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Psicopatologia alimentar e ortorexia nervosa em vegetarianos e não vegetarianos brasileiros: um estudo transversal

Eating psychopathology and orthorexia nervosa in vegetarian and non-vegetarian Brazilians: a cross-sectional study

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Resumo

Introdução: Este estudo teve como objetivo avaliar a psicopatologia alimentar e ortorexia nervosa (ON) em vegetarianos (VEG) e não vegetarianos (NVEG). **Métodos:** Foi realizado um estudo transversal com indivíduos de diferentes localidades do Brasil. Foram utilizados o *Eating Disorder Examination–Questionnaire Version* (EDE-Q) e *Düsseldorf Orthorexia Scale*. **Resultados:** Não houve diferenças a partir da pontuação global do EDE-Q (mediana 1,06 *vs*. 1,11 pontos, p=0,76) entre VEG (n=95) e NVEG (n=88), e os escores compatíveis com transtornos alimentares foram semelhantes entre os grupos (27,4% *vs*. 27,3%, p=1,00). A escala DOS foi maior em VEG do que em NVEG (mediana 20 vs. 17,5, p=0,04). O grupo VEG apresentou maior frequência de pontuação da escala DOS ≥25 (indicativo de risco aumentado para ON: 20% *vs*. 9,1%, p=0,04). Grupo VEG apresentou pontuação da escala DOS 1,9 pontos (CI95% 0,3 – 3,5) maior que o grupo NVEG, mesmo quando ajustado por sexo e índice de massa corporal (IMC) (p=0,02). A interação entre VEG e IMC foi significativa para a predição do escore global do EDE-Q (p=0,01). A magnitude de associação entre IMC e EDE-Q foi maior no grupo VEG. Para cada aumento de 1 kg/m² no IMC, houve aumento de 0,22 (CI95%: 0,16 – 0,29) pontos no escore EDE-Q no grupo VEG e aumento de 0,11 (CI95% 0,06 – 0,17) pontos no grupo NVEG (p=0,01), ajustado por sexo. **Conclusão:** Grupo VEG parece ter risco aumentado para ON, e a associação entre IMC e psicopatologia alimentar foi maior em magnitude no grupo VEG do que no grupo NVEG.

Palavras-chave: comportamento alimentar; transtorno alimentar; ortorexia nervosa; dieta vegetariana; vegetarianismo.

Abstract

Background: *This study aimed to assess eating psychopathology and orthorexia nervosa (ON) in vegetarians (VEG) and non-vegetarians (NVEG).* ***Methods:*** *We conducted a cross-sectional study with individuals from different locations throughout Brazil. The Eating Disorder Examination–Questionnaire Version (EDE-Q) and Düsseldorf Orthorexia Scale were used.* ***Results:*** *There were no differences in EDE-Q (median 1.06 vs. 1.11 points, p=0.76) between VEG (n=95) and NVEG (n=88), and the scores compatible with eating disorders were similar between groups (27.4% vs. 27.3%, p=1.00). DOS was higher in VEG than in NVEG (median 20 vs. 17.5, p=0.04). VEG presented a higher frequency of DOS ≥25 (indicative of increased risk of ON: 20% vs. 9,1%, p=0.04). VEG group presented 1.9 points (CI95% 0.3 – 3.5) higher DOS score than NVEG, even when adjusted for sex and body mass index (BMI) (p=0.02). The interaction between VEG and BMI was significant for the EDE-Q score prediction (p=0.01). The magnitude of the association between BMI and EDE-Q was higher in the VEG group. For each 1 kg/m² increase in BMI, there was a 0.22 (CI95%: 0.16 – 0.29) point increase in the EDE-Q score in the VEG group and a 0.11 (CI95% 0.06 – 0.17) point increase in the NVEG group (p=0.01), adjusted for*

sex. ***Conclusion:*** *VEG seems to be at increased risk for ON, and the association between BMI and eating psychopathology was higher in magnitude in the VEG than in the NVEG.*
Keywords: *eating behaviors; eating disorders, orthorexia nervosa, vegetarian diet; vegetarianism.*

