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ARTICLE

The relation between sexuality and obesity: the role of psychological factors in a sample of obese men undergoing bariatric surgery

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Abstract

Obesity produces a significant deterioration in general and sexual health. The aim of this cross-sectional study was to investigate the impact of obesity on sexuality, illustrating the psychological constructs that may play a significant role in determining sexual functioning and satisfaction. During the psychological assessment for bariatric surgery eligibility, 171 obese men filled out a socio-demographic questionnaire, the International Index of Erectile Function (IIEF), the 20 Item-Toronto Alexithymia Scale, the Symptom Checklist-90-Revised, the Body Uneasiness Test, and the Obesity-related Disability test. A series of hierarchical multiple regression analyses highlighted how obese men sexual desire ($F_{(11,159)} = 10.128$, $p < 0.001$), erectile function ($F_{(10,160)} = 63.578$, $p < 0.001$), orgasmic function ($F_{(10,160)} = 33.967$, $p < 0.001$), intercourse satisfaction ($F_{(7,163)} = 159.752$, $p < 0.001$), and general satisfaction ($F_{(10,160)} = 18.707$, $p < 0.001$) were significantly associated with other IIEF sexual domains, difficulties in identifying feelings, psychopathological symptoms (such as depression and paranoid ideation), body image, and quality of life. Findings are useful for deepening understanding of obese male sexual response, and more generally, for analyzing the complex and multivariate relation between obesity and sexuality, supporting the need of a multidisciplinary approach to obesity care that includes professionals with specific training in sexology.

Introduction

Obesity and sexuality

Obesity is a complex chronic disease, and it has increasingly become a major public health problem worldwide [1]. Obesity and overweight affect the 39% of world's population [2] and are recognized as primary risk factors for early mortality and higher morbidity rates, such as cardiovascular problems, hypertension, type 2 diabetes, metabolic syndrome, hyperlipidemia, and obstructive sleep apnea [3–6]. Obesity and related complications may produce a significant deterioration in quality of life (QoL) and in sexual health [7, 8].

Sexual functioning is a component of sexual health, which includes the occurrence of desire, arousal, lubrication, orgasm, pain, and satisfaction related to the sexual experience [9]. In psychological terms, sexual functioning is broadly defined by the psychological motivators involved (such as attraction and desire) and can be influenced by many variables: past sexual experiences, motivations, thoughts, fantasies, attachments, gender differences with their impact on relationships, emotions such as pleasure, anger, and fear, cultural messages on sex, and much more [10]. Nonetheless, research focused on sexual functioning, psychological variables, and obesity is limited and explored mainly on women [11, 12] or related to physical comorbidities [13, 14] and to weight loss or surgery improvements [15].

It is clear that biological factors have an important role in the relationship between sexual function and obesity, but physiological factors alone are not enough to explain such a complex and multivariate relation under a biopsychosocial

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(BPS) understanding of male sexual response [16]. Regarding psychopathological symptoms, the literature has widely acknowledged the negative effects that some psychological conditions (such as depression (DEP), anxiety (ANX), somatization (SOM), control, and low self-esteem) may have on sexual functioning, independently from obesity [9, 12, 16, 17]. Studies showed ANX and DEP as significantly associated with higher BMI classifications, erectile dysfunction, lower frequency of sexual intercourse, premature ejaculation, and reduced sexual enjoyment [18–20]. Men with extreme obesity tend to report heightened levels of body image dissatisfaction, with direct negative effects on sexual functioning and intimacy [21]. Obese men may significantly suffer from poor QoL in physical, psychological, social, and sexual domains, whereas individuals who lose weight usually report improvements in QoL [22, 23]. Moreover, there are some evidences suggesting an association between alexithymia and sexual functioning [24–26] and obesity [27–29], suggesting that obese people may have difficulties in managing their emotions with negative outcomes on their sexual experiences.

Further research is needed to investigate the impact of obesity on sexual functioning, highlighting how the psychological constructs that may play a significant role determining sexual functioning and satisfaction, such as psychopathological symptoms, QoL, body image, and emotional regulation.

Aims of the study

Studies on sexuality in obese men are lacking in literature, although sexual difficulties are often reported in bariatric care. This study recognized the importance of understanding the relationship between sexual functioning, satisfaction, and some BPS factors related to sexuality as emerged in previous studies on male general population (such as sexual domains, alexithymia, psychopathological symptoms, body image, and QoL) [16, 30] and detect their possible role in obese men.

The main aim of this study was to identify the most significant BPS predictors of sexual function and satisfaction among the selected domains in a group of obese men asking for bariatric surgery. In particular, the first aim was to highlight the most significant predictors for sexual desire, erectile, and orgasmic function, as described by the Kaplan's [31] sexual response model, which is currently used for the DSM-5 definition of sexual function in men [32]. The second aim was to identify the factors influencing intercourse and general sexual satisfaction among the same variables, and to discuss some clinical perspectives based on the improvement of sexual experience in obese men.

In general, we expected to find an association between lower level of sexual functioning and satisfaction and higher presence of psychological symptoms and alexithymia, lower body image, and QoL. Moreover, we expected that sexual function and satisfaction may also be related to each other in a complex circular direction.

Methods

Participants and procedures

A group of 213 men were recruited among patients attending the psychological assessment for bariatric surgery eligibility in the "Bariatric Center Of Excellence and Metabolic Surgery" UOC Chirurgia Generale Universitaria "Sapienza" Polo Pontino ICOT, between January and December 2019. The men approached were carefully advised that participation to the current study was voluntary and had no implication on surgery and care. Participants completed the self-reported anonymous questionnaires alone in a private room. All participants provided written informed consent and did not receive any remuneration for taking part in this study. The study was approved on January 9, 2019 by the Ethical Committee of the Department of Dynamic and Clinical Psychology.

The inclusion criteria were being a cisgender heterosexual man, BMI greater than 30, above the age of 18, fluent Italian speaker, having received the evaluation by the multidisciplinary bariatric team (composed by surgeon, endocrinologist, psychologist, nutritionist, and pulmonologist), and undergoing primary bariatric procedures. Patients undergoing revisional surgery were excluded by the present study to avoid potential confounding effects. Following these criteria, 171 men were eligible for the current study.

