet" do not always actually have one; therefore, such results should be interpreted with caution. Educational strategies that incorporate simultaneously healthy and conscious eating and consumer' sensory preferences are important. The cognitive model based on logical and rational processing can be useful when making food choices, as it aims to provide a background for people to use the knowledge acquired during product evaluation (Jaeger et al., 2017).

Regarding anthropometric nutritional status, our findings showed that mood, sensory appeal, natural content, weight control, familiarity, and ethical concern were important motives for food choice of the participants with obesity (11.6%, see Table 1). Sproesser et al. (2019), using a Brazilian sample, and Schliemann et al. (2019), with a sample of Irish workers, also found similar results. The use of food as a coping strategy may explain the importance placed on emotions (Canetti, Bachar, & Berry, 2002; Macht, 2008) and sensory pleasure (Gibson, 2006). According to Prescott (2017), emotions are powerful drivers of behaviors and are key in promoting preferences, in particular those related to sensory characteristics of foods (e.g., odors and flavors). Individuals with a higher BMI could choose to eat highly palatable foods or the best-known ones to regulate their emotions (Gibson, 2006; Martins et al., 2021). Furthermore, as global guidelines encourage weight loss to promote health (World Health Organization, 2020), individuals with obesity may experience social pressure to choose foods that achieve this goal. However, this can lead to psychological suffering, as what people eat not only shapes their nutritional status, but also their identities (Franchi, 2012). Therefore, people with obesity need to be guided by experts who help them find the best path to promote health and well-being. For ethical concern, we found no clear reason why it is important for people with a higher BMI; therefore, this should be explored in future studies. We also suggest a more accurate assessment of nutritional status (e.g., body composition) to evaluate its relationship with the reasons underlying food choices.

Finally, we found that convenience, price, weight control, and ethical concern were less important reasons for higher-income people (28.3%, see Table 1) when choosing food. Pricing policy is a powerful way to influence food choice (Puddephatt et al., 2020; Steenhuis, Waterlander, & de Mul, 2011; Steptoe et al., 1995). Steenhuis et al. (2011) studied the role of price in food choice among low-income and higher-income consumers. For low-income people, food price, mood, and familiarity were important reasons underlying their food choices. Although most consumers are sensitive to food price, higher-income people can choose with less concern (e.g., buying foods with healthy claims even if they are expensive). However, future studies with experimental groups (e.g., Epstein, Dearing, Roba, & Finkelstein, 2010) are important to better understand the role of income in food choice.

As seen, there is an apparent need to pay more attention to young consumers, women, students, nonpractitioners of physical activity, and individuals who frequently diet and rate their eating as poor. Furthermore, people with higher BMI and lower income also need special assistance. Therefore, food choice motives should not be considered in isolation from consumers' profile (Gama et al., 2018; Schliemann et al., 2019). It is worth noting that we used a questionnaire to provide quantitative data to investigate subjective variables (i.e., verbalized behaviors and not decisions) that could be only investigated otherwise through interviews and observations, which are rare and difficult in large samples. Although the FCQ is the most used in research to assess food choice, it cannot be seen as an instrument that exhausts all possibilities (Machin, Gimenez, Vidal, & Ares, 2014), since other factors not included in it such as hunger, pleasure, social image, and social norms could be explored and provide new results. Still, as food and health are strongly related, discussing the question "*What is health?*" in the context of the food choice of the participants it is important. To estimate health factor, FCQ items include content, such as "*contains a lot of vitamins and minerals*", "*is high in protein*", and others. Having a high score in this factor can address a certain "*nutritionism*"—a restrictive dietary approach focused only on nutrients of food—harming the individual's relationship with eating. It is known that a healthier diet does not always promote "health", which is a state of complete physical, mental, and social well-being, because the eating process is complex and involves many factors, such as pleasure and taste that greatly impact food choices (Jacquier, Bonthoux, Baciu, & Ruffieux, 2012). Furthermore, products with "nutrient-rich" claims, but are not truly healthy (e.g., ultra-processed), can be perceived by people as healthy. The idea of choosing "healthier foods" could also existed for environmental or ethical reasons (Honkanen, Verplanken, & Olsen, 2006), as well as for issues related with body image (Kristjansdottir et al., 2019). Therefore, we suggest future investigations with a broader evaluation of food choice and health.