Resumen

Introducción: *Este estudio tuvo como objetivo evaluar la psicopatolgía alimentaria y la ortorexia nerviosa (ON) en vegetarianos (VEG) y no vegetarianos (NVEG).* ***Métodos:*** *Se realizó un estudio transversal con individuos de diferentes localidades de Brasil. Se utilizaron el Eating Disorder Examination–Questionnaire Version (EDE-Q) y la Düsseldorf Orthorexia Scale.* ***Resultados:*** *No hubo diferencias en la pontuación del EDE-Q (mediana 1,06 vs. 1,11 puntos, p=0,76) entre VEG (n=95) y NVEG (n=88), y las pontuaciones compatibles con transtornos alimentarios fueron similares entre los grupos (27,4% vs. 27,3%, p=1,00). La escala DOS fue mayor en VEG que en NVEG (mediana 20 vs. 17,5, p=0,04). El grupo VEG mostró una mayor frecuencia de pontuaciones en la escala DOS ≥25 (indicativo de mayor riesgo de ON: 20% vs. 9,1%, p=0,04). El grupo VEG tuvo una pontuación en la escala DOS 1,9 puntos (CI95% 0,3 – 3,5) mayor que el grupo NVEG, incluso después de ajustar por sexo y índice massa corporal (IMC) (p=0,02). La interacción entre VEG y IMC fue significativa para predecir la puntuación global del EDE-Q (p=0,01). La magnitud de la asociación entre IMC y EDE-Q fue mayor en el grupo VEG. Por cada aumento de 1 kg/m² en el IMC, hubo un aumento de 0,22 (CI95%: 0,16 – 0,29) puntos en la pontuación EDE-Q en el grupo VEG y un aumento de 0,11 (CI95% 0,06 – 0,17) puntos en el grupo NVEG (p=0,01), ajustado por sexo.* ***Conclusión:*** *El grupo VEG parece tener un mayor riesgo de ON, y la asociación entre IMC y la psicopatologia alimentaria fue mas pronunciada en magnitud en el grupo VEG que en el grupo NVEG.*
Palabras clave: *conductas alimentarias; transtornos alimentarios; ortorexia nerviosa; dieta vegetariana; vegetarianismo.*

Introduction

A vegetarian diet is characterized by the exclusion of meat products, fish, and seafood (Melina, Craig & Levin, 2016). Often, there could be other exclusions like dairy products, eggs, and any type of animal source of food. In recent years, there has been exponential growth in the number of people embracing vegetarianism, as well as a growing interest in the scientific aspects and food industry related to this dietary choice (Craig & Mangels, 2009; Hargreaves, Raposo, Saraiva & Zandonadi, 2021). According to the American Dietetic Association and the Academy of Nutrition and Dietetics, when appropriately planned, a vegetarian diet is nutritionally adequate and can promote health benefits (Craig & Mangels, 2009; Melina et al., 2016).

Meta-analyses have consistently demonstrated significant associations between vegetarianism and health benefits. Specifically, adopting a vegetarian diet has been associated with a 25% reduction in the incidence of coronary artery disease, a 22%

