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Original Research

Obesity may be more associated with disordered eating behaviors, somatization, insecure attachment styles, and sexual dysfunction: an exploratory study

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Abstract

Background: Obesity is a challenging disease due to its multifactorial pathogenesis. However, sexual health is a poorly explored aspect in these patients, and the interaction between eating behavior, psychological factors, and sexual function remains insufficiently characterized, although it may represent a key aspect in clinical management.
Aims: To provide a characterization of psychological, eating, and sexual function characteristics of patients with obesity through an exploratory analysis.
Methods: A cross-sectional, single-center study was carried out at Umberto I Hospital of Sapienza University of Rome (Italy), where patients with obesity (body mass index $\geq$30 kg/m^2) were recruited. Additionally, a control group of age-matched, normal-weight (body mass index = 18-25 kg/m^2) subjects was enrolled online. All subjects compiled a series of validated psychometric questionnaires that evaluated psychological distress, disordered eating behaviors, attachment styles, and sexual dysfunction.
Outcomes: To evaluate the psychological distress, attachment style, disordered eating behavior, and sexual dysfunction in patients with obesity and to explore the correlations between these aspects.
Results: Seventy-two patients (45 women, mean age 51.4 $\pm$ 4.3 years and 27 men, mean age 39.6 $\pm$ 16.6 years) and 76 controls (51 women, mean age 36.8 $\pm$ 14.3 years and 25 men, mean age 39.2 $\pm$ 16.6 years) were recruited. Subjects with obesity reported significantly higher scores in somatization and paranoid ideation symptoms, higher scores in food addiction and binge eating domains, and a more fearful attachment style. Women also reported lower sexual desire, arousal, and lubrication, while men showed significantly lower erectile function, orgasmic intensity, and sexual satisfaction.
Clinical implications: Subjects with obesity are characterized by higher somatization, maladaptive eating behaviors, insecure attachment style, and worse sexual function compared to controls, which highlights the necessity of a multidimensional treatment approach.
Strengths and limitations: A large and comprehensive battery of questionnaires was employed to examine both the clinical and the control population. However, the absence of stratification by age and the small sample size prevent the generalizability of the results.
Conclusion: Our results highlight the intricate interplay between psychological, behavioral, and sexual factors in individuals affected by obesity. Further studies should focus on larger and more diverse samples and examine longitudinal trajectories of psychological and sexual health changes in response to weight-loss interventions, to assess how such interconnection may help to improve the personalization of care programs.

Keywords: obesity; sexual function; binge eating; psychopathology; attachment style.

Introduction

Obesity is a disease characterized by multiple contributing factors, including genetic, endocrine, environmental, and behavioral influences; hence, its pathogenesis is often defined as complex and multifactorial.[1] It is a long-term condition that persists over time (chronic), often marked by repeated episodes of weight regain after initial weight loss (relapsing), and a tendency to worsen if not managed effectively (progressive).[2] Obesity presents a significant challenge to public health due to its association with a wide range of comorbidities, including cardiovascular disease, type 2 diabetes, and certain cancers, which makes it a significant problem at a global health level.[3,4] Of the 41 million adult deaths each year due to non-communicable diseases (NCDs), 5 million are driven by a high body mass index (BMI) (>25 kg/m^2).[5] However, while obesity affects populations across all continents, its prevalence and impact vary by region, with certain areas experiencing a disproportionate burden.[5-7] In recent decades, in many countries of the WHO European Region, the number of overweight and/or obese people has

