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Vegans, strict vegetarians, partial vegetarians, omnivores: Do they differ in food choice motives, coping, and quality of life?



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ABSTRACT

Few studies have examined the differences in food choice motivations and eating disorders associated with different types of vegetarian diets (i.e., partial, strict, vegan), even though these diets are characterized by varying degrees of food selectivity. In addition, few studies have evaluated the quality of life of those following these diets, and none have assessed coping strategies in vegetarians. The objective of this study is, thus, to compare the factors influencing food choices, eating disorders, preferred coping strategies, and the quality of life of those following different vegetarian diets. The sample included 589 adults (83.4% female—mean age = 32 years), of whom 36% were omnivores, 23% were partial vegetarians, 19% were strict vegetarians, and 22% were vegans. Participants were recruited mainly through social networking and completed a self-administered questionnaire covering their sociodemographic characteristics, food choice motivations (FCQ), eating disorders (EAT-26), coping strategies (Brief COPE), and quality of life (WHOQOL-BREF). It was found that vegetarians and vegans are more motivated by ethics, health, and naturalness in their food choices, while omnivores are more motivated by familiarity and convenience. Concerning health indicators, omnivores have a higher risk of eating disorders and use potentially more dysfunctional coping strategies than vegans. Moreover, omnivores have poorer physical health than vegans. Vegans also appear to have better psychological functioning (e.g., less risk of eating disorders, better subjective physical health) than omnivores. These results underline the necessity to differentiate among vegetarians according to the continuum of dietary restrictions to deepen the understanding of the particularities of functioning and risk associated with these selective diets.

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Introduction

Over the past several years, adopting a vegetarian diet has become a growing trend in industrialized countries, with 2.8% to 8% of the population in Europe being vegetarians [1]. Vegetarianism encompasses a wide range of diets varying in their degree of restriction of animal products [2]. Three main categories can be distinguished: *partial vegetarians* who consume fish (pesco-vegetarianism), poultry (semi-vegetarianism), or even red meat (flexitarianism); *strict vegetarians* who exclude red meat, poultry, and fish but may include animal by-products such as eggs and/or dairy products (ovo- and/or lacto-vegetarianism); and *vegans* who exclude all animal products. Thus, the degree of vegetarianism ranges on a continuum from flexitarianism (limited but not prohibited meat consumption) to veganism. The three main

categories—partial vegetarianism, strict vegetarianism, and veganism—of vegetarianism may be associated with different psychological characteristics [3,4], but these differences have been insufficiently investigated to date [2].

The food choices of vegetarians are generally more heavily influenced by health, natural content, ethics concerns, and, sometimes, weight control compared to omnivores [3–6]. However, the differences in food choices according to the type of vegetarianism have only been evaluated to a limited extent. Some researchers have conceptualized the vegetarian diet as a socially acceptable strategy for abstaining from certain food categories to lose weight or keep weight off [7,8]. In recent studies, researchers have attempted to validate this hypothesis, but only the partial vegetarian diet was significantly associated with “weight loss” motivation [3,4]. Further, authors have suggested that the adoption of partial vegetarianism may be a transition to strict vegetarianism or a cover for an eating disorder, but no study has since re-evaluated the role of motivation to control weight in partial vegetarians.

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Furthermore, numerous studies have shown that eating dysregulation and the pursuit of weight loss are associated with both a reduced ability to cope with stressful situations and the adoption of dysfunctional strategies [9,10]. Although weight loss motivation may be observed in partial vegetarians, coping strategies have never been evaluated in these individuals. Therefore, it is not possible to determine how vegetarians and vegans tend to react in a stressful situation and whether they turn to food to regulate their affects.

These abilities to cope with stressful situations, moreover, influence quality of life: active coping strategies (i.e., problem-solving, positive thinking) are generally positively associated with quality of life, while passive strategies (i.e., social support, some forms of avoidance) are positively correlated with psychological distress and negatively associated with quality of life [11,12]. Diet also influences quality of life: For example, people with eating disorders have a lower quality of life than those without eating disorders [13] and vegans have a better quality of life than partial vegetarians, strict vegetarians, and omnivores [14,15]. Katcher and colleagues (2010) [15] hypothesized that the degree of animal product restriction is positively and proportionally related to quality of life, but their study did not include omnivorous participants, so this hypothesis requires further confirmation.

Currently, few studies have distinguished between the different types of vegetarianism, and when they have, the distinction between the different diets has been too heterogeneous. Indeed, some have distinguished pesco-vegetarianism from vegetarianism (e.g., [15]), but little is known about the differences between the major diet categories (i.e., partial vegetarianism, strict vegetarianism, veganism). On the other hand, no studies have differentiated between partial vegetarians, strict vegetarians, and vegans by simultaneously assessing food choice motivation and the presence of a behavioral eating disorder, even though such an investigation would provide a better understanding of the reasons for food choice focused on weight control. Moreover, although some studies have assessed quality of life according to different vegetarian diets [14,15], this measure has not been linked to any other key psychological variable such as coping, ultimately providing little information on the observed differences. Therefore, our objective is to better identify and understand how individuals following a vegetarian diet differ by taking into account dietary selectivity. Therefore, food choice motivations and psychological dimensions such as eating disorder symptoms, coping strategies, and quality of life were compared across the vegetarian continuum by differentiating between vegan, strictly vegetarian, partially vegetarian, and omnivorous diets.