The cross-sectional design limits cause-and-effect inferences. Only intervention studies can prove the relationships found. Although the sample is large, the respondent group was not representative for the entire Brazilian population and was predominantly composed of women and young adults (≤30 years old), which limits the generalization of the results. The questionnaires were self-completed by the participants limiting the target to literate respondents. The response scales used to investigate the variables "diet", "self-rated eating quality", and "physical activity" did not allow detailed identification of the type of diet, quality of the foods, and the level of physical activity of

the participants. Thus, we encourage future studies that reduce these limitations, developing more specific protocols. On the other hand, the strengths of this study are the use of an appropriated psychometrically instrument, a large sample, and robust statistical analysis.

In conclusion, the validity, reliability, and the factorial invariance across different groups of the FCQ original model were confirmed on Brazilian data. Based on these findings, the FCQ—with nine factors, 36 items, and four-point response scale—was useful to determine participants' food choice motives. The sensorial appeal and price were the most important for the individuals' food choice, while the ethical concern was the least valued. Thus, future dietary intervention protocols can consider these reasons for designing better-tailored eating behaviors. Furthermore, specific characteristics, such as age, gender, occupation, practicing of physical activity and dieting, self-perception of eating, BMI, and income, influenced food choice motives. Therefore, the results of this study provide useful information to nutritionists, food scientists, food companies, and others who want to better understand people's food choices.

AUTHOR CONTRIBUTIONS

Wanderson Roberto da Silva collected the data, contributed to the analysis, interpretation of findings and wrote the first draft of the manuscript. João Marôco contributed to the analysis and critical review of the manuscript. Marle dos Santos Alvarenga contributed to the interpretation of findings and critical review of the manuscript. Juliana Alvares Duarte Bonini Campos contributed to the analysis, interpretation of data and critical review of the manuscript, taking the lead in the research. All authors contributed to the conception and design of the study and approved the final version of the article.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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REFERENCES

Anastasi, A. (1988). *Psychological testing* (6th ed.). New York, NY: Macmillan Publishing Company.

Bernal-Gil, N. Y., Favila-Cisneros, H. J., Zaragoza-Alonso, J., Cuffia, F., & Rojas-Rivas, E. (2020). Using projective techniques and food Neophobia scale to explore the perception of traditional ethnic foods in Central Mexico: A preliminary study on the beverageSende. *Journal of Sensory Studies*, *35*(6), e12606. https://doi.org/10.1111/joss.12606

Blake, C. E., Frongillo, E. A., Warren, A. M., Constantinides, S. V., Rampalli, K. K., & Bhandari, S. (2021). Elaborating the science of food choice for rapidly changing food systems in low-and middle-income countries. *Global Food Security*, *28*(1), 100503. https://doi.org/10.1016/j.gfs.2021.100503

Canetti, L., Bachar, E., & Berry, E. M. (2002). Food and emotion. *Behavioural Processes*, *60*(2), 157–164. https://doi.org/10.1016/s0376-6357(02)00082-7

Carrillo, E., Varela, P., Salvador, A., & Fiszman, S. (2011). Main factors underlying consumers' food choice: A first step for the understanding of attitudes toward "healthy eating". *Journal of Sensory Studies*, *26*(2), 85–95. https://doi.org/10.1111/j.1745-459X.2010.00325.x

Carvalho, S. D. L., Barros Filho, A. A., Barros, M. B. A., & Assumpção, D. (2020). Self-rated diet quality according to adolescents: ISACamp-Nutri results. *Ciência & Saúde Coletiva*, *25*(11), 4451–4461. https://doi.org/10.1590/1413-812320202511.06792019

Chen, F. F. (2007). Sensitivity of goodness of fit indexes to lack of measurement invariance. *Structural Equation Modeling: A Multidisciplinary Journal*, *14*(3), 464–504. https://doi.org/10.1080/10705510701301834

Chen, M. (2011). The gender gap in food choice motives as determinants of consumers' attitudes toward GM foods in Taiwan. *British Food Journal*, *113*(6), 697–709. https://doi.org/10.1108/00070701111140052

Clarke, C., & Best, T. (2017). Low-carbohydrate, high-fat dieters: Characteristic food choice motivations, health perceptions and behaviours. *Food Quality and Preference*, *62*, 162–171. https://doi.org/10.1016/j.foodqual.2017.07.006