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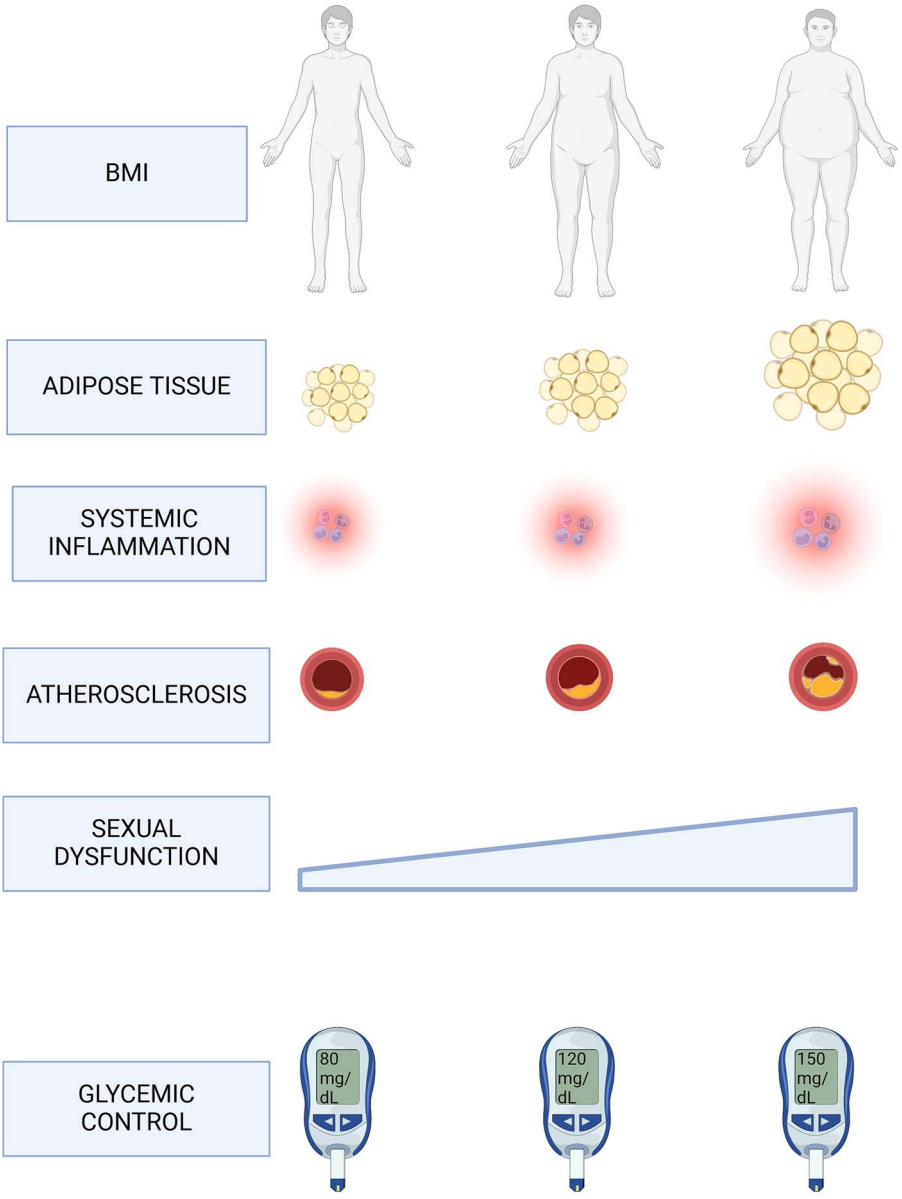

Figure 1. The correlation between obesity progression and its health consequences. Drawn with Biorender.com.

increased: in 46 countries (87% of the region), nowadays, excess weight affects more than half of adults.[8,9] In Italy, a high BMI is confirmed as the fifth of the top 10 risk factors for premature death and years lived in disability with an increase of 6.3% in the time interval 2007-2017.[10,11] Although an over-threshold BMI is 1 of the main features, obesity is better defined as a "clinical condition characterized by excessive body weight due to the accumulation of adipose tissue to such an extent as to affect health status negatively"[6] (Figure 1). An excess of body adipose tissue, in particular visceral adipose tissue, represents a relevant threat to individual health, bearing an increased risk for cardiovascular diseases, type 2 diabetes mellitus, hypertension, and some types of cancer.[2,4,12-14] Beyond its physical effects, obesity profoundly impacts psychological well-being, often leading to increased stress, anxiety, depression, disordered eating behaviors, and sexual dysfunction.[15-18]

A growing body of research suggests that eating behaviors in individuals with obesity vary considerably and may contribute to weight maintenance and relapse.[19-21] Specific maladaptive eating behaviors, such as uncontrolled eating (loss of control over food intake), emotional eating (eating in response to positive or negative emotions), grazing[22] (unplanned and repetitive consumption of small amounts of food), and night eating syndrome[23] (eating after dinner and when awake at night), are more prevalent in individuals with obesity. These behaviors are strongly influenced by psychological factors such as stress and mood disorders, creating a cycle of emotional distress and excessive caloric intake, which further exacerbates obesity.[24,25] Attachment styles, which describe how individuals form emotional bonds and regulate emotions in relationships, have been linked to obesity through their influence on eating behaviors and emotional regulation.[26,27] Insecure attachment styles, such as anxious or avoidant attachment, may lead individuals to use food as a coping mechanism for emotional distress, potentially resulting in overeating and weight gain.[28,29] However, despite evidence on how all these domains—that is, psychological

distress, eating behaviors, and attachment styles—contribute to the maintenance of obesity, the relationships between them remain poorly understood.

Sexual health is another underexplored aspect of obesity, with evidence suggesting that both overweight and obesity are risk factors for sexual dysfunction. In men, physiological mechanisms such as secondary hypogonadism (due to increased aromatase expression in adipose tissue[30]), vasculogenic erectile dysfunction, and cardiovascular comorbidities contribute to impaired sexual function.[31,32] In women, the association between obesity and sexual dysfunction and/or distress is less clear, with studies yielding mixed results.[33,34] While sexual dysfunction and/or distress have been extensively examined in relation to metabolic and hormonal imbalances, the role of body image dissatisfaction and self-esteem in sexual well-being is often overlooked.[35] Individuals with obesity may experience sexual distress due to negative self-perceptions, fear of judgment, and decreased confidence in intimate relationships, even in the absence of physiological dysfunction. Furthermore, weight stigma and fat-shaming, which are increasingly recognized as important societal issues, can further exacerbate these psychological barriers, influencing both self-perceived attractiveness and sexual satisfaction. For both men and women, research findings suggest indeed that body image dissatisfaction, low self-esteem, and psychological distress also play a crucial role in sexual difficulties.[32,36] However, the interaction between eating behavior, psychological factors, and sexual function in subjects with obesity remains insufficiently characterized, particularly concerning sex- and gender-specific differences.