decrease in the risk of mortality from acute myocardial infarction, a 27% decrease in the risk of developing diabetes, and an 8% decrease in the risk of developing cancer. These findings highlight the potential of vegetarianism as a preventive strategy against chronic diseases and emphasizing their role in promoting overall health (Dinu, Abbate, Gensini, Casini & Sofi, 2017; Glenn et al., 2019; Lee & Park, 2017). However, some studies have suggested a relationship between vegetarian diet and disordered eating, with vegetarians having a higher risk of developing eating disorders (EDs) and orthorexia nervosa (ON) (Barrack, West, Christopher & Pham-Vera, 2018; Barthels, Meyer & Pietrowsky, 2018; Novara, Pardini, Visioli & Meda, 2022; Paslakis et al., 2020). In general, vegetarians show greater attention and concern regarding the content and quality of the foods that will be consumed, aiming to have an extremely healthy diet (Dorard & Mathieu, 2020). This could be problematic, especially when concerns about weight and body shape are involved. The existing literature is conflicting on the risk of eating disorders related to vegetarianism (Barrack et al., 2018; Paslakis et al., 2020; Sieke et al., 2022) and a recent systematic review points out that the association between vegetarianism and eating disorders is more heterogeneous and depends on the type of samples and dimensions studied (Mathieu, Hanras & Dorard, 2023).

Regarding ON, which could be defined as an obsession to eat healthy and clean (Horovitz & Argyrides, 2023), many studies have suggested that it is more prevalent in vegetarians than in non-vegetarians (Barthels et al., 2018; Novara et al., 2022; Reynolds, McGowan, Smith & Rawstorne, 2023). In this way, a recent systematic review (McLean, Kulkarni & Sharp, 2022a) found a positive association between vegetarianism and ON in 15 of 16 studies included in the analysis. However, the authors pointed out that most of the reviewed articles used the ORTO-15 tool which appears to overestimate the prevalence of ON when compared to other commonly used tools, due to low internal consistency, in addition to lacking validity and reliability as described in others systematic reviews (López-Gil et al., 2023; McLean et al., 2022a).

Although a vegetarian diet offers benefits in preventing chronic diseases and promoting overall health, there is still no consensus regarding its potential link to dysfunctional eating patterns. Furthermore, we are unaware of any studies that have examined the eating behaviors of Brazilian vegetarians, leaving a gap in the understanding of this issue in Brazil.

Objective

Based on this, the objective of the present study was to evaluate the eating psychopathology and frequency of ON in adult vegetarians and compare them with non-vegetarians. We hypothesize that eating psychopathology will be more dysfunctional and orthorexia will be more frequent in vegetarians than non-vegetarians. Considering this, we believe that this paper will be highly valuable to the clinical practice of nutritionists and psychologists working with vegetarian individuals.

Method

Study Design and Sample

This cross-sectional study was conducted among vegetarian and non-vegetarian Brazilians from different locations recruited through researchers' social media. The data were collected between November 2021 and October 2022. Adult participants aged between 18 and 59 years who were vegetarian (VEG) or non-vegetarian (NVEG) were included. It was decided to include only individuals who were vegetarians before the Covid-19 pandemic, due to the impact the pandemic had on various lifestyle habits, including eating habits. To avoid potential selection bias, only those who were already vegetarians before the pandemic and remained so throughout it were included. Exclusion criteria were individuals who had a previous diagnosis of non-communicable chronic diseases or eating disorders (ED). The sample size was calculated based on studies by Sieke et al. (2022) and Barthels et al. (2018) that considered eating psychopathology (ED screening) and ON outcomes, respectively, and estimated a sample size of 156 individuals (78 in each group). The study was designed following the Declaration of Helsinki and was approved by the local ethics committee under number 2021-0415, CAAE 52208621.5.0000.5327. All participants provided written informed consent before data collection.

Data Collection

The data were collected online using Google Forms through the address https://forms.gle/2q7AnMgXk3EB2PNEA . Data collection was online due to Covid-19

pandemic, which made in-person data collection impossible. Participants answered a structured questionnaire developed by the researchers to address the following sociodemographic and general health variables: sex, age, weight, height, skin color/race, educational level, smoking status, physical activity, type of diet, motivation to become a vegetarian, and duration of vegetarianism. Vegetarian individuals were instructed to determine which type of vegetarian diet they followed based on the following classifications: a) lacto-ovo-vegetarian; b) lactovegetarian; c) ovo-vegetarian; d) strict vegetarian, and e) vegan. In addition, participants completed two additional questionnaires to screen for EDs and the presence of ON.

