



## Article

# Associations between Overweight and Obesity and Common Mental Disorders and Eating Behaviors of Adult Women

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**Abstract:** Background: Obesity is a serious public health concern, challenging health professionals worldwide. Women with obesity have an increased risk of triggering psychological disorders, due to the weight stigma. Stigmatization of weight-related health correlates with behavior and contributes to a vicious cycle of obesogenic processes. Objective: Our objective is to analyze the association between the presence of mental suffering, risk of mental disorders, and eating behaviors in lean, overweight, and obese women. Methods: A total of 169 adult women aged between 20 and 39 years were included, and participants signed the informed consent, answered a questionnaire on eating habits, the Self Report Questionnaire (SRQ-20), the Scale of Depression, Anxiety and Stress (DASS-21), and the Three-Factor Eating Questionnaire—R21 (TFEQ-R21). Results: The presence of mental suffering was higher in the lean group (26.9%) compared to the overweight and obese group (57.8%). The overweight and obese group had significantly higher scores for the SRQ, DASS, and TFEQ-R21 ( $p = 0.001$  for all analyses), except when evaluating cognitive restraint. Several correlations among scores were found and summarized. There was no significant effect of body mass index on emotional eating, albeit body mass index exerts effects on the DASS score and on binge eating behavior, both of which present mediation effects on emotional eating. Conclusions: These results support the connection between mental health status and the presence of overweight and obesity and emphasize that mental health risks also need specific targeting in public policy.

**Keywords:** obesity; mental disorders; eating behavior

## 1. Introduction

Obesity is defined by the World Health Organization as an abnormal or excessive accumulation of fat in the body that can cause numerous changes in body functions and even behavior [1]. By 2025, it is estimated that 2.3 billion adults around the world will be overweight, with 700 million individuals at risk for obesity [2]. Importantly, obesity leads people to live shorter, and lowers quality of life, whilst researchers have identified that obesity has been caused by changes faced in economic, social, and physical environments [1–3]. In women, there are several factors that are identified as the main causes for the development of obesity, either due to aging or changes in activities and lifestyle, including the decrease in physical activity and increase in the consumption of high energy density. Obese women have reduced reproductive capacity and an increased risk of harmful health effects, even triggering psychological disorders [4].

Moreover, obesity is a stressful state, mainly due to weight stigma which recently gained attention as an essential factor modulating health-related behaviors, ultimately contributing to weight gain and difficulty of weight loss [5]. Notably, stress is related to other common disorders (CMDs), which are described as cognitive, emotional, and behavioral disorders that can compromise mental functioning and affect individuals from

childhood and adolescence to adulthood [6]. Several epidemiological studies support the information that CMDs are approximately twice as prevalent in women as in men. Women have more depression, such as suicidal ideation, compared to young men, as they are more prone to substance use and risky behaviors [7,8]. Moreover, it is important to emphasize that genetic, physiological, psychological, and social factors are among the proposed explanations for this pattern of mental health in women, who are also more frequently exposed to stressful conditions, such as domestic and sexual violence [3,4]. Similarly, women are more vulnerable to weight-related stereotype threats and weight-related stigma experiences are more common for women, causing harmful impacts on mental health [9]. In this context, a link between mental health and obesity has been proposed, as negative emotional experiences are recognized to induce physiological and behavioral changes that contribute to obesogenic processes [5–10]. Studies suggest that pathways linking poor mental health and obesity are often attempts by individuals to cope with negative emotional aspects of stress, and since stigmatization of weight is also a trigger for mental stress, this creates a vicious cycle wherein weight stigma begets weight gain [10,11].

Therefore, psychological factors influence human eating behavior, depression, anxiety, and consequently, feelings of tension are identified as activators of binge eating that lead the individual to self-contempt, rejection of their body shape, stress, and damage to their interpersonal relationships [12]. Recently, obesogenic eating behaviors were attributed to hedonic pathways in the human brain, which can override the homeostatic mechanisms to increase body weight. Importantly, there are similar mechanisms between hedonic pathways triggered by food compared with other addictive substances, and the entity of eating behavior remains controversial [13]. Overweight and obese people are generally not satisfied with the same amount of food as people with an ideal weight, and when they decrease their intake, they lose weight and the brain knows that the body needs to save energy and reduce calories, a fact that can cause hormonal changes, increasing hunger and weight gain again [13,14].