To fully understand obesity, a biopsychosocial approach is essential.[37] While traditional biomedical perspectives focus on metabolic and physiological factors, recent research emphasizes the need for a more integrative model that considers psychological and social influences.[38,39] The application of such a framework requires comprehensive patient profiling to tailor interventions more effectively.

The aim of the present study is to investigate the relationships between eating behaviors, psychological symptoms, attachment styles, and sexual function in individuals with obesity. Specifically, it seeks:

- to examine the degree of psychological distress, disordered eating behaviors, and sexual dysfunction of patients with obesity (primary aim) and
- in the same population, to explore the correlation between disordered eating behaviors, attachment styles, psychological distress, and sexual dysfunction (secondary aim).

The ultimate goal is to offer a more nuanced understanding of obesity and contribute to the development of personalized treatment approaches that address the diverse factors influencing the disease trajectory.

Methods

Sample recruitment

This was a cross-sectional, single-center study. Patients were selected from those attending the Centre for Highly Specialized Care of Obesity in Umberto I Hospital, Rome (Italy) from February 2022 to December 2022. The patients were informed about the purpose of the study and its observational design and that the decision to participate would not have affected their treatment. Patients were enrolled according to the following criteria:

- Inclusion criteria: age between 18 and 65 years; body mass index (BMI) $\geq$30 kg/m; and willingness to sign informed consent and to fill in questionnaires.
  BMI was calculated upon the measurement of weight (kg) and height (cm) between 8 and 10 AM in a fasting state and with an empty bladder, with subjects wearing light clothing and without shoes. A calibrated balance beam (200 kg $\pm$ 0.1 kg) and a stadiometer (200 cm $\pm$ 0.1 cm) were used for recording weight and height, respectively (Seca GmbH & Co). The BMI was calculated as weight in kilograms divided by the square of the height in meters. BMI assessment was part of a series of anthropometric measurements for obesity that included waist circumference, hip circumference, waist-to-hip ratio, and body composition obtained by bioelectrical impedance analysis.
- Exclusion criteria: pregnancy and lactation; alcoholism and other drug addictions; severe psychiatric disorders; and absence of informed consent.

Additionally, a control group of age-matched, normal-weight subjects was enrolled through Google Forms upon informed consent and did not receive any financial remuneration for their participation. They were informed about the purpose of the study and asked to compile anonymous questionnaires. The exclusion criteria were the same as the clinical group. The research project complied with the ethical standards of the Helsinki Declaration of 1975, as revised in 2008, and it was approved by the Ethics Committee of the Department of Dynamic and Clinical Psychology of Sapienza University of Rome. Prot. n. 0000278 of 22/02/2022 - [UOR: SI000092 - Classif. VII/15].

Psychometric questionnaires

All subjects compiled a sociodemographic chart and a series of psychometric questionnaires. Psychological distress was evaluated with the SCL-90 (Symptom Checklist 90), a scale consisting of 90 questions that reflect the 9 dimensions that underlie most of the symptoms that are observed in those suffering from psychic disorders (somatization, obsessive–compulsive dimension, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, paranoid ideation, psychoticism) used for the self-assessment of psychopathological symptoms in the general population as they had occurred in the past week, on a 5-point Likert scale (from 0 = none to 4 = very severe)[40]; among the 3 general indices provided by the scale, the Global Severity Index is considered a screening index of overall distress.

Eating behaviors were assessed with the EBA-O (Eating Behaviors Assessment for Obesity), a relatively recent 18-item questionnaire with multiple-choice answers (from 0 = never to 8 = every day) for the simultaneous evaluation of 5 major disorganized eating behaviors (food addiction, night eating, binge eating, sweet eating, hyperphagia) that has shown good discriminant validity and reliability for the maladaptive eating behaviors screening.[21]

The attachment style was evaluated with the RQ (Relationship Questionnaire), which consists of 4 brief descriptions, each representing a distinct adult attachment style (secure,

preoccupied, dismissing-avoidant, fearful-avoidant). Participants have to rate how well each description applies to them on a 7-point Likert scale (1 = not at all, 7 = very much) or choose the one that best describes them.[41]

Women's sexual health was assessed with the FSFI (Female Sexual Function Index), a 19-item questionnaire that aims to assess female sexual health among 6 domains (lubrication, desire, arousal, orgasm, sexual satisfaction and pain) in the previous 4 weeks[42]; a cutoff ≤26.5 is suggestive of female sexual dysfunction.