Assessment of Eating Psychopathology

Eating psychopathology was assessed using the Eating Disorder Examination–Questionnaire Version (EDE-Q), which is a self-report measure widely used to assess dysfunctional behaviors and attitudes and is often used to assess and diagnose EDs (Machado et al., 2014). It is a semi-structured questionnaire that assesses a range of psychopathologies, including body shape and weight concerns (Cooper & Fairburn, 1987). The EDE-Q evaluates a 28-day period and shows the frequency of key behavioral characteristics of EDs (the number of episodes of each behavior or the number of days that the behavior occurred). It also provides subscales that reflect ED severity, namely Restraint, Eating Concern, Shape Concern, and Weight Concern. The test was translated and validated to the Portuguese language by Machado et al. (2014) and showed good internal consistency with an ordinal alpha of 0.94 and reliable change indices of 0.83. To obtain each subscale score, the scores of the questions within each subscale were summed and then divided by the number of questions. For the overall score, the four subscale scores were summed, and the resulting total was divided by the number of subscales (4). For the present study, the cutoff point proposed by Machado et al. (2014) was used as >2.12 for the global screening scale for EDs. The cutoff points for the subscales were >1.49 (restraint), >1.37 (eating concern), >2.63 (weight concern), and >2.12 (shape concern).

Evaluation of Orthorexia Nervosa

To date, no tool has been considered the gold standard for determining the presence or absence of ON. We choose to use the Düsseldorf Orthorexia Scale (DOS), which is a questionnaire with good consistency and internal reliability (Barthels, Meyer & Pietrowsky, 2015; Souza, Carmo & Santos, 2021). The DOS, a German instrument is a unidimensional self-report test that assesses the tendency toward orthorexic behaviors (Barthels et al., 2015). The test was translated and validated for the Brazilian population and showed good internal consistency with an ordinal alpha of 0.795 and test-retest reliability of 0.776 (Souza et al., 2021). The application is conducted using 10 questions with the following options: "does not apply to me", "does not apply to me very much", "partly applies to me", or "applies to me." Each alternative represented a score of 1–4 points. ON is defined as a sum of points >30, with 40 being the maximum score. A score between 25 and 29 points indicates a risk of ON development (Barthels et al., 2015; Souza et al., 2021).

Statistical Analysis

Data were tested for normality using the Shapiro-Wilk test and are presented as mean ± standard deviation or median (interquartile range). The differences between the VEG and NVEG groups were evaluated using Student's T-test for parametric data or the Mann-Whitney U test for non-parametric data. Associations between vegetarianism and categorical variables were analyzed using the Chi-square test. Pearson's correlation test was used to verify the correlation between BMI and questionnaire scores. A multiple linear regression model was applied to verify the impact of BMI on the EDE-Q scores between the groups. Interaction between VEG and BMI was tested in the prediction of EDE-Q and DOS scores, in linear regression models, considering centered BMI * VEG. Data were stratified when statistically significant interactions were found. A subgroup analysis was conducted considering the type of vegetarian diet followed and the motivations for adopting vegetarianism. Statistical analyses were performed using IBM SPSS Statistics for Windows, version 21.0. Differences were considered statistically significant at $p<0.05$.

Results

Sample Characterization

A total of 227 individuals agreed to participate in the survey. After applying the eligibility criteria, the final sample consisted of 183 individuals, of which 95 VEG (51.9%) and 88 NVEG (48.1%). The median age did not differ between the groups. However, women were more frequent among VEG than NVEG, and the BMI was significantly lower in the VEG group than in the NVEG group. Skin color/race, educational level, income, smoking status, and physical activity did not differ between the groups (Table 1).