Excess weight and common mental disorders (CMD) or mental distress are relevant public health problems that are growing in the population worldwide and have drawn the attention of researchers to determine a causal relationship between them [12]. In view of the relevance of these diseases to public health and the growth of their prevalence in recent years, the potentially harmful outcomes in the current and future health scenarios of our population remain a matter of concern [15,16]. Therefore, this study aims to analyze the association between the presence of mental suffering, risk of mental disorders, and eating behaviors in lean, overweight, and obese women.

## 2. Materials and Methods

### 2.1. Participants and Study Design

This is a cross-sectional study carried out at a local university center (Centro Universitário Metodista) in the metropolitan region of Porto Alegre. The sample size was non-probabilistic by convenience and consisted of adult women living in the metropolitan region of Porto Alegre, Rio Grande do Sul (south region of Brazil). Adult women aged between 20 and 39 years were included, who answered a sequence of questionnaires. This age group was defined in accordance with the proposed stratification for the population by the agency responsible for the official collection of statistical information in Brazil, the “Instituto Brasileiro de Geografia e Estatística” (IBGE—available online at <https://www.ibge.gov.br/> accessed on 1 March 2021) [17]. For participation, inclusion criteria required participants to be able to answer the questionnaire, not be undergoing psychological or psychiatric treatment, and not be participating in any systematic weight loss program. Participants who did not perform all the proposed assessments or had a diagnosed CMD were excluded. Volunteers were recruited through publicity on social networks, newspapers, and telephone contact. All protocols followed the recommendations of the Declaration of Helsinki and were approved by the research ethics committee of the institution (reg.

no. 34238720.4.0000.5308). The study was divided into two stages: On the first visit to the laboratory, the participants signed the informed consent, answered a questionnaire on eating habits based on Brazilian Dietary Guidelines, and performed an assessment of body mass and height. In the second visit, participants responded to the Self-Report Questionnaire (SRQ-20), the Depression, Anxiety, and Stress Scale (DASS-21), and the Three-Factor Eating Questionnaire R21 (TFEQ-R21) for mental health and eating behavior assessment. All evaluations were performed by a trained team of nutrition undergraduates.

## 2.2. Nutritional Status and Food Consumption

Participants had their height and body mass measured (Urano scale with stadiometer, Rio Grande do Sul, Brazil) for the calculation of body mass index (BMI) with the formula  $\text{Body mass}/\text{Height}^2$ . Patients were grouped according to their BMI groups: “Lean group” ( $\text{BMI} = 18.5\text{--}24.9 \text{ kg/m}^2$ ) and “overweight and obese group” ( $\text{BMI} > 25\text{--}34.9 \text{ kg/m}^2$ ) [18]. The diet quality and qualitative evaluation of eating habits were obtained by specific questionnaires from the nutrition guidelines for the Brazilian population [19]. The questionnaire consists of 24 items, which must be indicated using a Likert scale: “strongly disagree”; “I disagree”; “I agree”; and “strongly agree”, corresponding to the usual aspects of eating. The scale score is computed by the simple sum of the responses to these items (which are assigned values from 0 to 3), which can range from 0 to 72 as the maximum value. The classification is as follows: Excellent and healthy diet and dietary habits (above 41 points); Good habits, but needing improvements (between 31 and 41 points), and less than 31 points indicates a need for overall improvement in dietary habits. This instrument was validated and includes the four dimensions of the Food Guide: planning; home organization; choice of foods; and ways of eating [20].