Men's sexual health was assessed with the IIEF-15 (International Index of Erectile Function), a 15-item questionnaire investigating all domains of sexual function (erection, satisfaction in sexual intercourse, orgasmic function, sexual desire, and general satisfaction) over the 4 weeks before compilation. The score of mild erectile dysfunction ranges from 22 to 25, mild to moderate from 21 to 17, moderate from 16 to 11, and severe from 10 to 6.[43]

To specifically address the orgasmic intensity respectively, in men and women, the Orgasmometer and Orgasmometer-F, similarly structured to the well-known VAS (Visual Analogue Scale) for pain, with a score from 0 (absence of orgasm) to 10 (maximum intensity) were also administered.[44,45]

Finally, given the correlation reported in the literature between binge eating symptoms and hypersexual behaviors, as well as from hypersexuality and attachment styles,[46,47] the subjects also compiled HBI (Hypersexual Behavior Inventory), a 19-item questionnaire along a 5-point Likert scale (1 = Never; 5 = Very often) used to assess hypersexuality in 3 factors[48]: the coping factor (7 items), which evaluates the use of sex and sexual behaviors as a means of managing emotional distress, the control factor (8 items) that measures difficulties in regulating sexuality-related behaviors, and the consequences factor (4 items), which assesses the impact of sexual thoughts, urges, and behaviors on daily life, such as interference with educational or occupational responsibilities. Additionally, an overall total score (HBI total) is calculated, with higher scores indicating a greater tendency toward hypersexual behavior.

Statistical analysis

The normality of the distribution of the data was analyzed using the skewness and kurtosis tests. SPSS version 26.0 (SPSS Inc., Chicago, IL, USA) was used for statistical analysis. Descriptive analyses of the 2 samples, in relation to gender, age, BMI, and level of education, were carried out to understand the characteristics of the samples examined. Subsequently, to investigate the differences between the clinical group and the control group in the scores obtained in the dimensions of the instruments used, either an independent *t*-test for the men and the women groups or a multivariate analysis of covariance (MANCOVA) including sex as a covariate was conducted for each questionnaire. Analyses of variance (ANOVAs) were performed to examine between-group differences. Finally, Pearson's correlation analysis was used to verify the correlations between the sub-scales of the different instruments within the clinical population. Post hoc power analyses were performed using G*Power 3.1.9.7 to assess the statistical power of the study, with a target power of 0.80. which is commonly considered the standard threshold for detecting a true effect with an acceptable Type II error rate ($\beta = .20$). To ensure a statistical power of .80 in the correlation analyses, it was determined that in the overall clinical group (N = 72) the correlation had to be at least r = 0.323, in men (N = 27) at least r = 0.509, and in women (N = 45) at least r = 0.404.

Results

The final sample was composed of 72 patients and 76 controls (Table 1). The age of the women from the control group was significantly lower than the clinical group ($P < .001$). The chi-square analysis found that there was a significantly different education level between obesity and the control population ($\chi^2 = 40.9$, $P < .001$, Cramer's V 0.528 = large effect), with the control group being more likely to have a higher education status. For what regards psychological and eating behaviors domains, the results from the MANCOVA revealed that there was a significant multivariate effect of group (obesity vs control) in the scores of SCL-90 [$F_{(10, 135)} = 2364$, $P = .013$; $\eta_p^2 = 0.149$; Pillai's trace = 0.149), EBA-O [$F_{(5, 141)} = 4734$, $P < .001$; $\eta_p^2 = 0.144$; Pillai's trace = 0.144] and RQ [$F_{(4, 130)} = 3309$, $P = .013$; $\eta_p^2 = 0.092$; Pillai's trace = 0.092]. The results of univariate analysis (test of between-subjects effects), adjusted for sex, are shown in Table 2.

Analyzing men and women's sexual behavior with the corresponding tests, we found significant differences in the Erectile, Orgasmic, and Satisfaction domains of the IIEF-15 and in the Orgasmometer-M (Table 3), with the clinical group reporting significantly lower scores than the control group. Regarding women, FSFI Desire, Arousal, and Lubrication subdomains were significantly lower in the clinical group with respect to the control group (Table 4). For what regards the Orgasmometer-F, there was no significant difference in the intensity of the women's orgasm between the 2 groups, as opposed to the men's. To assess the robustness of our significant results, we conducted a post hoc analysis of statistical power for each variable. In the men group, the power for sexual satisfaction was 0.822 and for erectile function was 0.920. indicating a good statistical power. On the contrary, the comparisons of the orgasmic domains may have suffered from insufficient power to detect significant effects (the power of the orgasmic function was 0.677, while that for the Orgasmometer was 0.773). In the women group, the power for arousal was 0.831, while that for desire and lubrication were, respectively, 0.794 and 0.664, which may suggest that caution is needed when interpreting the significant results.