Method

Participants and procedure

Participants were recruited between February 2018 and March 2020 through calls for participation posted on social networks and directly from the investigators' social network. To participate, individuals had to be at least 18 years old, fluent in French, on a clear diet, and, for women, not pregnant.

This study was conducted in accordance with the Declaration of Helsinki [16]. Participants were informed of the study objectives, and informed consent was obtained from all participants before they accessed the online questionnaire hosted on LimeSurvey. Thus, all participants freely and voluntarily participated in this study.

Measures

Sociodemographic and dietary data

An ad-hoc questionnaire was developed to collect sociodemographic characteristics (i.e., gender, age, level of education, occupational activity) and height and weight to calculate the current,

minimal, and maximum lifetime body mass index (BMI). Dietary data included the type of diet and the frequency of organic food consumption.

Food choice questionnaire (FCQ)

The FCQ [17] is a self-reported questionnaire assessing food choices. For this study, it was adapted into French following the standard procedure (translation/back translation by native speakers; [18]). The FCQ scale comprises 36 items grouped into nine factors: health, mood, convenience, sensory appeal, natural content, price, weight control, familiarity, and ethical concerns. However, the ethical concerns scale proposed in the FCQ do not fully represent the complexity of this factor [19]. As recommended, these items were replaced by those of the ethical concerns scale developed by Lindeman and Vaananen [20], which evaluates ecological welfare, political values, and religion. Thus, this study proposed using a revised version of the FCQ, resulting in a pool of 41 items.

To ensure the construct validity of the proposed French version of the FCQ, a nine-factor confirmatory factor analysis was conducted among 589 participants. To preserve the ordinal nature of the data, the diagonal weighted least squares estimation (WLSMV) was used with a polychoric correlation matrix. All items were positively saturated only in their theoretical factors, except for the items of religion which saturated negatively and were subsequently removed. The model adjustment was analyzed using the comparative fit index (CFI > .95), the root mean square error of approximation (RMSEA < .07), and the Tucker-Lewis index (TLI > .95; [21]). Thus, the final fit (without the items of religion) was acceptable: $\chi^2(666) = 2330.54$, $p < .001$, CFI = .96, RMSEA = .065[.062-.068], TLI = .95, and WRMR = 1.66.

The French FCQ consists of 39 items rated on a four-point scale ranging from "not at all important" to "very important" assessing nine factors for food choices: health ($\alpha = .86$), mood ($\alpha = .91$), convenience ($\alpha = .88$), sensory appeal ($\alpha = .84$), natural content ($\alpha = .93$), price ($\alpha = .90$), weight control ($\alpha = .91$), familiarity ($\alpha = .86$) and ethical concerns ($\alpha = .95$). A higher factor score reflects a tendency to choose foods based on the factor.

Eating attitudes test (EAT-26)

The EAT-26 ([22,23] for the French version) is a self-reported questionnaire assessing the risk of disordered eating attitudes and behaviors. This scale is composed of 26 items divided into three distinct subscales: dieting, bulimia and food preoccupation, and oral control. A four-point scale ranging from "always" to "never" was used. A total score greater or equal to 20 indicates an excessive preoccupation about weight and a risk for an eating disorder. Due to the poor reliabilities of the subscales in the present study (i.e., .78 for dieting, .64 for bulimia and food preoccupation, and .59 for oral control.), only the total score was used ($\alpha = .88$).

Brief coping orientation to problems experienced (brief COPE)

The Brief COPE ([12,24] for the French version) is a self-administered questionnaire that measures coping strategies adopted by an individual when facing stressful situations. According to Baumstarck et al.'s [11] factorial model validated among the French sample, this scale is composed of 28 items distributed in four factors: seeking social support, problem solving, avoidance, and positive thinking. A four-point scale ranging from "I haven't been doing this at all" to "I've been doing this a lot" was used. A higher factor score reflects a greater tendency to use the strategy. In our sample, the reliabilities were acceptable (.82 for seeking social support; .80 for problem solving; .74 for avoidance; .76 for positive thinking).

World health organization quality of life-BREF (WHOQOL-BREF)

The WHOQOL-BREF ([25] included French version) is a self-administered questionnaire developed by the World Health

Organization to assess quality of life. The questionnaire comprises 24 items assessing four different factors: physical health, psychological health, social, and environment. Each item was scored on a five-point scale ranging from "very dissatisfied" to "very satisfied", "not at all" to "an extreme amount", or "never" to "always" based on the questions. The scores obtained for each factor were then transformed linearly on a scale varying from 0 to 100 [26]. The higher the domain score, the better the quality of life. In this study, the reliabilities were .73 for physical health, .83 for psychological health, .65 for social relationships, and .77 for environment.