## 2.3. Mental Health and Eating Behavior Assessments

The Self-Report Questionnaire—SRQ-20 was used, which is composed of 20 questions with results based on the quantities of “Yes” (1 point) and “No” (0 points) answers. The cutoff point adopted for the presence of a non-psychotic mental disorder was 7, as in this score, the sensitivity for the presence of a non-psychotic mental disorder is 86.33% and the specificity of 89.31%, with positive and negative predictive values of 76.43% and 94.21%, respectively [21]. The Depression, Anxiety, and Stress Scale (DASS-21) was also used, consisting of a set of three four-point Likert-type subscales (0, 1, 2, and 3). Each DASS subscale consists of seven items, aiming to assess the emotional states of depression, anxiety, and stress. The participant expressed the degree of agreement from “I totally disagree” (0 points) to “I totally agree” (3 points). The presence of depression, anxiety, and stress symptoms were considered positive when scores in the respective subscales were  $\geq 10$ ,  $\geq 8$ , and  $\geq 15$ , respectively [22]. Eating behavior was assessed using the three-factor eating questionnaire—R21 (TFEQ-R21), validated in Portuguese [23]. To determine the degrees of cognitive restriction, emotional eating, and eating disorder, classification instructions were used using a 4-point response format for items 1 to 20 and an 8-point numerical rating scale for question 21. The mean of each of the behavior variables was calculated and transformed into a scale from 0 to 100 points. It is considered that higher scores indicate the presence of each of the behaviors. The presence of binge eating, cognitive restraint, and emotional eating behavior was considered positive when scores in the respective subscales were  $\geq 33$ .

## 2.4. Statistical Analysis

The general description of the selected data is available through simple and relative frequencies, adopting for analysis the association between the variables defined in the performance of the chi-square test. The normality of distributions of all variables were evaluated using the Shapiro–Wilk test. Student’s *t* test for independent samples or the Mann–Whitney test was used to compare data between groups. Moreover, Cohen’s *d* and the effect sizes were computed for each comparison using the *t* test and *df* values. Spearman’s rho was used to evaluate the correlations between different variables. To evaluate the correlation between mental health scores and BMI, we used logistic regression where regression coefficients (*B*) were obtained for each variable, and when the Wald test values were significant, the odds ratio was calculated to indicate percentage changes ( $\text{Exp}(B) - 100$ ). Interactions and mediation effects were assessed between variables using specific approaches with the PROCESS package for the Statistical Package for Social Sciences (SPSS) [24]. Briefly, we tested if the DASS score (focal independent variable) could predict the binge eating score (continuous outcome variable) and if this effect is mediated by emotional eating (continuous moderator variable) using “Model 4” of the PROCESS package. We further explored if BMI (focal independent variable) could predict the emotional eating score (continuous outcome variable) and if this effect is mediated by both the DASS and binge eating scores (sequential moderators 1 and 2), using “Model 6” of the PROCESS package. Prediction and moderation coefficients were considered significant when  $p < 0.05$  [24]. Significant correlations and differences were considered where  $p < 0.05$ . All data were analyzed using the Statistical Package for Social Sciences (SPSS) 26.0 statistical program.

## 3. Results

### 3.1. Lean Participants Presented Better Dietary Habits

A total of 169 women aged 20 to 39 years were evaluated, as shown in Table 1. Among the 169 women evaluated, 105 participants were classified as lean. The overweight and obese group was composed of 64 participants, with 25 being overweight, 28 being obesity grade I, and 11 being obesity grade II (39.1, 43.8, and 17.2% of the group, respectively). Regarding the classification of the dietary habits according to the food guide, the lean group presented a significantly higher score ( $p = 0.001$ ); the majority of the lean group was classified as “excellent” ( $n = 76$ , 72.4%) and “good” ( $n = 24$ , 22.9), while only five participants (4.8) had their diets evaluated as “need to change”. In the overweight and obese group, 24 participants presented “excellent” dietary habits (37.5%), 23 presented “good” (35.9%), and 17 (26.6%) had their diets evaluated as “need to change”. Most of the participants from the lean group ( $n = 84$ , 80%) were regular exercise practitioners, while only 29 participants from the overweight and obese group (45.3%) declared that they exercised regularly.

**Table 1.** Sample characteristics.

	Lean (n = 105)	Overweight and Obese (n = 64)	<i>p</i> Value
Age (years)	29.88 ± 5.2	30.35 ± 5.4	0.575
Body Mass Index (kg/m <sup>2</sup> )	22.20 ± 1.8	31.57 ± 4.6	0.001 *
Diet Quality Score	46.79 ± 9.1	37.37 ± 9.5	0.001 *
<b>Classification of the Nutritional Status (n (%))</b>			
Eutrophic	105 (100%)	0 (0%)	-
Overweight	0 (0%)	25 (39.1%)	-
Obese grade I	0 (0%)	28 (43.8%)	-
Obese grade II	0 (0%)	11 (17.2%)	-

Data presented as mean ± standard deviation. \* Significant difference (Student’ *t* test for independent samples).