Concerning HBI, the group (obesity vs control) exerted a significant effect on the score, according to the MANCOVA analysis [$F_{(3, 141)} = 3763$, $P = .012$; $\eta_p^2 = 0.074$; Pillai's trace = 0.074]. Results from univariate analysis, adjusted for sex, are shown in Table 2.

Finally, to explore the correlation between all the variables studied in our clinical group, we performed a Pearson's correlation analysis between the variables studied. The significant results are shown in Tables 5 and 6. In men, it was also possible to observe a strong correlation between BMI and the Sexual Desire domain of the IIEF-15: as the BMI increases, sexual desire decreases (r = -0.492; $P = .011$).

Discussion

This study explored the relationship between obesity, psychological distress, attachment styles, disordered eating behaviors, and sexual dysfunction. In order to accomplish

Table 1. Characteristics of the recruited sample.

Variables	*Group*		
	PATIENTS WITH OBESITY (N = 72)	*CONTROLS (N = 76)*	*P-value*
Gender	45 F (62%) 27 M (38%)	51 (67%) 25 (33%)	
Mean age	39.6 ± 16.6 years (M) 51.4 ± 4.3 years (F)	39.2 ± 16.6 years (M) 36.8 ± 14.3 years (F)	$P = .907$ $P < .001$
Mean body mass index (kg/m ^{2})	40.1 ± 9.37 (M) 39.5 ± 7.37 (F)	24.9 ± 2.97 (M) 22.4 ± 4.14 (F)	**$P < .001$** **$P < .001$**
Education			**$P < .001$**
- Elementary school	0 (0%)	0 (0%)	
- Lower middle school	10 (15%)	2 (3%)	
- High school	43 (60%)	15 (20%)	
- Bachelor's degree	6 (8%)	21 (28%)	
- Master's degree	8 (11%)	21 (28%)	
- Postgraduate	4 (6%)	17 (22%)	

Table 2. Univariate analysis (test of between-subjects effects), adjusted for sex (controlled model).

Group	Patients (n = 72)		Controls (n = 76)				
	Mean	Std. deviation	Mean	Std. deviation	*F*	*P*	*ηp2*
SCL-90							
• SOMATIZATION	0.944	0.673	0.660	0.506	4174	**.017**	0.055
• OBSESSION-COMPULSION	0.931	0.768	0.787	0.619	1595	.206	0.022
• INTERNALIZATION	0.920	0.755	0.775	0.614	1602	.205	0.022
• DEPRESSION	1059	0.870	0.910	0.653	1096	.337	0.015
• ANXIETY	0.730	0.661	0.741	0.605	0.235	.791	0.003
• HOSTILITY	0.687	0.721	0.515	0.560	2152	.120	0.029
• PHOBIC ANXIETY	0.284	0.438	0.218	0.296	0.599	.551	0.008
• PARANOID IDEATION	0.879	0.837	0.708	0.639	3977	**.021**	0.052
• PSYCHOTICISM	0.487	0.597	0.533	0.519	2686	.072	0.036
• GLOBAL SEVERITY SCORE	0.810	0.622	0.690	0.471	1714	.184	0.023
RQ							
• SECURE	3.71	2163	4.14	1877	1937	.148	0.028
• PREOCCUPIED	2.68	2001	3.39	2053	2208	.114	0.032
• FEARFUL	1.94	1590	2.93	2212	4398	**.014**	0.062
• DISMISSING	3.25	2062	3.20	2074	0.178	.837	0.003
EBA-O							
• FOOD ADDICTION	2089	1988	1008	1409	8769	**.000**	0.108
• NIGHT EATING	1017	1376	0.780	0.988	0.874	.419	0.012
• BINGE EATING	1972	2171	1083	1514	4988	**.008**	0.064
• SWEET EATING	2778	2311	2684	1870	1114	.331	0.015
• HYPERPHAGIA	1972	1979	1996	1646	0.751	.474	0.010
• TOTAL SCORE	1966	1516	1510	1081	2735	.068	0.036
HBI							
• COPING	10 437	5500	12 440	5771	5417	**.005**	0.070
• CONTROL	6056	2151	7067	3461	13 800	**.000**	0.162
• CONSEQUENCES	6056	2151	7067	3461	13 800	**.000**	0.162
• TOTAL SCORE	25 648	9712	31 373	14 470	15 927	**.000**	0.182

Abbreviations: F = F-statistic; *P*, level of significance; *ηp2* partial eta-squared. Bold values are statistically significant.

the task, a clinical population of 72 subjects was compared to a population of normal-weight subjects recruited from an online platform. With regard to the first objective of the research, our results confirmed that individuals with obesity, compared to controls, report significantly higher levels of psychological distress, disordered eating behaviors, and sexual dysfunction. Analyzing each domain and, according to our second aim, exploring each domain's relative correlations with the other variables, the first result pertains to SCL-90; that is, patients with obesity showed higher somatization and paranoid ideation ($P = .017$ and $P = .021$, respectively). Previous studies employing SCL-90 have observed positive correlations between BMI and somatization,[49,50] while the data on paranoid ideation appears only in 1 previous study, which, however, was focused on women only.[50] When exploring the correlations with other variables, in the clinical population, somatization was found to be correlated with the total score of EBA-O, while paranoid ideation correlated with the total score of EBA-O and its subdomain of Binge Eating. Subjects from the obesity group also showed higher food addiction and binge eating symptoms ($P < .001$ and $P = .008$, respectively). When exploring the relationships between these

Table 3. Sexual functioning in clinical and control male groups.