Measures

For the present study, six self-report questionnaires exploring different BPS areas were assessed for about 20 min of administration. The following questionnaires were used for diffusion in research and clinical fields and measures validity and reliability in the Italian language.

A "socio-demographic questionnaire" collected information on age, weight, height, diabetes, sleep apnea/snoring, hypertension, sexual orientation, relational and marital status, educational level, work status, sexual activity frequency per month, age, and satisfaction of the first sexual intercourse.

The "International Index of Erectile Function" (IIEF) [33] is a widely used, multi-dimensional 15-item tool for the evaluation of male sexual function. A general index of sexual function and five specific domains can be calculated: sexual desire, erectile function, orgasmic function, satisfaction with sexual intercourse, and overall sexual

satisfaction. Higher scores indicate better sexual functioning. Psychometric studies reported good reliability, validity, and the ability to discriminate between clinical and non-clinical sexual subjects. The Cronbach's alpha values for this measure in the current study ranged from 0.84 to 0.93. The IIEF-15 items version has been widely used in its Italian version [34], although no validating study is available on indexed journals.

The "20 Item-Toronto Alexithymia Scale" (TAS-20) [35, 36] measures a general dimension of alexithymia and three main factors: difficulty identifying feelings (DIF), difficulty describing feelings, and externally oriented thinking (EOT). Higher scores indicate higher difficulties. The TAS-20 demonstrated adequate internal and test–retest reliability. The Cronbach's alpha values for this measure in the current study ranged from 0.79 to 0.84.

The "Symptom Checklist-90-Revised" (SCL-90-R) [37, 38] is a widely used checklist measuring the severity of self-reported psychopathological symptoms on a five-point Likert scale ranging from "not at all" to "extremely." The SCL-90-R includes three global indexes (Global Severity Index, Positive Symptom Total, and Positive Symptom Distress Index) and nine symptomatological sub-scales exploring the condition during the previous 7 days: SOM, obsessive-compulsive, interpersonal sensitivity, DEP, ANX, hostility, phobic anxiety, paranoid ideation (PAR), and psychoticism. The validity of the SCL-90-R demonstrated good internal consistency. The Cronbach's alpha values for this measure in the current study ranged from 0.81 to 0.92.

The "Body Uneasiness Test" (BUT) [39] is a largely used Italian questionnaire to evaluate eating disorders and abnormal body image attitudes. For the current study, only the BUT-A form (34 items) was considered to investigate weight phobia, avoidance, compulsive self-monitoring, body image concerns, detachment, and depersonalization. It demonstrated reliable psychometric properties. Higher scores indicate higher presence of body image concerns. The Cronbach's alpha values for this measure in the current study ranged from 0.75 to 0.89.

The "Obesity-related Disability test" (TSD-OC) [40] is a specific 36-item QoL questionnaire for obesity conditions created by the Italian Society of Obesity. It examines the areas in which obese people may experience problems divided in seven domains: pain, stiffness, activities of daily living and indoor mobility (ADL), housework, instrumental activities of daily living and outdoor activities (IADL), occupational activities, and social life. Respondents are requested to provide a subjective assessment of their disability for each item on a 0–10 visual analog scale, where 10 indicates the highest level of difficulties in performing the task. The validation study showed that the TSO-DC is a reliable and valid tool. The Cronbach's alpha values for this measure in the current study ranged from 0.81 to 0.93.

Data analysis

Firstly, Pearson correlations were performed to explore the association between socio-demographic variables and general sexual function (IIEF Total score). Hierarchical multiple regression analyses (enter method) were run having sexual funcion domains as dependent factors, selected factors (age, BMI, relational status, and hypertension) as covariates (Step 1), and the sub-scales of each questionnaire as independent variables (Step 2). This procedure was used to identify the significant predictors of sexual function separately in each area assessed (sexual frequency and first sexual intercourse, alexithymia, psychopathological symptoms, sexual functioning, body image, and QoL). Final hierarchical multiple regression analyses (enter method), including the significant variables emerged from the previous regressions and the covariates, were performed to find the best predictors of each sexual function domain. The statistical analyses were performed using IBM SPSS v. 23.0 (SPSS Inc., Chicago, IL, USA).

Results

The socio-demographic characteristics of the participants are presented in Table 1. Table 2 showed the questionnaire scales mean scores of the group. The group reported mild presence of erectile dysfunction (IIEF Erectile Function < 25), normal to borderline scores in the TAS-20 domains, and mild general distress in the psychological symptoms (especially in SOM).

A Pearson correlations matrix among socio-demographic variables and IIEF total score (Table 3) was run; age, hypertension, and relational status were significantly associated to sexual function. Based on these results and on literature evidences, 4 variables (age, BMI, relational status, and hypertension) out of 11 were selected and considered as covariates in the following analyses due to possible confounding effects. Consequently, five groups of hierarchical multiple regression analyses (enter method) were run having, respectively, sexual desire, erectile function, orgasmic function, intercourse satisfaction, and general satisfaction as dependent variables.

Regarding the sample size and the statistical power level, a minimum of 131 participants was calculated a priori as large enough to run the following analyses, having a desired statistical power 0.8, 13 predictors, a minimum effect size of 0.15 (considered medium), and a probability level set at 0.05. The actual sample size for the hierarchical multiple regression analyses is composed by 171 men. The post hoc

Table 1 Socio-demographic characteristics of the group ($n = 171$ heterosexual men).

Variable	Mean ± SD (range)
Age	43.87 ± 10.01 (19–67)
Weight (kg)	137.61 ± 22.2 (92–210)
Height (meters)	1.75 ± 0.07 (1.5–1.96)
BMI (body mass index)	44.73 ± 7.16 (30.72–76.89)
	n (%)
BMI obesity level	9 (5.3%) Class 1 (BMI of 30 to <35) 33 (19.3%) Class 2 (BMI of 35 to <40) 129 (75.4%) Class 3 (BMI of 40 or higher)
Diabetes	35 (20.5%)
Sleep apnoea/snoring	80 (46.8%)
Hypertension	69 (40.4%)
Marital status	66 unmarried (38.6%) 85 married (49.7%) 20 divorced (11.7%)
Relational status	41 single (24%) 130 coupled (76%)
Educational level	76 middle school (44.4%) 77 high school (45%) 18 degree or higher (10.6%)
Work status	138 employed (80.7%) 33 unemployed (19.3%)
	Mean ± SD (range)
Sexual intercourse frequency (per month)	4.98 ± 4.73 (0–28)
Age first sexual intercourse	17.08 ± 2.8 (12–30)
Satisfaction first sexual intercourse	3.83 ± 1.16 (0–5)

Socio-demographic characteristics of the participants ($n = 171$).