### 3.2. Overweight and Obese Group Had Higher Scores for Risk of Mental Disorders, Emotional Eating, and Bingeing Behaviors

Regarding the assessments with the questionnaires, we identified the presence of mental suffering in 65 participants: 28 from the lean group (26.9%) and 37 from the overweight and obese group (57.8%). Moreover, the overweight and obese group had significantly higher scores for the SRQ, DASS, and TFEQ-R21, except when evaluating the “cognitive restraint” subscale of the TFEQ-R21 questionnaire. Cohen’s *d* and effect-size analysis indicated a magnitude of  $-0.48$  to  $-0.72$  for the SRQ and the DASS scores, whereas regarding the TFEQ-R21 subscales, emotional eating presented the highest values in this analysis, followed by the binge eating score (Table 2).

**Table 2.** Mental health and eating behavior scores.

	Lean (n = 105)	Overweight and Obese (n = 64)	<i>p</i> value	Cohen’s <i>d</i>	Effect-Size <i>r</i>
SRQ-20 Score	4.92 ± 3.3	7.32 ± 4.4	0.001 **	−0.72	0.34
DASS Score	10.36 ± 7.8	16.09 ± 11.23	0.001 **	−0.71	0.33
Depression Scale Score	2.62 ± 2.7	4.73 ± 4.55	0.001 **	−0.69	0.32
Anxiety Scale Score	2.73 ± 3.1	4.71 ± 3.8	0.001 **	−0.65	0.31
Stress Scale Score	5.15 ± 3.15	6.64 ± 3.8	0.007 **	−0.48	0.23
Binge Eating Score	34.33 ± 20.4	48.61 ± 22.9	0.001 **	−0.74	0.34
Cognitive Restraint Score	50.16 ± 23.4	43.74 ± 19.6	0.069	0.31	0.15
Emotional Eating Score	37.66 ± 27.90	60.24 ± 28.55	0.001 **	−0.87	0.40

Data presented as mean ± standard deviation. \*\* Significant difference (Mann–Whitney test).

### 3.3. Body Mass Index, Mental Health and Eating Behavior Scores Present Several Correlations

There was a significant association between the presence of mental suffering (SRQ ≥ 7) and BMI classification ( $p$  Qui-Square = 0.001). Regarding the relationship of BMI and the variables, the logistic regression results are shown in Table 3. The odds ratio indicated that each unitary gain in BMI increases the chances of the presence of mental suffering, depression, anxiety, and stress symptoms, whilst also increasing the chances of binge eating and emotional eating behavior. Several correlations among scores were found and are summarized in Table 4. To further explore all the relationships, two different mediation analyses were performed (Figure 1). Model 1 (Figure 1a) shows the effect of the DASS score on binge eating behavior and identifies the mediation effect of emotional eating. Model 2 identifies no significant effect of body mass index on emotional eating, albeit body mass index exerts effects in the DASS score and in the binge eating behavior, both of which present mediation effects on emotional eating.

**Table 3.** Logistic regression regarding body mass index and the presence of mental health and behavioral symptoms.

	<i>p</i> Value	95% C.I. for EXP(B)		Odds Ratio (%)
Mental Suffering	0.001	1.05	1.187	11.6
Depression	0.001	1.054	1.245	14.5
Anxiety	0.001	1.058	1.204	12.9
Stress	0.009	0.941	1.257	8.8
Binge Eating	0.001	1.08	1.25	16.2
Cognitive Restraint	0.884	0.94	1.075	0.5
Emotional Eating	0.004	1.035	1.203	11.6