Statistical analysis

The statistical analysis was performed with Jamovi© (1.6.23.0 version) and R Studio© (1.2.5033 version) software. Food choice motivations and psychological variables (i.e., symptoms of disordered eating, coping strategies, and quality of life) were compared by diet (i.e., omnivore, partial vegetarian, strict vegetarian, and vegan). Chi-square tests were used for categorical data with an examination of the adjusted standardized residuals (an absolute value greater than 2 indicated a significant over- or under-representation) and of the effect sizes with the V of Cramer (interpretation according to the degrees of freedom; [27]). For continuous variables, an analysis of variance (one-way ANOVA) with Tukey's pairwise comparisons tests were used. η^2 measurement was also used to calculate the effect sizes. Effect sizes were interpreted according to the reference thresholds defined by Cohen [28]: small ($\eta^2 = 0.01$), medium ($\eta^2 = 0.06$), and large ($\eta^2 = 0.14$) effects. All analyses were conducted after removing multivariate outliers ($n = 24$) using the Mahalanobis distance ($N = 589$).

Results

Sample description

Participants comprised 589 French speaking adults, including 83.4% female, with a mean age of 32 years ($SD = 11.6$ – from 18 to 71 years). Of the participants, 36% declared themselves to be omnivores, 23% partially vegetarian (i.e., flexitarians, semi-vegetarians, and pesco-vegetarians), 19% strictly vegetarian (i.e., lacto-vegetarians, ovo-vegetarians, and vegetarians), and 22% vegan.

Sociodemographic and BMI characteristics

The sociodemographic characteristics of participants according to their diet are presented in Table 1. Statistical analyses showed that males were underrepresented among partial vegetarians and that omnivores were less often unemployed than vegans. No significant differences were observed among the groups for age, marital status, and school.

ANOVA revealed a significant group effect for current BMI, with pairwise comparisons analyses indicating a trend toward a difference between the omnivore and vegan participants ($p = .053$). In addition, an ANOVA revealed a significant group effect for the lifetime lower BMI; however, pairwise comparisons did not reveal significant inter-group differences. The distribution of the BMI categories indicated that the vegans were underrepresented in the "obesity" BMI category ($BMI \geq 30$), and the vegetarians were overrepresented in the "underweight" BMI category ($BMI < 18.5$). Regarding food consumption, vegans more frequently consumed more organic food, while omnivores less frequently consumed organic food.

Comparison of food choice motives and psychological dimensions according to diets

The descriptive statistics for the psychometric scales and the between-group comparisons are shown in Table 2. Regarding food choice motivations, partial vegetarians, strict vegetarians, and vegans had significantly higher scores than omnivores on the FCQ subscales for "ethical concern", "health", and "natural content". Vegetarians and vegans were much more motivated to make ethical food choices than partial vegetarians ($p < .001$ for both comparisons). Conversely, omnivores had significantly higher scores on the FCQ "convenience" and "familiarity" subscales than the other groups, as well as significantly higher scores on the FCQ "mood" subscale than vegans ($p = .049$). Moreover, omnivores and partial vegetarians were more motivated to choose foods that were familiar to them than vegans ($p < .001$ and $p = .018$, respectively). Omnivores and partial vegetarians also had higher scores than strict vegetarians and vegans on the weight control subscale. No significant differences were observed for the "price" and "sensory appeal" FCQ subscales.

The omnivores scored significantly higher on the EAT-26 total-scale than the vegans ($p = .002$). Using the EAT-26 cut-off score, 13.8% of the sample was considered to be at risk for an eating disorder; specifically, 17.9% of the omnivores, 12.3% of the partial vegetarians, 14.3% of the strict vegetarians, and 7.9% of the vegans.

Concerning coping, vegans had higher scores than omnivores on the Brief COPE "problem solving" subscore ($p = .002$). By contrast, omnivores had significantly higher scores on the "seeking social support" subscale ($p = .020$) compared to vegans. No significant differences were observed for the "avoidance" and "positive thinking" subscales.

Regarding quality of life, vegans scored higher than omnivores on the WHOQOL-BREF "physical health" ($p = .044$) subscale, and conversely, omnivores scored significantly higher on "social relationships" subscore than partial vegetarians ($p = .048$). No significant differences were observed for "psychological health" and "environment" subscales.

Discussion

Vegetarians (i.e., partial and strict) and vegans are typically more motivated by ethics, health, and natural content in their food choices, while omnivores prefer familiar foods that are convenient to cook. Vegetarians and vegans' interest in consuming ethical and healthy foods can be seen in their more frequent consumption of organic foods, which are deemed better for health and the planet [29]. These results are consistent with the literature demonstrating that ethical and health concerns are positively correlated with the natural content of foods [30]. Furthermore, these motivations seem to increase with the level of dietary restriction. For example, strict vegetarians and vegans report more ethical concerns than partial vegetarians. As the motivations to adopt a diet tend to change and become permanent over time [2], the ethical concerns of partial vegetarians could increase, causing them to transition to a stricter diet [31].