Table 2 Mean and standard deviation (SD) of questionnaires' mean scores.

Variable	Mean and SD (Min–Max)
IIEF total score	51.48 ± 19.66 (5–75)
Sexual desire	6.91 ± 1.95 (2–10)
Erectile function	20.84 ± 9.37 (1–30)
Orgasmic function	7.4 ± 3.39 (0–10)
Intercourse satisfaction	9.54 ± 4.65 (0–15)
General satisfaction	6.79 ± 2.6 (0–10)
TAS-20 total score	43.53 ± 7.78 (24–69)
DIF—difficulty identifying feelings	12.98 ± 4.19 (7–30)
DDF—difficulty describing feelings	10.81 ± 3.11 (5–24)
EOT—externally oriented thinking	19.75 ± 3.11 (11–34)
SCL-90-R GSI	0.47 ± 0.32 (0.01–1.84)
SOM—somatization	0.67 ± 0.45 (0–3.17)
O-C—obsessive-compulsive	0.51 ± 0.45 (0–2.7)
I-S—interpersonal sensitivity	0.42 ± 0.39 (0–2)
DEP—depression	0.46 ± 0.38 (0–2.08)
ANX—anxiety	0.38 ± 0.3 (0–1.7)
HOS—hostility	0.48 ± 0.48 (0–3)
PHOB—phobic anxiety	0.14 ± 0.23 (0–1.43)
PAR—paranoid Ideation	0.59 ± 0.51 (0–2.17)
PSY—psychoticism	0.28 ± 0.34 (0–1.9)
BUT GSI	1.21 ± 0.72 (0–3.76)
Weight phobia	1.66 ± 0.91 (0–4.63)
Body image concerns	1.87 ± 0.98 (0–5)
Avoidance	0.62 ± 0.68 (0–4.33)
Compulsive self-monitoring	0.66 ± 0.62 (0–3.17)
Depersonalization	0.68 ± 0.67 (0–4)
TSD-OC total score	113.55 ± 60.11 (0–283)
Pain	17.41 ± 9.24 (0–46)
Stiffness	6.33 ± 3.87 (0–18)
ADL—activities of daily living and indoor mobility	26.84 ± 14.37 (0–64)
Housework	21.07 ± 12.56 (0–60)
IADL—activities of daily living and outdoor activities	14.88 ± 9.47 (0–42)
Occupational activities	12.97 ± 8.14 (0–40)
Social life	14.04 ± 9.50 (0–46)

Descriptive variables of questionnaires' mean scores of the participants ($n = 171$).

statistical power, with an observed R^2 of 0.25, 13 variables, and a probability level set at 0.05, reported an observed statistical power of 0.99.

Sexual desire

A group of hierarchical multiple regression analyses (enter method, Table 4) were run having sexual desire (IIEF) as dependent variable. Age, BMI, relational status, and hypertension were put as covariates (Table 4, Step 1) and the domains of each questionnaire as independent variables (Table 4, Steps 2.1–2.6). The covariate age and the predictors sexual intercourse frequency, DIF, PAR, general satisfaction, ADL, housework, and occupational activities significantly emerged from the respective regression models. Specifically, higher levels of sexual desire were associated to higher frequency of sexual intercourses per month, higher general sexual satisfaction, and higher PAR symptoms. Conversely, lower levels of sexual desire were associated to older age, difficulties in identifying feelings, higher reported problems on housework, activities of daily living, and occupational activities.

To highlight the best predictor of sexual desire, a final hierarchical multiple regression was conducted using sexual desire as dependent variable, having socio-demographic

Table 3 Pearson correlations between socio-demographic variables and IIEF total score.

Variables	1	2	3	4	5	6	7	8	9	10	11
1. Age	–										
2. Weight (kg)	−0.155*	–									
3. Height (meters)	−0.148	0.331***	–								
4. BMI (body mass index)	−0.085	0.849***	−0.207**	–							
5. Diabetes	0.226**	−0.036	0.006	−0.048	–						
6. Sleep apnoea/snoring	0.126	0.065	0.034	0.047	0.105	–					
7. Hypertension	0.522***	−0.021	0.027	−0.045	0.115	−0.007	–				
8. Marital status[a]	0.422***	−0.272***	−0.091	−0.230**	0.039	0.076	0.261**	–			
9. Educational level	0.081	−0.109	0.061	−0.141	0.084	−0.051	0.161*	−0.030	–		
10. Work status[b]	−0.016	0.230**	0.056	0.200**	0.001	0.081	0.009	−0.117	0.011	–	
11. Relational status[c]	0.029	−0.114	0.002	−0.108	0.071	−0.017	−0.086	0.316***	0.032	−0.128	–
12. IIEF total score	−0.168*	−0.120	0.020	−0.135	−0.059	−0.047	−0.236**	0.143	0.017	−0.116	0.272**

Pearson correlations matrix among socio-demographic variables and IIEF total score.

*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.

[a]This variable was coded as 0 = "being unmarried"; 1 = "married."

[b]This variable was coded as 0 = "unemployed"; 1 = "employed."

[c]This variable was coded as 0 = "being single"; 1 = "having a romantic relationship."

Table 4 Predictors of sexual desire in obese men ($n = 171$).