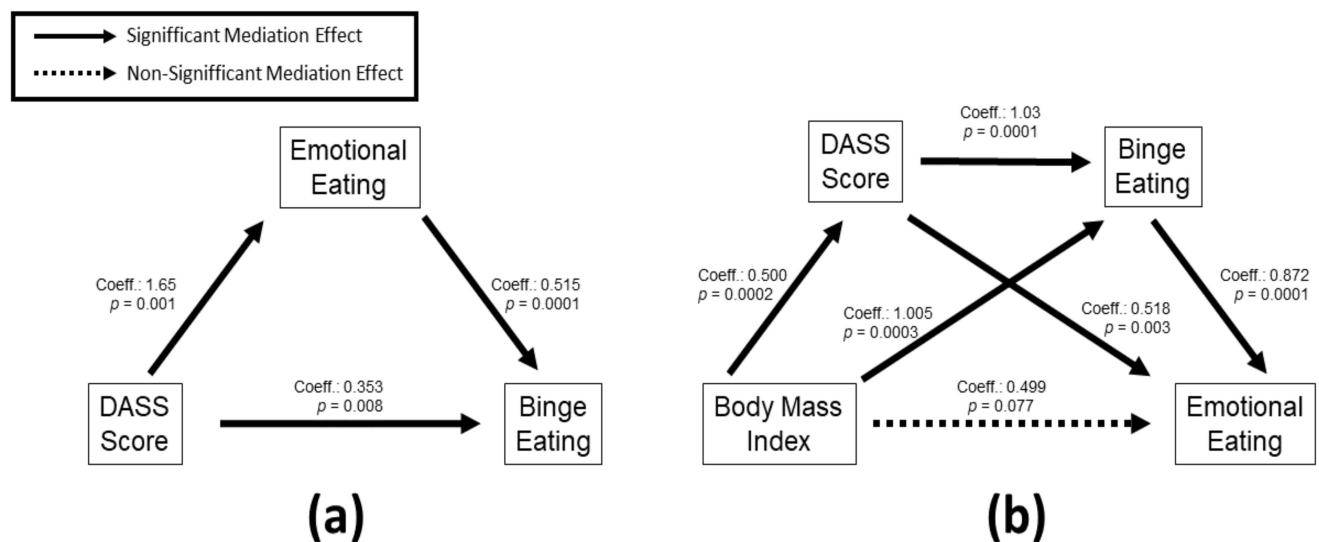
C.I. = Confidence Interval. *p* value of Wald test.



**Table 4.** Correlations (Spearman's rho) between behavioral scores.

	BMI	SRQ20	DASS	Depression	Anxiety	Stress	Binge Eating	Cognitive Restraint	Emotional Eating
BMI	1								
SRQ20	0.247 *	1							
DASS	0.257 *	0.698 *	1						
Depression	0.218 **	0.680 *	0.903 *	1					
Anxiety	0.253 *	0.572 *	0.896 *	0.741 *	1				
Stress	0.188 **	0.642 *	0.919 *	0.757 *	0.756 *	1			
Binge Eating	0.385 *	0.498 *	0.539 *	0.506 *	0.450 *	0.471 *	1		
Cognitive Restraint	−0.12 (NS)	−0.221 **	−0.152 **	−0.134 (NS)	−0.224 **	−0.087 (NS)	−0.022 (NS)	1	
Emotional Eating	0.412 *	0.569 *	0.545 *	0.483 *	0.434 *	0.514 *	0.772 *	0.056 (NS)	1

Data presented as rho. \*  $p = 0.001$ ; \*\*  $p < 0.05$ ; (NS) = Non-significant.



**Figure 1.** Mediation Analyses: (a) Model 1 considers the effect of the DASS score on binge eating behavior and identifies the mediation effect of emotional eating; (b) Model 2 identifies no significant effect of body mass index on emotional eating, albeit body mass index exerts effects on the DASS score and on binge eating behavior, both of which present mediation effects on emotional eating.