The results showed that vegan participants have better health indicators than omnivores; that is, they are less likely to suffer from eating disorders, have a lower average body mass index (BMI), have fewer mood-related eating behaviors, and have a better physical quality of life. This better physical health that vegans reported shows that having a vegan diet can be healthy, contradicting the belief that these diets lead to deficiencies [32] and the prejudices that omnivores have against vegetarian diets [33]. In addition, faced with a stressful situation, vegans are more likely to resort to problem-solving, considered an active strategy, while omnivores rely on seeking social support, a more passive strategy. The decreased use of social support among vegans could be linked to them having a smaller social group of peers or, more simply, their preferential use of other,

Table 1
Group comparisons for sociodemographic information and BMI by diet (N = 589).

	Group A: Omnivores (n = 212)	Group B: Partial vegetarians (n = 138)	Group C: Vegetarians (n = 112)	Group D: Vegans (n = 127)	Comparisons		Pairwise comparisons	Effect size V of Cramer/ η^2
					Chi ² /F	p		
Sex % (ASR)					10.03	.018		.131
Male	22.2 (1.97)	9.4 (-2.08)	15.2 (-0.38)	16.5 (-0.03)				
Female	77.8 (-0.88)	90.6 (0.93)	84.4 (0.17)	83.5 (0.01)				
Age Mean (SD)	32.1 (12.1)	32.6 (11.9)	30.9 (10.3)	32.1 (11.7)	0.59	.695		.002
Marital status % (ASR)					0.82	.846		.013
Single	43.4 (0.21)	39.1 (-0.60)	43.8 (0.21)	43.3 (0.15)				
In couple	56.6 (-0.18)	60.9 (0.51)	56.3 (-0.18)	56.7 (-0.13)				
School degree % (ASR)					5.51	.788		.016
< Bachelor	5.2 (-0.45)	8.0 (0.98)	5.4 (-0.25)	5.5 (-0.20)				
Bachelor	20.4 (0.08)	18.1 (-0.50)	17.0 (-0.72)	24.4 (1.10)				
> Bachelor	74.4 (0.03)	73.9 (0.01)	77.7 (0.47)	70.1 (-0.49)				
Professional activity % (ASR)					21.35	.046		.064
Student	32.1 (1.02)	28.3 (-0.02)	23.4 (-1.02)	26.8 (-0.33)				
Employed	59.0 (0.44)	58.7 (0.31)	56.8 (-0.06)	51.2 (0.83)				
Unemployed	7.1 (-2.36)	10.9 (-0.66)	18.0 (1.45)	20.5 (2.37)				
Retirement	1.9 (0.02)	2.2 (0.26)	1.8 (-0.06)	1.6 (-0.24)				
Organic food consumption % (ASR)					161.52	< .001		.108
(almost) Never	44.3 (7.56)	10.9 (-2.54)	8.9 (-2.74)	2.4 (-4.54)				
At least once a week	37.7 (0.21)	42.0 (1.00)	39.3 (0.43)	27.6 (-1.72)				
At least once a day	17.0 (-5.37)	45.7 (0.97)	51.8 (1.89)	63.8 (4.14)				
Only organic food	0.9 (-1.12)	1.4 (-0.48)	0.0 (-1.51)	6.3 (3.36)				
BMI Mean (SD)								
Current	27.3 (32.4)	22.5 (3.79)	22.5 (4.90)	21.6 (3.45)	3.03	.028	A,B,C,D	.015
Lifetime higher	28.0 (25.0)	24.6 (4.93)	24.6 (5.87)	23.8 (4.09)	2.57	.053		.014
Lifetime lower	22.6 (19.5)	19.7 (2.47)	19.7 (3.14)	19.4 (2.72)	2.81	.039	A,B,C,D	.013
Current weight status % (ASR)					22.2	.008		.154
Underweight	7.5 (-1.13)	8.0 (-0.76)	16.1 (2.02)	11.0 (0.35)				
Normal	63.2 (-0.92)	72.5 (0.57)	65.2 (-0.41)	75.6 (0.98)				
Overweight	17.9 (1.56)	13.8 (-0.05)	9.8 (-1.16)	11.0 (-0.87)				
Obesity	11.3 (1.94)	5.8 (-0.78)	8.9 (0.49)	2.4 (-2.15)				

Note: Pairwise comparisons were conducted using Tukey tests. Only significant pairwise comparisons tests at p -value < .05 are indicated; the use of A,B,C,D means that there is no significant difference between the groups.