Table 1
Sociodemographic characteristics of participants (n=183)

	VEG (%)	NVEG (%)	p value
Sex			
Female	79 (83.2)	59 (67.0)	0.02
Male	16 (16.8)	29 (33.0)	
Age	24.0 (18-41)	24.0 (19-44)	0.96
BMI	22.28 ± 3.34	24.49 ± 4.0	<0.01
Education Level			
Primary education	2 (2.1)	0 (0.0)	
High school	48 (50.5)	49 (55.7)	0.35
Graduation	30 (31.6)	30 (34.1)	
Postgraduate	15 (15.8)	9 (10.2)	
Income			
1-5 salaries	48 (50.5)	44 (50.0)	0.99
5-10 salaries	33 (34.7)	31 (35.2)	
>10 salaries	14 (14.7)	13 (14.8)	
Smoking			
Never Smoked	75 (78.9)	70 (79.5)	0.90
Ex-smoker	8 (8.4)	6 (6.8)	
Smoker	12 (12.6)	12 (13.6)	
Race			
White	84 (88.4)	77 (87.5)	0.98
Brown	9 (9.5)	9 (10.2)	
Black	2 (2.1)	2 (2.3)	
Physical Activity			
No	36 (37.9)	29 (33.0)	0.53
Yes	59 (62.1)	59 (67.0)	

Data are presented as absolute (relative, %) frequencies, median (percentiles 25 – 75), or mean standard deviation, using Chi-square test, Mann-Whitney U test, or Student's T-test for independent samples. VEG: vegetarian. NVEG: non-vegetarian.

Based on the classifications of vegetarianism, 66.3% considered themselves lacto-ovo-vegetarians, 16.8% vegans, 8.4% strict vegetarians, 4.2% lactovegetarians, and 4.2% ovovegetarians. The most frequent motivations for adopting a vegetarian diet were ethical (69.5%), environmental (49.5%), health (17.9%), political/ideological (11.6%), and spiritual (4.2%) reasons. The median time adhering to vegetarianism was 4.5 (1.9–27) years.

Assessment of Eating Psychopathology

EDs were more frequent among women than men (31.2% vs. 15.6%, p=0.04), and a positive correlation was found between BMI and EDE-Q global score (r=0.41, p<0.01), independent of the diet adopted.

There was no difference between groups in the median EDE-Q global scores (VEG, 1.06 [0–4.8] vs. NVEG, 1.11 [0–4.3]; [p=0.76]). The frequency of individuals with scores compatible with EDs did not differ (p=1.00) between the VEG (27.4%) and NVEG groups (27.3%).

Table 2 shows the subscales and global EDE-Q scores, and the frequencies of related eating psychopathology dysfunctionality in both VEG and NVEG groups.

Table 2
EDE-Q global and subscale scores in vegetarians and non-vegetarians (n=183).

EDE-Q		VEG	NVEG	Cut off	p value
Global	Median (P25–P75)	1.06 [0–4.8]	1.11 [0–4.3]	2.12	0.76
	Dysfunctionality, n(%)	26 (27.4)	24 (27.3)		1.00
Restraint	Median (P25–P75)	0.40 (0–5.4)	0.80 (0–4.8)	1.49	0.26
	Dysfunctionality, n(%)	25 (26.3)	26 (29.5)		0.74
Eating Concern	Median (P25–P75)	0.20 (0–5.0)	0.20 (0–4.4)	1.37	0.63
	Dysfunctionality, n(%)	20 (21.1)	15 (17.0)		0.57

Shape Concern	Median (P25–P75)	2.0 (0–6.0)	1.93 (0–5.6)		0.80
	Dysfunctionality, n(%)	45 (47.4)	44 (50.0)	2.12	0.76
Weight Concern	Median (P25–P75)	1.60 (0–6.0)	1.40 (0–5.2)		0.94
	Dysfunctionality, n(%)	28 (29.5)	28 (31.8)	2.63	0.49

Data were analyzed using the Mann-Whitney U test for independent samples, presented as median and interquartile range, or Chi-square test, presented as absolute and relative frequencies. EDE-Q: Eating Disorder Examination – Questionnaire Version. VEG: vegetarian. NVEG: non-vegetarian.