Step 1 Socio-demographic Predictors *(Covariates)*	*B*	*SE*	*β*
Age	-.049	.017	-.252**
BMI	-.020	.020	-.073
Relational Status	.216	.137	.119
Hypertension	-.116	.346	-.029

Step 2.1 Sexual Frequency Predictors	*B*	*SE*	*β*
Age	-.044	.017	-.226*
BMI	-.012	.020	-.044
Relational Status	.094	.139	.052
Hypertension	.040	.343	.010
Sexual Intercourse Frequency (per month)	.108	.034	.251**
First Sexual Intercourse Age	.037	.054	.051
First Sexual Intercourse Satisfaction	.117	.135	.066

Step 2.2 Alexithymia Predictors (TAS-20)	*B*	*SE*	*β*
Age	-.046	.017	-.235**
BMI	-.015	.02	-.055
Relational Status	.22	.137	.122
Hypertension	-.226	.346	-.057
DIF - Difficulty Identifying Feelings	-.084	.042	-.18*
DDF - Difficulty Describing Feelings	.028	.057	.045
EOT - Externally-Oriented Thinking	-.063	.048	-.1

Step 2.3 Psychopathology Predictors (SCL90R)	*B*	*SE*	*β*
Age	-.054	.017	-.278**
BMI	-.027	.02	-.099
Relational Status	.231	.137	.128
Hypertension	-.001	.339	-.001
SOM - Somatization	-.712	.446	-.164
O-C - Obsessive-Compulsive	.45	.63	.103
I-S - Interpersonal Sensitivity	.351	.709	.069
DEP - Depression	-1.581	.801	-.309
ANX - Anxiety	.223	.899	.034
HOS - Hostility	-.732	.538	-.18
PHOB - Phobic Anxiety	.863	.759	.103
PAR - Paranoid Ideation	1.32	.595	.344*
PSY - Psychoticism	.381	.791	.067

Step 2.4 Sexual Function Predictors (IIEF)	*B*	*SE*	*β*
Age	-.04	.015	-.203**
BMI	0	.018	-.002
Relational Status	-.16	.13	-.088
Hypertension	.29	.302	.073
Erectile Function	.001	.039	.006
Orgasmic Function	.059	.063	.103
Intercourse Satisfaction	.119	.073	.284
General Satisfaction	.191	.066	.254**

Step 2.5 Body Unease Predictors (BUT)	*B*	*SE*	*β*
Age	-.048	.018	-.248**
BMI	-.021	.021	-.078
Relational Status	.18	.141	.1
Hypertension	-.078	.353	-.02
Weight Phobia	.314	.353	.147
Body Image Concern	-.181	.333	-.091
Avoidance	-.371	.346	-.129
Compulsive Self-Monitoring	.187	.407	.059
Depersonalization	.226	.392	.078

Step 2.6 Quality of Life Predictors (TSD-OC)	*B*	*SE*	*β*
Age	-.031	.017	-.158
BMI	-.017	.02	-.062
Relational Status	.19	.133	.105
Hypertension	-.146	.337	-.037
Pain	.019	.032	.089
Stiffness	-.068	.06	-.136
ADL - Activities of Daily Living & Indoor Mobility	-.049	.022	-.357*
Housework	-.058	.026	-.373*
IADL - Activities of Daily Living & Outdoor Activities	-.01	.035	-.049
Occupational Activities	-.074	.033	-.307*
Social Life	.04	-.062	.025

Step 2.7 Final Regression	*B*	*SE*	*β*
Age	-.030	.015	-.155*
BMI	.001	.017	.002
Relational Status	.004	.118	.002
Hypertension	.084	.291	.021
Sexual Intercourse Frequency (per month)	.039	.030	.090
TAS20 - DIF- Difficulty Identifying Feelings	-.088	.032	-.189**
SCL90R - PAR- Paranoid Ideation	1.005	.256	.262***
IIEF - General Satisfaction	.301	.054	.400***
TSD-OC - ADL- Activities of Daily Living & Indoor Mobility	-.042	.017	-.307*
TSD-OC – Housework	-.031	.020	-.200
TSD-OC - Occupational Activities	-.062	.025	-.258*

Group of hierarchical multiple regression analyses (enter method) with sexual desire (IIEF) as dependent variable, age, BMI, relational status, and hypertension as covariates, and questionnaire scores as independent variables.

TAS-20 Toronto Alexithymia Scale, *SCL90R* Symptom Checklist-90-Revised, *IIEF* International Index of Erectile Function, *BUT* Body Unease Test, *TSD-OC* Obesity-related Disability test.

*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.

variables as covariates, and using the factors significantly emerged in the previous analyses (sexual intercourse frequency, DIF, PAR, general satisfaction, ADL, housework, and occupational activities) as predictors (Table 4, Step 2.7). The analysis revealed a significant general model explaining the 37.1% of variance in sexual desire ($F_{(11,159)} = 10.128$, $p < 0.001$, $\Delta R^2 = 0.31$). Age, DIF, PAR, general satisfaction, ADL and occupational activities emerged as significant predictors of sexual desire, whereas general satisfaction was the strongest one.

Erectile function

A group of hierarchical multiple regression analyses (enter method, Table 5) were run having erectile function (IIEF) as dependent variable. Age, BMI, relational status, and hypertension were put as covariates (Table 5, Step 1) and the domains of each questionnaire as independent variables (Table 5, Steps 2.1–2.6). The covariates relational status and hypertension and the predictors sexual intercourse frequency, first sexual intercourse satisfaction,

Table 5 Predictors of erectile function in obese men ($n = 171$).

Step 1 Socio-demographic Predictors (Covariates)	*B*	*SE*	*β*
Age	-.104	.077	-.111
BMI	-.13	.092	-.099
Relational Status	2.818	.615	.325***
Hypertension	-4.031	.561	-.212*

Step 2.1 Sexual Frequency Predictors	*B*	*SE*	*β*
Age	-.081	.072	-.087
BMI	-.06	.085	-.046
Relational Status	1.857	.585	.214**
Hypertension	-2.512	1.448	-.132
Sexual Intercourse Frequency (per month)	.678	.145	.329***
First Sexual Intercourse Age	-.146	.228	-.042
First Sexual Intercourse Satisfaction	1.527	.569	.179**

Step 2.2 Alexithymia Predictors (TAS-20)	*B*	*SE*	*β*
Age	-.104	.078	-.111
BMI	-.113	.092	-.086
Relational Status	2.865	.622	.33***
Hypertension	-4.174	1.57	-.219**
DIF - Difficulty Identifying Feelings	-.359	.188	-.16
DDF - Difficulty Describing Feelings	-.029	.257	-.01
EOT - Externally-Oriented Thinking	.021	.219	.007