ASR: adjusted standardized residuals; bold adjusted standardized residuals reflect significant over- or under-representation; BMI: body mass index; η^2 : eta-squared; small effect: $\eta^2 = 0.01$, medium effect: $\eta^2 = 0.06$, large effect: $\eta^2 > 0.14$; SD: standard deviation; V of Cramer: the closer the V of Cramer is to 1, the stronger the link between the two variables studied.

more efficient, coping strategies before resorting to the use of social support. Problem-solving, for example, may play a role in resolving the conflict between attitudes and behavior about animal-derived food consumption. Furthermore, adopting a vegan diet may be a strategy to eliminate cognitive dissonance [34] and promote a sense of inner harmony [35]. While differences in health indicators can be observed among individuals at the ends of the continuum, it is unclear whether radical changes in diet are also a strategy for dealing with bodily discomfort (both physical and psychological).

Partial vegetarians indicated more motivation to control their weight than strict vegetarians and vegans. Although our results indicated no difference in the risk of an eating disorder, it seems that partial vegetarianism may either hide an eating disorder or be a transition to a stricter form of vegetarianism [31]. Thus, in the present study, individuals who adopt this type of diet to control their weight may experience other difficulties, such as less satisfaction in social relationships, compared to omnivores. Considering that low social support is a risk factor for developing an eating disorder [36], further investigation is needed to explore whether the lower social relationship satisfaction of partial vegetarians may be associated with eating dysregulation.

The present results should be interpreted with caution due to some limitations. First, the participants were recruited from vegetarian and vegan social media groups to obtain a large sample. However, recruitment bias is likely in this approach since all participants were interested in food, as illustrated by membership in these food groups;

additionally, some advocated vegetarianism. This method of recruitment seems also to have increased the participation of women, while age range was also important. In a future study, it will be necessary to distinguish the specificities of vegetarianism and veganism according to gender on the one hand and the age of individuals on the other. Secondly, flexitarian and semi-vegetarian participants were combined into the same group to produce groups with equivalent sizes and better statistical power. However, these two diets have specific differences [31] that may require considering them as distinct diets and food identities in future studies. Third, the prevalence of eating disorder risk obtained from the EAT-26 was high and raised questions since the subscales had poor construct validity, and it has been shown that the items poorly discriminated among individuals in some studies [37].

To overcome these limitations, it is, therefore, necessary to replicate this study by distinguishing even more finely among the different sub-types of vegetarianism (e.g., flexitarians, semi-vegetarians) to better understand their characteristics. Moreover, another eating disorder assessment questionnaire should be used as a diagnostic interview (e.g., the Mini International Neuropsychiatric Interview; [38]) to more accurately estimate the prevalence of eating disorders in vegetarians in general. In addition, a cluster approach could highlight the individual specificities of vegetarians. This would also help to improve the understanding of the differences among vegetarians motivated by weight loss or with an eating disorder and those more focused on ethical and/or health concerns. Thus, primary

Table 2
Group comparisons for eating and psychological scores by diet (N = 589).

	Group A:	Group B:	Group C:	Group D:	Comparisons		Pairwise comparisons	Effect size
	Omnivores (n = 212)	Partial vegetarians (n = 138)	Vegetarians (n = 112)	Vegans (n = 127)	F	p		η^2
FCQ Mean (SD)								
Convenience	3.18 (0.78)	2.96 (0.73)	3.02 (0.84)	2.80 (0.75)	6.17	< .001	A > B,C,D	.030
Ethical concern	2.47 (0.96)	3.27 (0.76)	3.71 (0.51)	3.83 (0.37)	118.9	< .001	C,D > B > A	.379
Familiarity	2.29 (0.90)	1.96 (0.79)	1.84 (0.79)	1.67 (0.74)	17.45	< .001	A > B > C,D	.082
Health	2.70 (0.78)	3.01 (0.74)	3.10 (0.66)	3.17 (0.64)	14.54	< .001	B,C,D > A	.069
Mood	2.81 (0.84)	2.83 (0.77)	2.81 (0.82)	2.57 (0.87)	2.98	.031	A > D	.015
Natural content	2.78 (0.94)	3.38 (0.73)	3.34 (0.84)	3.34 (0.77)	34.3	< .001	B,C,D > A	.145
Price	2.75 (0.80)	2.75 (0.84)	2.78 (0.78)	2.69 (0.78)	0.29	.830		.001
Sensory appeal	3.57 (0.58)	3.51 (0.62)	3.45 (0.66)	3.41 (0.66)	2.11	.098		.011
Weight control	2.37 (0.96)	2.48 (0.95)	2.09 (0.96)	1.98 (0.85)	8.47	< .001	A > B > C,D	.041
EAT-26 Mean (SD)	12.2 (9.06)	11.5 (9.25)	10.3 (7.87)	9.54 (8.02)	2.93	.033	A > D	.015
Brief COPE Mean (SD)								
Seeking social support	2.37 (0.57)	2.29 (0.51)	2.37 (0.55)	2.19 (0.57)	3.35	.019	A > D	.017
Problem solving	2.57 (0.62)	2.69 (0.59)	2.65 (0.60)	2.81 (0.66)	4.31	.005	D > A	.021
Avoidance	1.92 (0.41)	1.84 (0.37)	1.89 (0.36)	1.84 (0.40)	1.53	.206		.007
Positive thinking	2.42 (0.51)	2.50 (0.48)	2.52 (0.61)	2.51 (0.52)	1.31	.272		.006
WHOQOL-BREF Mean (SD)								
Physical health	71.2 (16.3)	72.4 (16.4)	71.2 (17.9)	76.2 (16.6)	2.66	.047	D > A	.014
Psychological health	63.6 (15.3)	62.5 (18.8)	61.1 (18.9)	64.9 (19.1)	1.03	.379		.005
Social relationships	65.4 (17.7)	59.7 (19.7)	59.6 (21.6)	65.7 (22.2)	4.13	.007	A > B	.021
Environment	70.1 (12.7)	71.4 (15.2)	69.8 (14.0)	72.2 (16.8)	0.84	.474		.004