#### 4. Discussion

The present study shows that higher BMI correlates with a higher presence of mental suffering, depression, anxiety, and stress disorders. These data are in agreement with the research by Santos et al., which evaluated the relationship between overweight and mental disorders in 167 volunteers of both sexes aged over 18 years in the north region of Brazil, where the majority of participants ( $n = 129$ , 77.2%) had a diagnosis of a mental disorder and 122 of the participants were overweight (73.1%) in the evaluated population [25]. The latest edition of the Nutritional Guide for the Brazilian Population (NGBP) of the Ministry of Health reinforces that a healthy diet should be based on in natura (fresh) and minimally processed foods, to the detriment of the consumption of processed and ultra-processed foods [19]. The guide also describes the various negative aspects of the consumption of ultra-processed foods for health and embraces a multidimensional approach to food and nutrition, including orientations for eating practices (i.e., eating with company and with attention) as a part of a healthy diet [19]. Nowadays, ultra-processed food consumption by adults is frequent, causing concerns regarding their higher energy density, higher fat, and sugar content, as well as lower fiber and micronutrient contents, leading to an unbalanced dietary pattern [26–28]. In the present study, people with overweight and obesity had lower diet quality scores when compared with lean individuals, in accordance with the NGBP guidelines. This result opposes that reported by Lima et al. [29], which found no association between diet quality and anthropometric measures, education level, or salary level in 43 climacteric women with a mean age of  $50.3 \pm 4.77$  years. On the other hand, Guo

et al. [30], when studying the relationship between diet quality and obesity, demonstrated a significantly positive association between low levels of diet adequacy and overweight and obesity. A total of 10,930 adults were evaluated and the HEI score (Healthy Eating Index) was used to assess the quality of the diet. Likewise, Costa et al. [31] found an association between the quality of the diet assessed by the HEI score and women who practiced physical activities living in the city of Aracaju. The participants were 180 women with a mean age between 49 and 24 years and a mean BMI of 27.33 kg/m<sup>2</sup>, 24.85% of whom were obese and 43.20% of whom had abdominal obesity [31]. It is important to consider that the HEI score is a more robust instrument compared to the questionnaire indicated in the Brazilian guidelines, and the similarity of the reported results not only strengthens the relationship of poorer diet quality with overweight and obese people, but also indicates that the instrument used by Brazilian national guidelines for nutrition are appropriate tools for this analysis [20].

Furthermore, the present study indicates the relationship of BMI with several aspects of mental health and behavior. The odds ratio analysis indicated that each unitary gain in BMI increases the chances of the presence of mental suffering, depression, anxiety, and stress symptoms, whilst also increasing the chances of binge eating and emotional eating behavior. Lin et al. [32] evaluated the prevalence of mental disorders in 841 patients undergoing treatment for obesity (including bariatric surgery and non-surgical treatment), of which 42% had at least some psychiatric disorders, such as anxiety disorders and eating disorders. Additionally, the study reported that the prevalence of anxiety disorders and eating disorders was more frequent in women than in men.

Nevertheless, obesity is directly related to eating behavior, which is also influenced by impulsiveness, as more impulsive individuals have greater difficulty in resisting food intake and food control [14]. Emotional eating is defined as when the individual uses food to satisfy emotional needs, where most of the time, food with high palatability and greater energy density is sought. Binge eating describes the impulsive acts of individuals who eat uncontrollably, followed by feelings of guilt, which are related to emotional eating [33]. Considering these concepts, impulsiveness and impairments in inhibitory control are associated with uncontrolled eating, culminating in increased risks of being overweight and obese [13–16]. Moreover, the present study indicates that the higher the BMI, the greater the presence of emotional eating behavior and uncontrolled food consumption. These data are in agreement with the study by Loffler et al. [34], who evaluated the association between eating behavior and body mass index (BMI) in 3144 male and female participants aged 40 to 79 years, where the participants' BMI was associated with emotional eating, and the relationship was strengthened with the presence of uncontrolled eating. The method used was The Three-Factor Eating Questionnaire (TFEQ), which is an established instrument to assess eating behavior and is also used in the present study. Nevertheless, the reported relationship between BMI, emotional eating behavior, and uncontrolled food consumption could be partially due to the weight stigma, increasing the emotional burden of people with overweight and obesity, which in turn could potentiate depressive and anxiety symptoms, culminating in increased susceptibility to use food intake to cope with these emotions [5,6].