A subgroup analysis was performed considering the EDE-Q global score and subscales, concerning the type of vegetarian diet adopted and the motivation for adhering to vegetarianism, and no significant differences were found.

Evaluation of Orthorexia Nervosa

The median score on the DOS questionnaire was higher in the VEG group than in the NVEG group (p=0.04, Table 3). VEG group presented a higher frequency of DOS ≥25 (indicative of increased risk of ON, p=0.04), although the frequency of ON in three separate categories did not differ between groups (p=0.08, Table 3). The box plots of the distribution of DOS scores in both groups are presented in Figure 1. No associations were found between the sociodemographic characteristics and ON.

Table 3

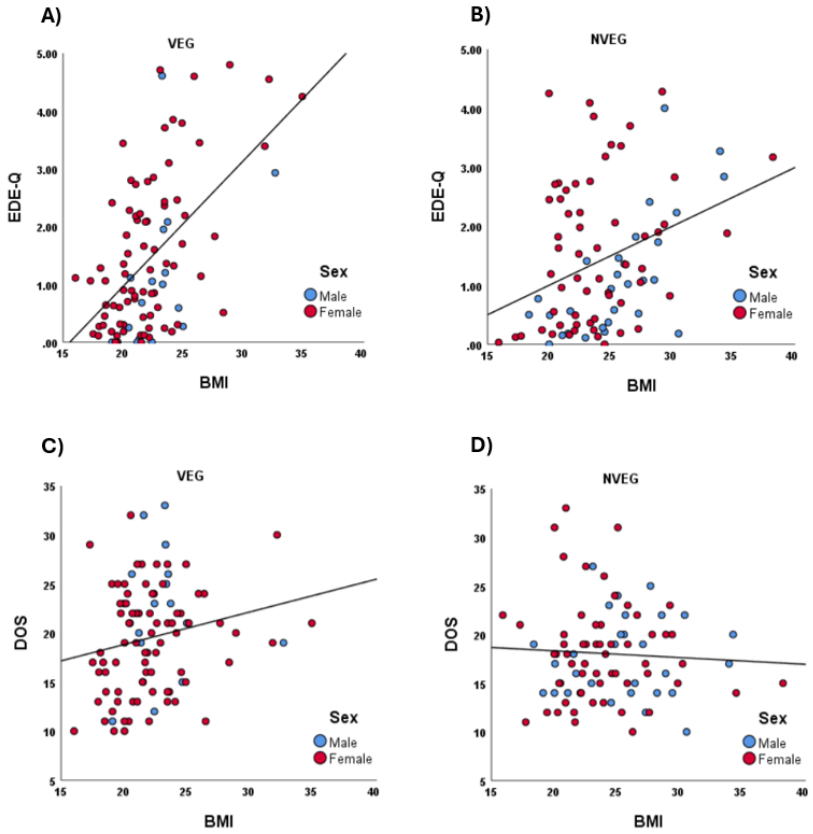
DOS scores and Orthorexia frequency in vegetarians and non-vegetarians (n=183).

DOS	VEG	NVEG	Cutoff	p value
Median (P25–P75)	20 (15 – 24)	17.5 (14 – 20.7)		0.04
Without risk, n(%)	76 (80.0)	80 (90.9)	<25	
With Risk, n(%)	15 (15.8)	5 (5.7)	25-29	0.08
Orthorexia, n(%)	4 (4.2)	3 (3.4)	>30	
With risk or Orthorexia, n(%)	19 (20)	8 (9,1)	≥25	0.04

Data were analyzed using the Mann-Whitney U test for independent samples, presented as median and interquartile range, or Chi-square test, presented as absolute and relative frequencies. DOS: Düsseldorf Orthorexia Scale. VEG: vegetarian. NVEG: non-vegetarian

Figure 1

Association between body mass index (BMI) and Eating Disorder Examination – Questionnaire (EDE-Q) and Düsseldorf Orthorexia Scale (DOS). VEG: vegetarians. NVEG: non-vegetarians.