Note: Pairwise comparisons were conducted using Tukey tests. Only significant pairwise comparisons tests at p -value < .05 are indicated. The use of A,B means that there is no significant difference between the two groups, as opposed to A > B which means that group A had significantly higher scores than group B.

Brief COPE: Brief Coping Orientation to Problems Experienced; EAT-26: Eating Attitudes Test; FCQ: Food Choice Questionnaire; η^2 : eta-squared; small effect: $\eta^2 = 0.01$, medium effect: $\eta^2 = 0.06$, large effect: $\eta^2 > 0.14$; SD: standard deviation; WHOQOL-BREF: World Health Organization Quality of Life-BREF.

interventions could be developed and implemented to prevent eating disorders and more global health issues in this population.

Partial vegetarians are more motivated in their food choices by weight control compared to strict vegetarians and vegans. It is therefore important to be particularly attentive to the dietary restrictions of these individuals, as they could be part of an eating disorder (i.e., prodrome, compensatory behavior). It is therefore important for health professionals to be able to assess the motivations of individuals to follow a diet such as flexitarianism or semi-vegetarianism in order to identify possible eating difficulties. However, the reasons given by individuals for their dietary restrictions may sometimes be erroneous in order to mask the eating difficulties. Therefore, the assessment of motivations could be combined with BMI monitoring to document the level of restriction and provide early intervention for eating disorders.

Conclusion

This study is the first to compare food choice motivations, eating disorder symptoms, coping strategies, and quality of life in omnivores, partial vegetarians, strict vegetarians, and vegans. Food motivations distinguish vegetarians from omnivores, and eating disorder symptoms, coping, and physical health can differentiate vegetarians from omnivores. It is, therefore, necessary to differentiate among the various types of vegetarianism in future studies to better understand how these individuals who have adopted a selective diet differ. In addition, it is important to be vigilant of omnivores and partial vegetarians who are motivated by weight loss in their food choices, as this can be associated with an eating disorder. Thus, it is necessary to recognize both the food identity and the underlying motivations of individuals to offer them suitable psychological support.

Human and animal rights

This article does not contain any studies with animals performed by any of the authors. All procedures performed in studies involving human participants were in accordance with the ethical standards of

the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

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References

- [1] FranceAgriMer. (2019). Combien de végétariens en Europe ? Synthèse des résultats à partir de l'étude « Panorama de la consommation végétarienne en Europe ». https://www.franceagrimer.fr/fam/content/download/62309/document/11_Synthèse%20Panorama%20végétarisme%20en%20Europe.pdf?version=1
- [2] Rosenfeld DL. The psychology of vegetarianism: recent advances and future directions. *Appetite* 2018;131:125–38 Dec. doi: 10.1016/j.appet.2018.09.011.
- [3] Forestell CA, Spaeth AM, Kane SA. To eat or not to eat red meat. A closer look at the relationship between restrained eating and vegetarianism in college females. *Appetite* 2012;58(1):319–25 Feb. doi: 10.1016/j.appet.2011.10.015.
- [4] Timko CA, Hormes JM, Chubski J. Will the real vegetarian please stand up? An investigation of dietary restraint and eating disorder symptoms in vegetarians versus non-vegetarians. *Appetite* 2012;58(3):982–90 Jun. doi: 10.1016/j.appet.2012.02.005.
- [5] Cruwys T, Norwood R, Chachay VS, Ntontis E, Sheffield J. "An Important Part of Who I am": the predictors of dietary adherence among weight-loss, vegetarian, vegan, paleo, and gluten-free dietary groups. *Nutrients* 2020;12(4):970. Apr. doi: 10.3390/nu12040970.
- [6] Dorard G, Mathieu S. Vegetarian and omnivorous diets: a cross-sectional study of motivation, eating disorders, and body shape perception. *Appetite* 2021;156:104972 Jan. doi: 10.1016/j.appet.2020.104972.
- [7] Gilbody SM, Kirk SF, Hill AJ. Vegetarianism in young women: another means of weight control? *Int J Eat Disord* 1999;26(1):87–90 Jul. doi: 10.1002/(SICI)1098-108X(199907)26:1<87::AID-EAT11>3.0.CO;2-M.
- [8] O'Connor MA, Touyz SW, Dunn SM, Beumont PJ. Vegetarianism in anorexia nervosa? A review of 116 consecutive cases. *Med J Aust* 1987;147(11-12):540–2 Dec. doi: 10.5694/j.1326-5377.1987.tb133677.x.