Clarke, C., & Best, T. (2019). Food choice motivations: Profiling low-carbohydrate, high-fat dieters. *Appetite*, *141*, 1–7. https://doi.org/10.1016/j.appet.2019.104324

Coelho, C. G., Giatti, L., Molina, M. D., Nunes, M. A., & Barreto, S. M. (2015). Body image and nutritional status are associated with physical cctivity in men and women: The ELSA-Brasil study. *International Journal of Environmental Research and Public Health*, *12*(6), 6179–6196. https://doi.org/10.3390/ijerph120606179

Cox, D. N., Hendrie, G. A., & Lease, H. J. (2018). Do healthy diets differ in their sensory characteristics? *Food Quality and Preference*, *68*(1), 12–18. https://doi.org/10.1016/j.foodqual.2018.01.016

Cunha, L. M., Cabral, D., Moura, A. P., & Almeida, M. D. V. (2018). Application of the food choice questionnaire across cultures: Systematic review of cross-cultural and single country studies. *Food Quality and Preference*, *64*(1), 21–36. https://doi.org/10.1016/j.foodqual.2017.10.007

Dikmen, D., İnan-Eroğlu, E., Göktaş, Z., Barut-Uyar, B., & Karabulut, E. (2016). Validation of a Turkish version of the food choice questionnaire. *Food Quality and Preference*, *52*(1), 81–86. https://doi.org/10.1016/j.foodqual.2016.03.016

Dunn, T. J., Baguley, T., & Brunsden, V. (2014). From alpha to omega: A practical solution to the pervasive problem of internal consistency estimation. *British Journal of Psychology*, *105*(3), 399–412. https://doi.org/10.1111/bjop.12046

Eertmans, A., Victoir, A., Notelaers, G., Vansant, F., & Van den Bergh, O. (2006). The food choice questionnaire: Factorial invariant over western urban populations? *Food Quality and Preference*, *17*(5), 344–352. https://doi.org/10.1016/j.foodqual.2005.03.016

Epstein, L. H., Dearing, K. K., Roba, L. G., & Finkelstein, E. (2010). The influence of taxes and subsidies on energy purchased in an experimental

purchasing study. *Psychological Science*, *21*(3), 406–414. https://doi.org/10.1177/0956797610361446

Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research*, *18*(1), 39–50. https://doi.org/10.2307/3151312

Franchi, M. (2012). Food choice: Beyond the chemical content. *International Journal of Food Sciences and Nutrition*, *63*(1), 17–28. https://doi.org/10.3109/09637486.2011.632403

Gadermann, A. M., Guhn, M., & Zumbo, B. D. (2012). Estimating ordinal reliability for Likert-type and ordinal item response data: A conceptual, empirical, and practical guide. *Practical Assessment, Research and Evaluation*, *17*(3), 1–13. http://pareonline.net/pdf/v17n3.pdf

Gama, A. P., Adhikari, K., & Hoisington, D. A. (2018). Factors influencing food choices of Malawian consumers: A food choice questionnaire approach. *Journal of Sensory Studies*, *33*, e12442. https://doi.org/10.1111/joss.12442

Garcia, A. C., Sykes, L., Matthews, J., Martin, N., & Leipert, B. (2010). Perceived facilitators of and barriers to healthful eating among university students. *Canadian Journal of Dietetic Practice and Research*, *71*(2), e28–e33. https://doi.org/10.3148/71.2.2010.69

Georgiou, C., Betts, N., Hoos, T., & Glenn, M. (1996). Young adult exercisers and nonexercisers differ in food attitudes, perceived dietary changes, and food choices. *International Journal of Sport Nutrition*, *6*(4), 402–413. https://doi.org/10.1123/ijsn.6.4.402

Gibson, E. L. (2006). Emotional influences on food choice: Sensory, physiological and psychological pathways. *Physiology & Behavior*, *89*(1), 53–61. https://doi.org/10.1016/j.physbeh.2006.01.024

Hair, J. F., Jr., Black, W. C., Babin, B. J., & Anderson, R. E. (2019). *Multivariate data analysis* (8th ed.). Andover, Hampshire: Cengage Learning EMEA.