Although no significant statistical difference was found for EDE-Q scores, Table 4 shows that VEG group presents 1.9 points (CI95% 0.3 – 3.5) higher DOS score than NVEG, even when adjusted for sex and body mass index (p=0.02).

Table 4

Adjusted mean difference between vegetarians (VEG) and non-vegetarians (NVEG) in the Eating Disorder Examination – Questionnaire Version (EDE-Q) and Düsseldorf Orthorexia Scale (DOS).

Score	Difference (95%CI): VEG - NVEG	p value
EDE-Q	0.3 (-0.1 – 0.6)	0.14
DOS	1.9 (0.3 – 3.5)	0.02

Linear regression, adjusted for sex and body mass index.

No significant differences were identified in the subgroup analysis when considering both the type of vegetarian diet followed and the motivation for adopting vegetarianism.

The interaction between VEG and BMI was significant for the EDE-Q score prediction (p=0.01). The magnitude of the association between BMI and EDE-Q was higher in the VEG group. For each 1 kg/m² increase in BMI, there was a 0.22 (CI95%: 0.16 – 0.29) point increase in the EDE-Q score in the VEG group and a 0.11 (CI95% 0.06 – 0.17) point increase in the NVEG group (p=0.01), adjusted for sex.

An indication of interaction between VEG and BMI was also observed for DOS prediction (p=0.05). While there was no association between BMI and DOS in NVEG (β= -0.06, 85% CI: -0.32 – 0.20, p=0.64) it seemed that for VEG, for each 1 kg/m² increase in BMI, there was a 0.29 (CI95%: -0.04 – 0.63, p=0.08) point increase in the DOS score, adjusted for sex.

Discussion and Conclusion

This study aimed to evaluate eating psychopathology and ON frequency in vegetarians and non-vegetarians. The sample consisted of young adults, mostly female, where the vegetarians had a lower BMI than the non-vegetarians. The main reasons for adopting a vegetarian diet were ethical and environmental reasons. Global and specific behavior analysis did not show differences between groups regarding eating psychopathology, although almost 1/3 of the sample in both groups displayed scores that were indicative of EDs. The interaction between the vegetarian group and BMI was significant for the EDE-Q score prediction. Also, the magnitude of the association between BMI and EDE-Q was higher in vegetarians. Although the frequency of ON did not differ between vegetarians and non-vegetarians, vegetarians presented a statistically significant higher DOS score than NVEG, even when adjusted for sex and body mass index.

Related to sex predominance and BMI differences, other studies have already reported these findings in vegetarians (Dorard & Mathieu, 2020; Hessler-Kaufmann et al., 2021). Women have a higher frequency of scores compatible with eating

psychopathology than men, as observed in the literature (Aykut & Bilici, 2022; Griffiths et al., 2016), which is related to higher social pressure on female body image (Carrard, Rothen & Rodgers, 2020). One reason for lower BMI values among VEG than NVEG may be related to better food quality and higher consumption of fruits, vegetables, and whole grains, while non-vegetarians seem to consume more ultra-processed foods, saturated fat, and sodium, reflecting a higher caloric intake (Hargreaves, Araújo, Nakano & Zandonadi, 2020).