Furthermore, individuals with obesity who seek specialized treatment for weight loss may have a higher prevalence of symptoms of anxiety, depression, impulsive traits, and eating behavior disorders [16–35]. Strikingly, the present study conducted a mediation analysis that indicated that the presence of symptoms related to anxiety, depression, or stress (DASS score) exert effects on emotional eating, which mediate binge eating behaviors. Surprisingly, body mass index was not a factor with effects on emotional eating, but it presented an effect on both the DASS score and binge eating behavior, which are ultimately linked with emotional eating and with uncontrolled food intake, leading to a chronic state of obesity. The mediation model presented herein reinforces that several pathways connect mental health and obesity, culminating in obesogenic behaviors such as binge eating and emotional eating [5,6]. Since poor mental health interferes with self-regulation and can affect eating behavior and food preferences through hedonic and homeostatic

mechanisms, multidisciplinary interventions focusing on stress-induced eating have gained attention (i.e., mindfulness eating and cognitive behavioral therapy), albeit presenting limited efficacy in weight loss success [36,37]. Likewise, Braden et al. [35] evaluated the associations between decreased emotional eating and weight loss success in a randomized clinical trial conducted at two university medical centers with 227 overweight adults. After 6 months of behavioral and nutritional intervention, the chances of successful weight loss for individuals with reduced emotional eating at 12 months were 1.70 times greater than for individuals with higher emotional eating, which shows that strategies to reduce emotional eating can be useful to promote greater weight loss and aid in nutritional treatment. Similarly, Grilo et al. [38] aimed to evaluate the ability of an interdisciplinary group program to change eating behavior and food preferences. The intervention was coordinated by a psychologist and nutritionist and consisted of eight sessions lasting two hours each, using “Cognitive Behavioral Therapy”, showing the effectiveness of interdisciplinary work for obese and overweight people through an improvement in the symptoms of binge eating and improvements in the diet quality [38]. The present study extends the existing evidence on the association of psychosocial features and obesogenic behavior.

Hence, it is important to consider the presented results linking mental health with obesogenic behaviors alongside the results regarding dietary quality, as binge and emotional eating could be associated with higher consumption of ultra-processed, highly palatable food, as indicated by the lower scores for dietary quality reported by people with overweight and obesity [19]. Accordingly, a recent review points out that a higher preference for fats is well-reported in people with obesity, albeit the preference for sweets could also be a factor, indicating that food preferences are a pivotal obesogenic factor [39]. Moreover, energy consumption could be influenced by the presence of ultra-processed foods, regardless of the energy or macronutrient and micronutrient content, resulting in weight gain. This could be partially explained by increased consumption of food due to the higher palatability of ultra-processed foods, but also due to decreased fat oxidation and PYY concentrations alongside increased ghrelin concentrations [40]. Thus, since the present results reinforce theoretical links between emotional and binge eating with mental health status, future experimental research is required to establish causality and elucidate the mechanisms, improving lifestyle approaches to treat obesity.

Our findings should be evaluated with caution due to their limitations. In the present work, the sample selection was non-probabilistic, and we aggregated people with overweight and obesity in the same group, which may compromise the analysis. Moreover, the dietary quality was evaluated using a specific Brazilian guideline, which considers food processing and other aspects of feeding, ranging from “acquisition of food” to “eating habits and behavior”, which hampers the expansion of our diet-related findings to different populations and does not allow for the evaluation of the energy content or another specific nutrient intake. In addition, we did not perform other anthropometric measures besides body mass index, whereas further studies could explore other aspects of body composition. Nevertheless, the present work already presents a profound analysis of the relationships between factors influencing eating behavior, as well as the mediation analysis, which indicates that although body mass index does not directly affect emotional eating, it affects the DASS score and binge eating, which influences emotional eating leading to obesity. Therefore, while current obesity prevention efforts focus solely on nutrition and physical activity, mental health risks also need specific targeting in public policy.



## 5. Conclusions

The present study reports a higher presence of mental suffering and a higher risk for depression, anxiety, and stress disorders in people with overweight and obesity. Moreover, overweight and obese individuals present higher scores indicating emotional and binge eating. We report significant interactions between mental suffering, the risk for mental disorders, and eating behavior and food preferences. These results support the connection between mental health status and the presence of overweight and obesity, and they emphasize the necessity of considering multidisciplinary approaches aimed at health promotion and mitigation of the detrimental effects of excess body weight in different populations, especially in women.

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