Heitor, S. F., Estima, C. C., das Neves, F. J., de Aguiar, A. S., Castro Sde, S., & Ferreira, J. E. (2015). Translation and cultural adaptation of the questionnaire on the reason for food choices (food choice questionnaire - FCQ) into Portuguese. *Ciência & Saúde Coletiva*, *20*(8), 2339–2346. https://doi.org/10.1590/1413-81232015208.15842014

Heitor, S. F., Reichenheim, M. E., Ferreira, J. E. S., & Castro, S. S. (2019). Validity of the factorial structure of the Brazilian version scale of the food choice questionnaire. *Ciência & Saúde Coletiva*, *24*(9), 3551–3561. https://doi.org/10.1590/1413-81232018249.26482017

Honkanen, P., Verplanken, B., & Olsen, S. O. (2006). Ethical values and motives driving organic food choice. *The Journal of Cell Biology*, *5*(5), 420–430. https://doi.org/10.1002/cb.190

Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal*, *6*(1), 1–55. https://doi.org/10.1080/10705519909540118

Jacquier, C., Bonthoux, F., Baciu, M., & Ruffieux, B. (2012). Improving the effectiveness of nutritional information policies: Assessment of unconscious pleasure mechanisms involved in food-choice decisions. *Nutrition Reviews*, *70*(2), 118–131. https://doi.org/10.1111/j.1753-4887.2011.00447.x

Jaeger, S. R., Hort, J., Porcherot, C., Ares, G., Pecore, S., & MacFie, H. J. H. (2017). Future directions in sensory and consumer science: Four perspectives and audience voting. *Food Quality and Preference*, *56*(1), 301–309. https://doi.org/10.1016/j.foodqual.2016.03.006

Jallinoja, P., Niva, M., Helakorpi, S., & Kahma, N. (2014). Food choices, perceptions of healthiness, and eating motives of self-identified followers of a low-carbohydrate diet. *Food & Nutrition Research*, *58*, 1–9. https://doi.org/10.3402/fnr.v58.23552

Januszewska, R., Pieniak, Z., & Verbeke, W. (2011). Food choice questionnaire revisited in four countries. Does it still measure the same? *Appetite*, *57*(1), 94–98. https://doi.org/10.1016/j.appet.2011.03.014

Jorgensen, T. D., Pornprasertmanit, S., Schoemann, A. M., & Rosseel, Y. (2020). semTools: Useful tools for structural equation modeling. R package version 0.5-3. Retrieved from: https://CRAN.R-project.org/package=semTools

Kline, R. B. (2016). *Principles and practice of structural equation modeling* (4th ed.). New York, NY: Guilford Press.

Kourouniotis, S., Keast, R. S. J., Riddell, L. J., Lacy, K., Thorpe, M. G., & Cicerale, S. (2016). The importance of taste on dietary choice, behaviour and intake in a group of young adults. *Appetite*, *103*, 1–7. https://doi.org/10.1016/j.appet.2016.03.015

Kristjansdottir, H., Sigurethardottir, P., Jonsdottir, S., Thornorsteinsdottir, G., & Saavedra, J. (2019). Body image concern and eating disorder symptoms among elite icelandic athletes. *International Journal of Environmental Research and Public Health*, *16*(15), 1–11. https://doi.org/10.3390/ijerph16152728

Krystallis, A., Arvanitoyannis, I. S., & Kapirti, A. (2003). Investigating Greek consumers' attitudes towards low-fat food products: A segmentation study. *International Journal of Food Sciences and Nutrition*, *54*(3), 219–233. https://doi.org/10.1080/09637480120091973

Lindeman, M., & Vaananen, M. (2000). Measurement of ethical food choice motives. *Appetite*, *34*(1), 55–59. https://doi.org/10.1006/appe.1999.0293

Machin, L., Gimenez, A., Vidal, L., & Ares, G. (2014). Influence of context on motives underlying food choice. *Journal of Sensory Studies*, *29*(5), 313–324. https://doi.org/10.1111/joss.12107

Macht, M. (2008). How emotions affect eating: A five-way model. *Appetite*, *50*(1), 1–11. https://doi.org/10.1016/j.appet.2007.07.002

Markovina, J., Stewart-Knox, B. J., Rankin, A., Gibney, M., Almeida, M. D. V., Fischer, A., … Frewer, L. J. (2015). Food4Me study: Validity and reliability of food choice questionnaire in 9 European countries. *Food Quality and Preference*, *45*(1), 26–32. https://doi.org/10.1016/j.foodqual.2015.05.002

Marôco, J. (2021). *Análise de equações estruturais [Structural equation analysis]* (3rd ed.). Pêro Pinheiro, Portugal: ReportNumber, Ltd.