Step 2.3 Psychopathology Predictors (SCL90R)	*B*	*SE*	*β*
Age	-.138	.079	-.147
BMI	-.156	.095	-.12
Relational Status	2.929	.64	.337***
Hypertension	-3.742	1.581	-.197*
SOM - Somatization	-.274	2.082	-.013
O-C - Obsessive-Compulsive	-1.667	2.939	-.079
I-S - Interpersonal Sensitivity	-.616	3.307	-.025
DEP - Depression	-5.354	3.737	-.218
ANX - Anxiety	3.692	4.195	.118
HOS - Hostility	-4.597	2.507	-.236
PHOB - Phobic Anxiety	3.805	3.539	.095
PAR - Paranoid Ideation	5.061	2.775	.276
PSY - Psychoticism	3.15	3.687	.115

Step 2.4 Sexual Function Predictors (IIEF)	*B*	*SE*	*β*
Age	-.037	.03	-.039
BMI	-.002	.036	-.002
Relational Status	-.42	.262	-.048
Hypertension	-.884	.607	-.046
Sexual Desire	.005	.159	.001
Orgasmic Function	.613	.119	.222***
Intercourse Satisfaction	1.407	.099	.699***
General Satisfaction	.306	.135	.085*

Step 2.5 Body Unease Predictors (BUT)	*B*	*SE*	*β*
Age	-.063	.079	-.067
BMI	-.138	.093	-.106
Relational Status	2.686	.626	.31***
Hypertension	-4.193	1.57	-.22**
Weight Phobia	-.214	1.57	-.021
Body Image Concern	2.03	1.479	.214
Avoidance	-3.293	1.538	-.238*
Compulsive Self-Monitoring	1.196	1.81	.079
Depersonalization	.653	1.745	.047

Step 2.6 Quality of Life Predictors (TSD-OC)	*B*	*SE*	*β*
Age	-.054	.082	-.057
BMI	-.111	.096	-.085
Relational Status	2.714	.624	.313***
Hypertension	-4.117	1.585	-.216*
Pain	-.032	.153	-.031
Stiffness	-.001	.281	.0
ADL - Activities of Daily Living & Indoor Mobility	.134	.106	.206
Housework	-.185	.122	-.248
IADL - Activities of Daily Living & Outdoor Activities	.093	.165	.094
Occupational Activities	-.265	.154	-.231
Social Life	.117	.11	.118

Step 2.7 Final Regression	*B*	*SE*	*β*
Age	-.036	.03	-.038
BMI	-.005	.036	-.004
Relational Status	-.415	.264	-.048
Hypertension	-.917	.612	-.048
Sexual Intercourse Frequency (per month)	-.023	.066	-.011
First Sexual Intercourse Satisfaction	-.134	.248	-.016
IIEF - Orgasmic Function	.609	.119	.221***
IIEF - Intercourse Satisfaction	1.425	.102	.708***
IIEF - General Satisfaction	.322	.135	.089*
BUT - Avoidance	.043	.376	.003

Group of hierarchical multiple regression analyses (enter method) with erectile function (IIEF) as dependent variable, age, BMI, relational status, and hypertension as covariates, and questionnaire scores as independent variables.

TAS-20 Toronto Alexithymia Scale, *SCL90R* Symptom Checklist-90-Revised, *IIEF* International Index of Erectile Function, *BUT* Body Unease Test, *TSD-OC* Obesity-related Disability test.

*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.

orgasmic function, intercourse satisfaction, general satisfaction, and avoidance significantly emerged from the respective regression models. Specifically, higher scores on erectile function were associated to be in couple, higher frequency of sexual intercourses per month, higher satisfaction at the first sexual intercourse, higher orgasmic function, higher intercourse and general sexual satisfaction. Lower scores on erectile function were associated to hypertension and avoidance behavior regarding the body image.

To highlight the best predictor of erectile function, a final hierarchical multiple regression was conducted using erectile function as dependent variable, having Socio-demographic variables as covariates, and using the factors significantly emerged in the previous analyses (Sexual Intercourse Frequency, First Sexual Intercourse Satisfaction, Orgasmic Function, Intercourse Satisfaction, General Satisfaction, and Avoidance) as predictors (Table 5, Step 2.7). The analysis revealed a significant general model explaining the 57.8% of variance in erectile function ($F_{(10,160)}$=63.578, $p < .001$, $\Delta R^2 = .408$). Orgasmic Function, Intercourse and General Satisfaction emerged as significant predictors of erectile function, whereas Intercourse Satisfaction was the strongest one.

Orgasmic function

A group of hierarchical multiple regression analyses (enter method, Table 6) were run having Orgasmic Function (IIEF) as dependent variable. Age, BMI, Relational Status, and Hypertension were put as covariates (Table 6, Step 1) and the domains of each questionnaire as independent variables (Table 6, Steps 2.1–2.6). The covariates relational status and the predictors sexual intercourse frequency, first sexual intercourse satisfaction, DIF, DEP, erectile function, and occupational activities significantly emerged from the regression models. Specifically, higher scores on orgasmic function were associated to be in a couple, higher frequency of sexual intercourses per month, higher satisfaction at the first sexual intercourse, and higher erectile function. Lower scores on orgasmic function were associated to difficulties in identifying feelings, DEP symptoms, and reporting problems during occupational activities.

To highlight the best predictor of orgasmic function, a final hierarchical multiple regression was conducted using orgasmic function as dependent variable, having socio-demographic variables as covariates, and using the factors significantly emerged in the previous analyses (sexual intercourse frequency, first sexual intercourse satisfaction, DIF, DEP, erectile function, and occupational activities) as predictors (Table 6, Step 2.7). The analysis revealed a significant general model explaining the 56% of variance in orgasmic function ($F_{(10,160)} = 33.967$, $p < 0.001$, $\Delta R^2 = 0.464$). DEP and erectile function emerged as significant predictors of orgasmic function, whereas erectile function was the strongest one.

Intercourse satisfaction

A group of hierarchical multiple regression analyses (enter method, Table 7) were run having Intercourse Satisfaction (IIEF) as dependent variable. Age, BMI, relational status,

Table 6 Predictors of orgasmic function in obese men ($n = 171$).