- [9] Fitzsimmons EE, Bardone-Cone AM. Differences in coping across stages of recovery from an eating disorder. *Int J Eat Disord* 2010;43(8):689–93 Nov. doi: [10.1002/eat.20781](https://doi.org/10.1002/eat.20781).
- [10] Hernando A, Pallás R, Cebolla A, García-Campayo J, Hoogendoorn CJ, Roy JF. Mindfulness, rumination, and coping skills in young women with eating disorders: a comparative study with healthy controls. *PLoS One* 2019;14(3):e0213985 Mar. doi: [10.1371/journal.pone.0213985](https://doi.org/10.1371/journal.pone.0213985).
- [11] Baumstarck K, Alessandrini M, Hamidou Z, Auquier P, Leroy T, Boyer L. Assessment of coping: a new french four-factor structure of the brief COPE inventory. *Health Qual Life Outcomes* 2017;15(1):8. Jan 11. doi: [10.1186/s12955-016-0581-9](https://doi.org/10.1186/s12955-016-0581-9).
- [12] Muller L, Spitz E. Evaluation multidimensionnelle du coping: validation du Brief COPE sur une population française [multidimensional assessment of coping: validation of the Brief COPE among French population]. *Encephale* 2003;29(6):507–18 Nov-Dec.
- [13] Ágh T, Kovács G, Supina D, Pawaskar M, Herman BK, Vokó Z, Sheehan DV. A systematic review of the health-related quality of life and economic burdens of anorexia nervosa, bulimia nervosa, and binge eating disorder. *Eat Weight Disord* 2016;21(3):353–64 Sep. doi: [10.1007/s40519-016-0264-x](https://doi.org/10.1007/s40519-016-0264-x).
- [14] Hargreaves SM, Nakano EY, Han H, Raposo A, Ariza-Montes A, Vega-Muñoz A, Zandonadi RP. Quality of life of Brazilian vegetarians measured by the WHOQOL-BREF: influence of type of diet, motivation and sociodemographic data. *Nutrients* 2021;13(8):2648. Jul 30. doi: [10.3390/nu13082648](https://doi.org/10.3390/nu13082648).
- [15] Katcher HI, Ferdowsian HR, Hoover VJ, Cohen JL, Barnard ND. A worksite vegan nutrition program is well-accepted and improves health-related quality of life and work productivity. *Ann Nutr Metab* 2010;56(4):245–52. doi: [10.1159/000288281](https://doi.org/10.1159/000288281).
- [16] World Medical Association. World medical association declaration of Helsinki: ethical principles for medical research involving human subjects. *JAMA* 2013;310(20):2191–4 Nov 27. doi: [10.1001/jama.2013.28105](https://doi.org/10.1001/jama.2013.28105).
- [17] Steptoe A, Pollard TM, Wardle J. Development of a measure of the motives underlying the selection of food: the food choice questionnaire. *Appetite* 1995;25(3):267–84 Dec. doi: [10.1006/appe.1995.0061](https://doi.org/10.1006/appe.1995.0061).
- [18] Sousa VD, Rojjanasrirat W. Translation, adaptation and validation of instruments or scales for use in cross-cultural health care research: a clear and user-friendly guideline. *J Eval Clin Pract* 2011;17(2):268–74 Apr. doi: [10.1111/j.1365-2753.2010.01434.x](https://doi.org/10.1111/j.1365-2753.2010.01434.x).
- [19] Souza AM, Bezerra IWL, Pereira GS, Torres KG, Costa RM, Oliveira AG. Relationships between motivations for food choices and consumption of food groups: a prospective cross-sectional survey in manufacturing workers in Brazil. *Nutrients* 2020;12(5):1490. May 20. doi: [10.3390/nu12051490](https://doi.org/10.3390/nu12051490).
- [20] Lindeman M, Väänänen M. Measurement of ethical food choice motives. *Appetite* 2000;34(1):55–9 Feb. doi: [10.1006/appe.1999.0293](https://doi.org/10.1006/appe.1999.0293).
- [21] Hooper D, Coughlan JP, Mullen MR. Structural equation modelling: guidelines for determining model fit. *Electron J Bus Res Methods* 2008;6(1):53–60. doi: [10.21427/D7CF7R](https://doi.org/10.21427/D7CF7R).
- [22] Garner DM, Garfinkel PE. The eating attitudes test: an index of the symptoms of anorexia nervosa. *Psychol Med* 1979;9(2):273–9 May. doi: [10.1017/s0033291700030762](https://doi.org/10.1017/s0033291700030762).