Variables	Group (mean ± SD)		t	df	*P*	Cohen's d	SE Cohen's d
	Patients	Controls					
ERECTILE FUNCTION	13.769 ± 12.180	22.840 ± 8.547	−3.067	49	**.004**	−0.859	0.304
ORGASMIC FUNCTION	5.615 ± 4.446	7.920 ± 3.214	−2.114	49	**.040**	−0.592	0.292
SEXUAL DESIRE	6.692 ± 2.494	7.760 ± 1.985	−1.687	49	.098	−0.473	0.288
SEXUAL SATISFACTION	5.615 ± 5.485	9.280 ± 4.587	−2.583	49	**.013**	−0.723	0.298
GENERAL SATISFACTION	4.885 ± 4.141	5.440 ± 3.190	−0.535	49	.595	−0.150	0.281
ORGASMOMETER	6.043 ± 2.121	7.304 ± 1.579	−2.287	44	**.027**	−0.674	0.311

Abbreviations: SD, standard deviation; SE, standard error. Bold values are statistically significant.

Table 4. Sexual functioning in clinical and control female groups.

Variables	Group (mean ± SD)		t	df	*P*	Cohen's d	SE Cohen's d
	Obese patients	Controls					
SEXUAL DESIRE	2.733 ± 1.183	3.541 ± 1.875	−2.485	94	**.015**	−0.508	0.211
SEXUAL AROUSAL	2.573 ± 2.138	3.712 ± 2.110	−2.621	94	**.010**	−0.536	0.212
LUBRICATION	2.807 ± 2.555	3.841 ± 2.316	−2.081	94	**.040**	−0.426	0.209
ORGASM	2.871 ± 2.519	3.475 ± 2.202	−1.253	94	.213	−0.256	0.206
SEXUAL SATISFACTION	2.489 ± 2.541	3.231 ± 2.243	−1.521	94	.132	−0.311	0.207
PAIN	2.116 ± 2.673	2.188 ± 1.709	−0.161	94	.873	−0.033	0.205
TOT FSFI	15.589 ± 12.112	19.988 ± 11.668	−1.811	94	.073	−0.370	0.208
ORGASMOMETER - F—CLITORAL SCORE	7.036 ± 2.134	7.684 ± 1.297	−1.531	64	.131	−0.381	0.254
ORGASMOMETER - F—VAGINAL SCORE	7.500 ± 2.121	7.167 ± 2.333	0.374	26	.712	0.147	0.396

Abbreviations: SD, standard deviation; SE, standard error. Bold values are statistically significant.

Table 5. Significant results from the explorative Pearson's correlation analysis between several domains investigated by the psychometric questionnaires.

VARIABLE 1	VARIABLE 2	r	*P*-value
Total score of EBA-O (men and women)	SOMATIZATION	0.248	.036
	OBSESSION-COMPULSION	0.358*	.002
	INTERNALIZATION	0.342*	.003
	DEPRESSION	0.429*	<.001
	ANXIETY	0.348*	.003
	HOSTILITY	0.394*	<.001
	PHOBIC ANXIETY	0.242	.040
	PARANOID IDEATION	0.266	.024
	PSYCHOTICISM	0.359*	.002
	GLOBAL SEVERITY SCORE	0.402*	<.001
Food addiction (men and women)	OBSESSION-COMPULSION	0.337*	.004
	INTERNALIZATION	0.304	.010
	DEPRESSION	0.403*	<.001
	ANXIETY	0.312	.008
	HOSTILITY	0.355*	.002
	PHOBIC ANXIETY	0.242	.041
	PSYCHOTICISM	0.304	.010
	GLOBAL SEVERITY SCORE	0.358*	.002
Binge eating (men and women)	OBSESSION-COMPULSION	0.434*	<.001
	INTERNALIZATION	0.403*	<.001
	DEPRESSION	0.456*	<.001
	ANXIETY	0.430*	<.001
	HOSTILITY	0.441*	<.001
	PHOBIC ANXIETY	0.359*	.002
	PARANOID IDEATION	0.346*	.003
	PSYCHOTICISM	0.466*	<.001
	GLOBAL SEVERITY SCORE	0.458*	<.001
	PREOCCUPIED ATTACHMENT STYLE	0.271	.028
	FEARFUL ATTACHMENT STYLE	0.253	.040
	COPING (HBI)	0.277	.019
	CONTROL (HBI)	0.281	.017
	TOTAL SCORE HBI	0.311	.008
Orgasmic function of FSFI (women)	HYPERPHAGIA	−0.304	.042

*To ensure a statistical power of 0.80 in the correlation analyses, it was determined that in the overall clinical group (N = 72) the correlation had to have at least r = 0.323 and in women (N = 45) at least r = 0.404.