Step 1 Socio-demographic Predictors *(Covariates)*	*B*	*SE*	*β*
Age	-.034	.029	-.101
BMI	-.05	.035	-.106
Relational Status	.859	.233	.273***
Hypertension	-.788	.59	-.114

Step 2.1 Sexual Frequency Predictors	*B*	*SE*	*β*
Age	-.027	.028	-.081
BMI	-.029	.034	-.061
Relational Status	.569	.230	.181*
Hypertension	-.328	.569	-.048
Sexual Intercourse Frequency (per month)	.205	.057	.275***
First Sexual Intercourse Age	.039	.089	-.031
First Sexual Intercourse Satisfaction	.471	.224	.153*

Step 2.2 Alexithymia Predictors (TAS-20)	*B*	*SE*	*β*
Age	-.034	.029	-.099
BMI	-.043	.035	-.091
Relational Status	.871	.233	.277***
Hypertension	-.853	.589	-.124
DIF - Difficulty Identifying Feelings	-.153	.071	-.189*
DDF - Difficulty Describing Feelings	.033	.096	-.030
EOT - Externally-Oriented Thinking	-.004	.082	.004

Step 2.3 Psychopathology Predictors (SCL90R)	*B*	*SE*	*β*
Age	-.041	.030	-.120
BMI	-.061	.036	-.128
Relational Status	.811	.240	.258**
Hypertension	-.649	.594	-.094
SOM - Somatization	-.028	.782	-.004
O-C - Obsessive-Compulsive	.425	1.103	.056
I-S - Interpersonal Sensitivity	.282	1.242	.032
DEP - Depression	-3.285	1.403	-.369*
ANX - Anxiety	.659	1.575	.058
HOS - Hostility	-1.635	.941	-.232
PHOB - Phobic Anxiety	.591	1.329	.041
PAR - Paranoid Ideation	1.527	.042	.229
PSY - Psychoticism	.862	1.384	.087

Step 2.4 Sexual Function Predictors (IIEF)	*B*	*SE*	*β*
Age	-.001	.019	-.004
BMI	-.009	.022	-.018
Relational Status	-.025	.161	-.008
Hypertension	.38	.373	.055
Sexual Desire	.091	.097	.052
Erectile Function	.23	.045	.634***
Intercourse Satisfaction	.09	.091	.123
General Satisfaction	.097	.084	.074

Step 2.5 Body Unease Predictors (BUT)	*B*	*SE*	*β*
Age	-.021	.03	-.062
BMI	-.054	.035	-.114
Relational Status	.854	.237	.272***
Hypertension	-.838	.596	-.121
Weight Phobia	-.751	.596	-.202
Body Image Concern	-.881	.561	.256
Avoidance	-.882	.584	-.176
Compulsive Self-Monitoring	1.023	.687	.187
Depersonalization	.001	.662	.000

Step 2.6 Quality of Life Predictors (TSD-OC)	*B*	*SE*	*β*
Age	-.015	.031	-.045
BMI	-.048	.036	-.101
Relational Status	.805	.234	.256**
Hypertension	-.750	.514	-.109
Pain	.021	.057	.056
Stiffness	-.04	.105	-.045
ADL - Activities of Daily Living & Indoor Mobility	.056	.04	.237
Housework	-.057	.046	-.21
IADL - Activities of Daily Living & Outdoor Activities	-.011	.062	.03
Occupational Activities	-.138	.058	-.332*
Social Life	.057	.041	.116

Step 2.7 Final Regression	*B*	*SE*	*β*
Age	.001	.019	.001
BMI	-.012	.022	-.025
Relational Status	-.022	.156	-.007
Hypertension	.427	.374	.062
Sexual Intercourse Frequency (per month)	.002	.039	.003
First Sexual Intercourse Satisfaction	-.061	.151	-.02
TAS 20 – DIF - Difficulty Identifying Feelings	-.01	.042	-.012
SCL90R – DEP - Depression	-1.075	.473	-.121*
IIEF – Erectile Function	.294	.021	.812***
TSD-OC – Occupational Activities	-.01	.02	-.025

Group of hierarchical multiple regression analyses (enter method) with orgasmic function (IIEF) as dependent variable, age, BMI, relational status, and hypertension as covariates, and questionnaire scores as independent variables.

TAS-20 Toronto Alexithymia Scale, *SCL90R* Symptom Checklist-90-Revised, *IIEF* International Index of Erectile Function, *BUT* Body Unease Test, *TSD-OC* Obesity-related Disability test.

*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.

and hypertension were put as covariates (Table 7, Step 1) and the domains of each questionnaire as independent variables (Table 7, Steps 2.1–2.6). The covariates relational status and hypertension and the predictors sexual intercourse frequency, first sexual intercourse satisfaction, and erectile function significantly emerged from the regression models. Specifically, higher scores on intercourse satisfaction were associated to be in a couple, not having hypertension, higher frequency of sexual intercourses per month, higher satisfaction at the first sexual intercourse, and higher erectile function.

To highlight the best predictor of intercourse satisfaction, a final hierarchical multiple regression was conducted using intercourse satisfaction as dependent variable, having socio-demographic variables as covariates, and using the factors significantly emerged in the previous analyses (sexual intercourse frequency, first sexual intercourse satisfaction, and erectile function) as predictors (Table 7, Step 2.7). The analysis revealed a significant general model explaining the 66.7% of variance in intercourse satisfaction ($F_{(7,163)} = 159.752$, $p < 0.001$, $\Delta R^2 = 0.457$). Relational status, sexual intercourse frequency, and erectile function emerged as significant predictors of intercourse satisfaction, whereas erectile function was the strongest one.

General satisfaction

A group of hierarchical multiple regression analyses (enter method, Table 8) were run having general satisfaction (IIEF) as dependent variable. Age, BMI, relational status, and hypertension were put as covariates (Table 8, Step 1) and the domains of each questionnaire as independent variables (Table 5, Steps 2.1–2.6). The covariates relational status and the predictors sexual intercourse frequency, first sexual intercourse satisfaction, SOM, sexual desire, erectile function, and avoidance significantly, respectively, emerged from the regression models. Specifically, higher scores on general satisfaction were associated to be in a couple, higher frequency of sexual intercourses per month, higher satisfaction at the first sexual intercourse, higher sexual desire level, and higher erectile function. Lower scores on general satisfaction were associated to SOM symptoms and avoidance behavior regarding the body image.