Marsola, C. M., Cunha, L. M., Carvalho-Ferreira, J. P., & da Cunha, D. T. (2020). Factors underlying food choice motives in a Brazilian sample: The association with socioeconomic factors and risk perceptions about chronic diseases. *Food*, *9*(8), 1–16. https://doi.org/10.3390/foods9081114

Martins, B. G., da Silva, W. R., Maroco, J., & Campos, J. (2021). Eating behavior of Brazilian college students: Influences of lifestyle, negative affectivity, and personal characteristics. *Perceptual and Motor Skills*, *128*(2), 781–799. https://doi.org/10.1177/0031512520983082

Milosevic, J., Zezelj, I., Gorton, M., & Barjolle, D. (2012). Understanding the motives for food choice in Western Balkan countries. *Appetite*, *58*(1), 205–214. https://doi.org/10.1016/j.appet.2011.09.012

Onwezen, M. C., Reinders, M. J., Verain, M. C. D., & Snoek, H. M. (2019). The development of a single-item food choice questionnaire. *Food Quality and Preference*, *71*(1), 34–45. https://doi.org/10.1016/j.foodqual.2018.05.005

Pagliarini, E., Spinelli, S., Proserpio, C., Monteleone, E., Fia, G., Laureati, M., … Dinnella, C. (2021). Sensory perception and food neophobia drive liking of functional plant-based food enriched with winemaking by-products. *Journal of Sensory Studies*, *37*(1), e12710. https://doi.org/10.1111/joss.12710

Pearcey, S. M., & Zhan, G. Q. (2018). A comparative study of American and Chinese college students' motives for food choice. *Appetite*, *123*, 325–333. https://doi.org/10.1016/j.appet.2018.01.011

Pieniak, Z., Verbeke, W., Vanhonacker, F., Guerrero, L., & Hersleth, M. (2009). Association between traditional food consumption and motives for food choice in six European countries. *Appetite*, *53*(1), 101–108. https://doi.org/10.1016/j.appet.2009.05.019

Pollard, T. M., Steptoe, A., & Wardle, J. (1998). Motives underlying healthy eating: Using the food choice questionnaire to explain variation in dietary intake. *Journal of Biosocial Science*, *30*(2), 165–179. https://doi.org/10.1017/s0021932098001655

Pramudya, R. C., Lee, J., Chapko, M. J., Lee, K., Lee, S., Lee, J., … Seo, H.-S. (2019). Variations in U.S. consumers' acceptability of commercially-available rice-based milk alternatives with respect to sensory attributes and food neophobia traits. *Journal of Sensory Studies*, *34*(3), e12496. https://doi.org/10.1111/joss.12496

Prescott, J. (2017). Some considerations in the measurement of emotions in sensory and consumer research. *Food Quality and Preference*, *62*(1), 360–368. https://doi.org/10.1016/j.foodqual.2017.04.005

Puddephatt, J. A., Keenan, G. S., Fielden, A., Reaves, D. L., Halford, J. C. G., & Hardman, C. A. (2020). 'Eating to survive': A qualitative analysis of factors influencing food choice and eating behaviour in a food-insecure population. *Appetite*, *147*, 104547. https://doi.org/10.1016/j.appet.2019.104547

Revelle, W. (2019). psych: Procedures for psychological, psychometric, and personality research. R Package Version 1.9.12. Retrieved from: https://CRAN.R-project.org/package=psych

Rosseel, Y. (2012). Lavaan: An R package for structural equation modeling and more. Version 0.5-12 (BETA). *Journal of Statistical Software*, *48*(2), 1–36.