Table 6. Significant results from the explorative Pearson's correlation analysis of the HBI total score and single domains with other psychometric questionnaires' items.

Variables 2	Variables 1							
	COPING		CONTROL		CONSEQUENCES		TOTAL HBI	
	r	*P*-value	r	*P*-value	r	*P*-value	r	*P*-value
SOMATIZATION	0.233	.051	0.302	.010	0.230	.053	0.309	.009
OBSESSION-COMPULSION	0.339*	.004	0.346*	.003	0.359*	.002	0.416*	<.001
INTERNALIZATION	0.345*	.003	0.391*	<.001	0.402*	<.001	0.448*	<.001
DEPRESSION	0.239	.045	0.350*	.003	0.343*	.003	0.357*	.002
ANXIETY	0.227	.056	0.330*	.005	0.376*	.001	0.350*	.003
HOSTILITY	0.332*	.005	0.466*	<.001	0.371*	.001	0.465*	<.001
PHOBIC ANXIETY	0.406*	<.001	0.429*	<.001	0.509*	<.001	0.522*	<.001
PARANOID IDEATION	0.319	.007	0.466*	<.001	0.532*	<.001	0.493*	<.001
PSYCHOTICISM	0.320	.007	0.423*	<.001	0.416*	<.001	0.450*	<.001
GLOBAL SEVERITY SCORE	0.330*	.007	0.372*	.002			0.391*	.001
FEARFUL ATTACHMENT STYLE			0.272	.028				
DISMISSING ATTACHMENT STYLE								

*To ensure a statistical power of 0.80 in the correlation analyses, it was determined that in the overall clinical group (N = 72), the correlation had to have at least r = 0.323.

key variables, Binge eating correlates significantly with overall psychological distress, as indicated by the total SCL-90 score ($P < .001$) and all its subscales—except for the somatization dimension. Significant and positive correlations were also observed between the Food Addiction domain and the overall score of the SCL-90 and almost all its subscales. These findings align with previous research suggesting that obesity is often associated with emotional dysregulation, and the correlation with disordered eating patterns may establish a vicious circle that contributes to weight gain and difficulties in weight-loss maintenance.[51-53]

Sexual dysfunction and/or distress was another key outcome. Men with obesity reported lower erectile function, orgasmic intensity, and sexual satisfaction, while women with obesity exhibited lower sexual desire, arousal, and lubrication, although the effect size was small to medium. Moreover, some comparisons may have suffered from insufficient power to detect significant effects, such as desire and lubrication in women, and orgasmic function in both sexes. Nevertheless, these results may be seen in light of prior studies indicating that obesity negatively impacts sexual health through multiple mechanisms, including metabolic and hormonal imbalances, endothelial dysfunction, and psychological distress. Data from various surveys indicate a high prevalence of erectile dysfunction in obese men, possibly due to not only endocrine factors such as functional hypogonadism,[54] but also shared vascular risk factors between the 2 conditions and the comorbid metabolic syndrome.[36,55,56] Also, in otherwise healthy women, obesity affects several aspects of sexual function, with arousal, lubrication, orgasm, and satisfaction all being negatively correlated with BMI, as reported in previous studies.[57,58] Low-grade chronic inflammation, often associated with obesity,[59] plays a critical role in the development of behavioral and functional disturbances in these patients. For instance, the inflammatory milieu associated with metabolic diseases, including obesity, has been implicated in endothelial dysfunction, an initiating and contributing factor of sexual dysfunction, particularly in men.[60,61]

Interestingly, while men from the clinical group reported lower orgasm intensity compared to controls, no significant differences were found in women's orgasmic intensity. However, and interestingly, in our clinical sample, correlation analysis highlighted a significantly strong association between the increase in hyperphagia and a reduction in orgasmic function, although the significance of the result should be taken cautiously due to the low statistical power. Both motivated behaviors (eating and sexual activity) are elicited by the reward perspective and other strong incentive stimuli, *bona fide* involving an activation in 1 of the mesolimbic areas. In this case, the reward obtained from the intake of satisfactory food, and sexual satisfaction in general and the quality of orgasm and sexual desire in particular might be inhibited. Additionally, excessive eating can lead to physiological changes such as metabolic syndrome and hormonal imbalances, which can directly impair sexual arousal and orgasm, especially among women.[62] Moreover, the psychological effects of chronic overeating—such as feelings of inadequacy, body dissatisfaction, and stress—are known to disrupt sexual functioning.[63]