To highlight the best predictor of general satisfaction, a final hierarchical multiple regression was conducted using general satisfaction as dependent variable, having socio-demographic variables as covariates, and using the factors significantly emerged in the previous analyses (sexual intercourse frequency, first sexual intercourse satisfaction, SOM, sexual desire, erectile function, and avoidance) as predictors (Table 8, Step 2.7). The analysis revealed a significant general model explaining the 51% of variance in general satisfaction ($F_{(10,160)} = 18.707$, $p < 0.001$, $\Delta R^2 = 0.42$). Sexual intercourse frequency, sexual desire, and erectile function emerged as significant predictors of general satisfaction, whereas erectile function was the strongest one.

Discussion

In line with the general aim of the current study, the role of selected BPS variables (sexual domains, alexithymia, psychopathological symptoms, body image, and QoL) on obese

Table 7 Predictors of intercourse satisfaction in obese men ($n = 171$).

Step 1 Socio-demographic Predictors *(Covariates)*	*B*	*SE*	*β*
Age	-.028	.037	-.06
BMI	-.058	.045	-.089
Relational Status	1.805	.298	.419***
Hypertension	-1.725	.756	-.182*

Step 2.1 Sexual Frequency Predictors	*B*	*SE*	*β*
Age	-.017	.034	-.036
BMI	-.019	.04	-.03
Relational Status	1.286	.275	.298***
Hypertension	-.889	.68	-.094
Sexual Intercourse Frequency (per month)	.36	.068	.351***
First Sexual Intercourse Age	.089	.107	.052
First Sexual Intercourse Satisfaction	.874	.268	.207**

Step 2.2 Alexithymia Predictors (TAS-20)	*B*	*SE*	*β*
Age	-.029	.038	-.062
BMI	-.051	.045	-.078
Relational Status	1.85	.303	.429***
Hypertension	-1.798	.765	-.19*
DIF - Difficulty Identifying Feelings	-.164	.092	-.148
DDF - Difficulty Describing Feelings	.053	.125	.036
EOT - Externally-Oriented Thinking	-.006	.107	-.004

Step 2.3 Psychopathology Predictors (SCL90R)	*B*	*SE*	*β*
Age	-.043	.038	-.091
BMI	-.065	.046	-.101
Relational Status	1.816	.311	.421***
Hypertension	-1.571	.768	-.166*
SOM - Somatization	.1	1.012	-.01
O-C - Obsessive-Compulsive	-1.117	1.428	-.107
I-S - Interpersonal Sensitivity	-.316	1.607	-.026
DEP - Depression	-2.752	1.816	-.226
ANX - Anxiety	1.005	2.039	.064
HOS - Hostility	-1.823	1.219	-.188
PHOB - Phobic Anxiety	2.026	1.772	.111
PAR - Paranoid Ideation	1.855	1.349	.203
PSY - Psychoticism	2.19	1.792	.162

Step 2.4 Sexual Function Predictors (IIEF)	*B*	*SE*	*β*
Age	-.023	.016	-.05
BMI	.002	.019	.003
Relational Status	.574	.132	.133***
Hypertension	-.02	.323	-.002
Sexual Desire	.136	.083	.057
Erectile Function	.394	.028	.793***
Orgasmic Function	.067	.068	.049
General Satisfaction	.063	.072	.035

Step 2.5 Body Unease Predictors (BUT)	*B*	*SE*	*β*
Age	-.007	.039	-.015
BMI	-.059	.045	-.09
Relational Status	1.783	.305	.414***
Hypertension	-1.87	.764	-.198*
Weight Phobia	-.267	.764	.052
Body Image Concern	1.221	.72	.259
Avoidance	-1.225	.749	-.179
Compulsive Self-Monitoring	.323	.881	.043
Depersonalization	-.088	.849	.013

Step 2.6 Quality of Life Predictors (TSD-OC)	*B*	*SE*	*β*
Age	-.001	.017	-.158
BMI	-.048	.046	-.074
Relational Status	1.774	.302	.411***
Hypertension	-1.831	.766	-.194*
Pain	-.027	.074	-.054
Stiffness	.004	.136	.003
ADL - Activities of Daily Living & Indoor Mobility	.044	.051	.136
Housework	-104	.059	-.279
IADL - Activities of Daily Living & Outdoor Activities	-.081	.08	.164
Occupational Activities	-.118	.074	-.206
Social Life	.074	-.053	.151

Step 2.7 Final Regression	*B*	*SE*	*β*
Age	.017	.016	.037
BMI	.005	.019	.008
Relational Status	.518	.131	.12***
Hypertension	.144	.318	.015
Sexual Intercourse Frequency (per month)	.08	.033	.078*
First Sexual Intercourse Satisfaction	.241	.127	.057
IIEF – Erectile Function	.417	.017	.839***

Group of hierarchical multiple regression analyses (enter method) with intercourse satisfaction (IIEF) as dependent variable, age, BMI, relational status, and hypertension as covariates, and questionnaire scores as independent variables.

TAS-20 Toronto Alexithymia Scale, *SCL90R* Symptom Checklist-90-Revised, *IIEF* International Index of Erectile Function, *BUT* Body Unease Test, *TSD-OC* Obesity-related Disability test.

*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.

Table 8 Predictors of general satisfaction in obese men ($n = 171$).