Savu, C. V., Gheorghiu, A., Trandafir, M., Serea, C., & Barna, O. (2019). Influence of food behavior and physical activity in relation to the overall physical condition of Romanian students. *Progress in Nutrition*, *2*(4), 1003–1010. https://doi.org/10.23751/pn.v21i4.8943

Schliemann, D., Woodside, J. V., Geaney, F., Cardwell, C., McKinley, M. C., & Perry, I. (2019). Do socio-demographic and anthropometric characteristics predict food choice motives in an Irish working population? *The British Journal of Nutrition*, *122*(1), 111–119. https://doi.org/10.1017/S0007114519000941

Schreiber, J. B., Nora, A., Stage, F. K., Barlow, E. A., & King, J. (2006). Reporting structural equation modeling and confirmatory factor analysis results: A review. *The Journal of Educational Research*, *99*(6), 323–338. https://doi.org/10.3200/JOER.99.6.323-338

Sobal, J., Bisogni, C. A., Devine, C. M., & Jastran, M. (2006). A conptual model of the food choice progress over the life course. In R. Shepherd & M. Raats (Eds.), *The psychology of food choice* (pp. 1–18). King's Lynn, UK: CABI.

Souza, A. M., Bezerra, I. W. L., Pereira, G. S., Torres, K. G., Costa, R. M., & Oliveira, A. G. (2020). Relationships between motivations for food choices and consumption of food groups: A prospective cross-sectional survey in manufacturing workers in Brazil. *Nutrients*, *12*(5), 1–15. https://doi.org/10.3390/nu12051490

Sproesser, G., Moraes, J. M. M., Renner, B., & Alvarenga, M. D. S. (2019). The eating motivation survey in Brazil: Results from a sample of the general adult population. *Frontiers in Psychology*, *10*(1), 1–12. https://doi.org/10.3389/fpsyg.2019.02334

Steenhuis, I. H., Waterlander, W. E., & de Mul, A. (2011). Consumer food choices: The role of price and pricing strategies. *Public Health Nutrition*, *14*(12), 2220–2226. https://doi.org/10.1017/S1368980011001637

Steptoe, A., Pollard, T. M., & Wardle, J. (1995). Development of a measure of the motives underlying the selection of food: The food choice questionnaire. *Appetite*, *25*(3), 267–284. https://doi.org/10.1006/appe.1995.0061

Szakaly, Z., Kontor, E., Kovacs, S., Popp, J., Peto, K., & Polereczki, Z. (2018). Adaptation of the food choice questionnaire: The case of Hungary. *British Food Journal*, *120*(7), 1474–1488. https://doi.org/10.1108/BFJ-07-2017-0404

Thurecht, R., & Pelly, F. (2020). Key factors influencing the food choices of athletes at two distinct major international competitions. *Nutrients*, *12*(4), 1–12. https://doi.org/10.3390/nu12040924

Torstveit, M. K., Johansen, B. T., Haugland, S. H., & Stea, T. H. (2018). Participation in organized sports is associated with decreased likelihood of unhealthy lifestyle habits in adolescents. *Scandinavian Journal of Medicine & Science in Sports*, *28*(11), 2384–2396. https://doi.org/10.1111/sms.13250

Veiga, G. C. V., Johann, G., Lima, V. A., Kaushik, N., & Mitterer-Daltoé, M. L. (2021). Food choice questionnaire and PLS-path modeling as tools to understand interest in low sugar products. *Journal of Sensory Studies*, *36*(5), e12667. https://doi.org/10.1111/joss.12667

Vilaro, M. J., Colby, S. E., Riggsbee, K., Zhou, W., Byrd-Bredbenner, C., Olfert, M. D., … Mathews, A. E. (2018). Food choice priorities change over time and predict dietary intake at the end of the first year of college among students in the U.S. *Nutrients*, *10*(9), 1–13. https://doi.org/10.3390/nu10091296

Wardle, J., Haase, A. M., Steptoe, A., Nillapun, M., Jonwutiwes, K., & Bellisle, F. (2004). Gender differences in food choice: The contribution of health beliefs and dieting. *Annals of Behavioral Medicine*, *27*(2), 107–116. https://doi.org/10.1207/s15324796abm2702_5

Willett, W., Rockstrom, J., Loken, B., Springmann, M., Lang, T., Vermeulen, S., … Murray, C. J. L. (2019). Food in the anthropocene: The EAT-lancet commission on healthy diets from sustainable food systems. *Lancet*, *393*(10170), 447–492. https://doi.org/10.1016/S0140-6736(18)31788-4

World Health Organization. (2020). Healthy diet. WHO. Retrieved from: https://who.int/news

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