The overall analysis of specific behaviors that comprise the psychopathology of EDs showed no differences between the groups. In screening for EDs, the score presented by vegetarians was lower than those reported in similar studies (McLean, Lavale, Kulkarni & Sharp, 2022b; Sieke et al., 2022). Furthermore, in the same studies, no differences were observed in dietary psychopathology between vegetarians and non-vegetarians. In addition, a recent systematic review (McLean et al., 2022a) evaluated the relationship between vegetarianism and EDs based on studies that used different tools and found no consensus among the articles evaluated. Among the studies included in the analysis, 18 found a positive association between vegetarianism and EDs, 16 found no association, and seven showed a negative association. The authors reported that the results varied according to the tool used and that, in many cases, the sample of vegetarians was much smaller than that of non-vegetarians, affecting the statistical power of the results (McLean et al., 2022a). It is noteworthy that almost 1/3 of the sample (27%) showed a positive screening for ED, regardless of the diet ingested, which may suggest the existence of other triggering factors for ED in the sample, not evaluated in this study. However, when exploring the relationship between BMI and EDE-Q, we observed that an increase in BMI had a greater impact on the degree of dysfunctional behavior in vegetarians than in non-vegetarians. To date, studies available in the literature have evaluated this correlation only in non-vegetarians (Cass, Giltrap & Talbot, 2020; Nagata et al., 2020). The mechanisms that explain this association still need to be understood and require further investigation through future studies.

Although the specific behavior assessed by the EDE-Q subscales did not differ between the groups, it is important to note that 47.4% of the sample of vegetarians and 50% of non-vegetarians had a high score on the shape concern subscale. A similar result was observed by McLean et al. (2022b), where vegetarians and non-vegetarians also had

high scores for this behavior. In a Sieke et al. (2022) study, only vegetarians were concerned about body shape. The latter further divides vegetarians into two subgroups based on the reasons why individuals do not consume meat, wherein the motivation may involve body weight or other factors. However, the results remained similar without statistical differences. This suggests that preoccupation with shape and possibly body image seems to be a trend that is independent of the diet followed or the motivation for such food choices. Regarding vegetarians, the recent systematic review of Mathieu et al. (2023) suggests that associations between vegetarianism and EDs are more consistent in patients diagnosed with an ED and/or fulfilling the relevant DSM criteria or when the reason to adopt vegetarianism was health or weight concerns.

The frequency of established ON was similar between vegetarians and non-vegetarians (4.2% and 3.4%, respectively). These findings differ from those of Barthels et al. (2018), who evaluated a sample of Germans (n=351) classified as vegans, vegetarians, occasional meat eaters (flexitarians), or frequent meat eaters. The prevalence of ON was 7.9% in vegans, 3.8% in vegetarians, 3.6% in occasional meat eaters, and 0% in frequent meat eaters. Another study carried out by Hessler-Kauffman et al. (2021) found a higher DOS tool score in vegetarians (19.0±5) when compared to semi-vegetarians (16.8±5.3) and omnivores (16.0±4.6), as found in the present study. Although the ON frequency was not different between groups, vegetarians seemed to be at higher risk for ON in our sample, as suggested by the statistically significant higher values observed when compared to non-vegetarians. According to Mathieu et al. (2023), the reason to adopt a vegetarian diet seems to be a determinant for the presence or not of orthorexia, where vegetarians and vegans motivated by health concerns are at greater risk of developing ON than those motivated by ethical reasons. This could explain the low frequency of ON found in this study, once the main motivations cited by the participants were ethical reasons and concerns about the environment. Another study conducted with Brazilian vegetarians found that 60.5% of participants adopted this lifestyle for ethical and moral reasons (Hargreaves et al., 2020).

As a limitation, we mention that the data collection was conducted online, which can make it difficult to extrapolate the results for individuals not engaging in this recruiting strategy since the use and consumption of technology are known to impact eating behavior. Furthermore, the low proportion of men compared to women,

particularly in the vegetarian group, limits our ability to gain a more robust understanding of this gender.

In conclusion, vegetarians seem to be at increased risk for ON and the association between BMI and eating psychopathology had a higher magnitude in this same group, which suggests that vegetarians may be more susceptible to concerns about weight and body shape. Considering this, we highlight the need for nutritionists and psychologists to pay closer attention to the eating behaviors of these individuals, which we consider the primary contribution of this study. Understanding the eating behaviors of a Brazilian sample is also an important contribution to advancing knowledge on this topic.

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