- [23] Leichner P, Steiger H, Puentes-Neuman G, Perreault M, Gottheil N. Validation d'une échelle d'attitudes alimentaires auprès d'une population québécoise francophone [Validation of an eating attitude scale in a French-speaking Quebec population]. *Can J Psychiatry* 1994;39(1):49–54 Feb. doi: [10.1177/070674379403900110](https://doi.org/10.1177/070674379403900110).
- [24] Carver CS. You want to measure coping but your protocol's too long: consider the brief COPE. *Int J Behav Med* 1997;4(1):92–100. doi: [10.1207/s15327558ijbm04016](https://doi.org/10.1207/s15327558ijbm04016).
- [25] The Whoqol Group. Development of the world health organization WHOQOL-BREF quality of life assessment. *Psychol Med* 1998;28(3):551–8 May. doi: [10.1017/S0033291798006667](https://doi.org/10.1017/S0033291798006667).
- [26] World Health Organization. WHOQOL-BREF: Introduction, administration, scoring and generic version of the assessment: field trial version. World Health Organization; 1996 <https://apps.who.int/iris/handle/10665/63529>.
- [27] Kim HY. Statistical notes for clinical researchers: Chi-squared test and Fisher's exact test. *Restor Dent Endod* 2017;42(2):152–5 May. doi: [10.5395/rde.2017.42.2.152](https://doi.org/10.5395/rde.2017.42.2.152).
- [28] Cohen J. *Statistical power analysis for the behavioral sciences*. 2nd éd. Hillsdale: Lawrence Erlbaum; 1988.
- [29] Forman J, Silverstein J, Nutrition CO. Committee on nutrition and council on environmental health. Organic foods: health and environmental advantages and disadvantages. *Pediatric* 2012;130(5):e1406–15. doi: [10.1542/peds.2012-2579](https://doi.org/10.1542/peds.2012-2579).
- [30] Dikmen D, Inan-Eroglu E, Göktaş Z, Barut-Uyar B, Karabulut E. Validation of a Turkish version of the food choice questionnaire. *Food Qual Prefer* 2016;52:81–6 Sep. doi: [10.1016/j.foodqual.2016.03.016](https://doi.org/10.1016/j.foodqual.2016.03.016).
- [31] Forestell CA. Flexitarian diet and weight control: healthy or risky eating behavior? *Front Nutr* 2018;5:59. Jul. doi: [10.3389/fnut.2018.00059](https://doi.org/10.3389/fnut.2018.00059).
- [32] Bakaloudi DR, Halloran A, Rippin HL, Oikonomidou AC, Dardavesi TI, Williams J, Wickramasinghe K, Breda J, Chourdakis M. Intake and adequacy of the vegan diet. A systematic review of the evidence. *Clin Nutr* 2021;40(5):3503–21 May. doi: [10.1016/j.clnu.2020.11.035](https://doi.org/10.1016/j.clnu.2020.11.035).
- [33] Sédova I, Slovak L, Jezkova I. Coping with unpleasant knowledge: meat eating among students of environmental studies. *Appetite* 2016;116:415–24 Dec. doi: [10.1016/j.appet.2016.08.102](https://doi.org/10.1016/j.appet.2016.08.102).
- [34] Rothgerber H. Efforts to overcome vegetarian-induced dissonance among meat eaters. *Appetite* 2014;79(1):32–41 Aug. doi: [10.1016/j.appet.2014.04.003](https://doi.org/10.1016/j.appet.2014.04.003).
- [35] Mathieu S, Dorard G. Végétarisme, végétalisme, véganisme: aspects motivationnels et psychologiques associés à l'alimentation sélective [Vegetarianism and veganism lifestyle: Motivation and psychological dimensions associated with selective diet]. *Presse Med* 2016;45(9):726–33 Sep. doi: [10.1016/j.psf.2020.09.006](https://doi.org/10.1016/j.psf.2020.09.006).
- [36] Lambert C. Perceptions of social support and eating disorder characteristics. *Health Care Women Int* 2010;31(2):170–8 Feb. doi: [10.1080/07399330902893846](https://doi.org/10.1080/07399330902893846).
- [37] Nasser M. The EAT speaks many languages: Review of the use of the EAT in eating disorders research. *Eat Weight Disord* 1997;2(4):174–81 Mar. doi: [10.1007/BF03339972](https://doi.org/10.1007/BF03339972).
- [38] Sheehan DV, Lecrubier Y, Sheehan KH, Amorim P, Janavs J, Weiller E, Hergueta T, Baker R, Dunbar GC. The Mini-International Neuropsychiatric Interview (M.I.N.I.): the development and validation of a structured diagnostic psychiatric interview for DSM-IV and ICD-10. *J Clin Psychiatry* 1998;59(Suppl 20):22–33 quiz 34–57.