Hypersexual behaviors were more prevalent in the control group than in the clinical group, for both total ($P < .001$) and single domains (all $P < .05$), possibly due to the sexual difficulties commonly associated with obesity, such as arousal problems and the decrease in sexual desire.[35] However, within the clinical group, hypersexual behaviors correlated with insecure attachment styles (fearful and dismissing) and higher psychological distress (Table 6), supporting the hypothesis that hypersexuality may function as a maladaptive coping mechanism, as hypothesized by different theoretical approaches.[46,64-67] Furthermore, significant correlations emerged between binge eating and hypersexuality (Table 5), reinforcing the idea that compulsive sexual behaviors and disordered eating may share underlying emotional regulation deficits.[46,68]

Finally, when exploring the role of attachment style, insecure attachment style could be seen as a vulnerability factor in the exacerbation of dysfunctional eating behaviors.[26] The mechanism underlying these associations seems to be linked with emotional regulation: when facing unpleasant events or mental states, individuals with insecure attachment are not only less able to regulate their emotions but are also characterized by an overactivation of the attachment system.[69] These findings support existing evidence that individuals with insecure attachment are more likely to engage in emotional eating as a coping mechanism for psychological distress. However, despite these associations, insecure attachment alone does not

fully account for the variability in eating behaviors, indicating that other psychological and environmental factors contribute to these patterns.

These findings may hinder important implications for the clinical management of obesity. First, they emphasize the necessity of a biopsychosocial approach, considering not only metabolic and physiological factors but also psychological, behavioral, and sexual health components. Obesity treatment programs should integrate psychological interventions that address emotional regulation difficulties, attachment-related vulnerabilities, sexual function, and coping mechanisms.

Second, given the strong association between disordered eating and sexual dysfunction, sexual health should be routinely assessed in patients seeking weight-loss treatment. Addressing body image concerns and sexual self-esteem could improve both psychological well-being and treatment adherence, given that weight stigma and fat-shaming have been widely reported as key psychosocial stressors impacting sexual well-being.

Our study was not devoid of limitations. Although there was a good gender correspondence between the clinical and the control group, the sample mainly consisted of women, with an age difference between the clinical and the control group that was not negligible. Stratified analysis by age, albeit undoubtedly useful, was indeed not conducted as it would have required a larger sample size to ensure sufficient statistical power for meaningful comparisons. A second limitation concerns the relatively small sample size, which, although coherent with the exploratory design of the research, might not be representative of the entire population. Although some correlations were statistically significant, not all achieved sufficient power ($\geq$0.80) to ensure reliability; the results should be interpreted with caution, as they may result from an insufficient sample rather than a real effect. Future research with larger samples is needed to confirm these findings. While obesity assessment in our clinical center includes additional anthropometric measurements beyond BMI, the online recruitment of the control population required the use of self-reported data, making detailed body composition assessments unfeasible. The choice of including patients based on BMI represents a limitation of the study, as BMI alone may not fully capture variations in body fat distribution and composition. Moreover, the self-reported nature of height and weight data should be interpreted with caution. In addition, a further limitation is inherent in the procedure of the administration of the questionnaires for the clinical sample, which occurred in the hospital waiting room before the first assessment. The possibility that this setting, and the social desirability, may have interfered with the time needed to carry out the questionnaires should be considered.

Conclusion

Obesity is a chronic, multifactorial systemic disease that constitutes a major public health problem worldwide, as well as a major threat to individual health, being bidirectionally associated with both physical and psychosexual distress. As such, to enhance patient outcomes in obesity management, there is a need for a personalized and multidimensional treatment approach that incorporates psychological support, sexual health counseling, and behavioral modifications. The results of our research, despite the limitations previously exposed, confirmed in patients with obesity the close relationship between disorganized eating patterns, sexual disorders, and psychopathological aspects. These aspects should be taken into consideration when planning adequate and personalized treatment strategies, and they can act as vulnerability factors, possibly exacerbating the evolution of obesity and compromising adherence to treatment plans. Considering them when managing obesity is, to date, of fundamental importance to manage such a condition in a multifaceted and personalized perspective.

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Author contributions

E.C.: Conceptualization-Equal, Writing—original draft-Equal. A.G.: Investigation-Equal. B.D.L.: Investigation-Equal. C.M.: Investigation-Equal. T.B.J.: Writing—review & editing-Equal. L.G.: Validation-Equal. C.L.: Visualization-Equal. E.L.: Validation-Equal, Writing—review & editing-Equal. A.S.: Data curation-Equal, Formal analysis-Equal. G.C.: Methodology-Equal, Supervision-Equal.

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Conflicts of interest

None declared.

Ethical statement

The study was carried out in accordance with the code of ethics of the World Medical Association for human studies (Declaration of Helsinki, 2001) and Good Clinical Practice (GCP). The research project complied with the ethical standards of the Helsinki Declaration of 1975, as revised in 2008, and it was approved by the Ethics Committee of the Department of Dynamic and Clinical Psychology of Sapienza University of Rome. Prot. n. 0000278 of 22/02/2022 - [UOR: SI000092 - Classif. VII/15].

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