Step 1 Socio-demographic Predictors *(Covariates)*	*B*	*SE*	*β*
Age	-.022	.022	-.084
BMI	-.049	.027	-.135
Relational Status	.557	.179	.231**
Hypertension	-.778	.454	-.147

Step 2.1 Sexual Frequency Predictors	*B*	*SE*	*β*
Age	-.015	.021	-.058
BMI	-.03	.025	-.082
Relational Status	.310	.171	.129
Hypertension	-.419	.424	-.079
Sexual Intercourse Frequency (per month)	.204	.042	.356***
First Sexual Intercourse Age	.073	.067	.076
First Sexual Intercourse Satisfaction	.411	.167	.174*

Step 2.2 Alexithymia Predictors (TAS-20)	*B*	*SE*	*β*
Age	-.023	.023	-.089
BMI	-.046	.027	-.127
Relational Status	.557	.181	.231**
Hypertension	-.764	.458	-.145
DIF - Difficulty Identifying Feelings	-.069	.055	-.11
DDF - Difficulty Describing Feelings	-.057	.075	-.068
EOT - Externally-Oriented Thinking	.039	.064	.046

Step 2.3 Psychopathology Predictors (SCL90R)	*B*	*SE*	*β*
Age	-.029	.023	-.111
BMI	-.042	.027	-.117
Relational Status	.643	.185	.267**
Hypertension	-.666	.458	-.126
SOM - Somatization	-1.233	.604	-.214*
O-C - Obsessive-Compulsive	-.064	.852	-.011
I-S - Interpersonal Sensitivity	-.614	.959	-.091
DEP - Depression	-.351	1.084	-.052
ANX - Anxiety	.907	1.216	.104
HOS - Hostility	-1.124	.727	-.208
PHOB - Phobic Anxiety	1.137	1.026	.102
PAR - Paranoid Ideation	.076	.805	.015
PSY - Psychoticism	.989	1.069	.131

Step 2.4 Sexual Function Predictors (IIEF)	*B*	*SE*	*β*
Age	-.006	.017	-.023
BMI	-.022	.02	-.061
Relational Status	-.012	.151	-.005
Hypertension	-.15	.35	-.028
Sexual Desire	.255	.089	.192**
Erectile Function	.01	.044	.361*
Orgasmic Function	.085	.073	.111
Intercourse Satisfaction	.074	.085	.133

Step 2.5 Body Unease Predictors (BUT)	*B*	*SE*	*β*
Age	-.01	.023	-.039
BMI	-.053	.027	-.146
Relational Status	.509	.181	.211**
Hypertension	-.829	.455	-.157
Weight Phobia	.476	.455	-.167
Body Image Concern	.613	.429	.233
Avoidance	-1.148	.446	-.299*
Compulsive Self-Monitoring	.703	.525	.168
Depersonalization	.183	.506	.047

Step 2.6 Quality of Life Predictors (TSD-OC)	*B*	*SE*	*β*
Age	-.007	.024	-.027
BMI	-.043	.028	-.12
Relational Status	.554	.181	.23**
Hypertension	-.824	.459	-.156
Pain	.012	.044	.042
Stiffness	-.05	.082	-.074
ADL - Activities of Daily Living & Indoor Mobility	.018	.031	.102
Housework	-.017	.035	-.08
IADL - Activities of Daily Living & Outdoor Activities	-.043	.048	-.158
Occupational Activities	-.037	.045	-.117
Social Life	.023	.032	.083

Step 2.7 Final Regression	*B*	*SE*	*β*
Age	.009	.017	.036
BMI	-.018	.02	-.049
Relational Status	.005	.142	.002
Hypertension	-.024	.344	-.005
Sexual Intercourse Frequency (per month)	.074	.036	.129*
First Sexual Intercourse Satisfaction	.114	.138	.048
SCL90R - SOM- Somatization	-.607	.323	-.105
IIEF – Sexual Desire	.249	.086	.187**
IIEF – Erectile Function	.139	.02	.501***
BUT - Avoidance	-.265	.211	-.069

Group of hierarchical multiple regression analyses (enter method) with general satisfaction (IIEF) as dependent variable, age, BMI, relational status, and hypertension as covariates, and questionnaire scores as independent variables.

TAS-20 Toronto Alexithymia Scale, *SCL90R* Symptom Checklist-90-Revised, *IIEF* International Index of Erectile Function, *BUT* Body Unease Test, *TSD-OC* Obesity-related Disability test.

*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.

men sexual functioning and satisfaction has been analyzed. Data showed a complex situation in which some predictors were strongly connected with sexual functioning and satisfaction in men.

In general, the group reported to have sexual activity about once a week, which seems to be started later in life (around 17 years old) comparing to the general Italian population [41]. Regarding the mean scores of questionnaires assessed, the group appeared to be in line with the general Italian population and the obese population [39, 40, 42]. As expected, the group on average reported a mild presence of erectile dysfunction, having about 49% (84 men) of the group scoring <25 in the IIEF erectile function domains. Regarding psychological variables, the group reported borderline TAS-20 scores and mild psychological distress especially in the SOM area, which is closely connected to the possibility of expressing psychological conflicts throughout the body.

Age, BMI, relational status, and hypertension were selected as variables of interest among the socio-demographic factors. While age, being in a relationship, and hypertension are acknowledged factors influencing the male sexual response in normal weight people in literature [10, 43] and were confirmed by the correlation matrix (Table 2), BMI was chosen on the basis of confounding effects on obese sexual functioning reported in literature [44, 45]. Considering these socio-demographic variables as covariates allowed us to make more general assumptions and considerations about the results.

Following the first aim of this study, we have identified the best predictors for sexual desire, erectile, and orgasmic function among the dimensions assessed. Considering "sexual desire," the factors emerged as significant from the regression models were age, sexual intercourse frequency, DIF, PAR, general satisfaction, ADL, housework, and occupational activities. The association between lower desire and older age is quite established in literature [10, 46] for the physiological decline of sexual response with ageing in both men and women. Sexual intercourse frequency and general satisfaction were positively correlated to sexual desire, suggesting a positive feedback effect of recurrent and satisfactory sexual experience on desire. This connection was highlighted in the Basson's [47] model for women and verified in the cognitive-emotional model for men [46]. In these models, sexual response phases are circularly related to each other and past sexual experiences may influence the present expression of desire. The association between greater difficulties in identifying feelings and lower sexual drive may reflect a difficulty in fantasizing about sexual needs and wishes, rather than on the acting out of sexual behaviors. As expected, QoL domains expressed by problems in daily living activities such as occupation and housework were related to a lower level of sexual desire. In this case, a general impairment in effectively engaging in daily activities may lower self-engagement in sexual experience and desire, preventing individual from additional distress [10, 48, 49]. Not totally intuitively, PAR (expressing beliefs of being harassed or persecuted, general suspiciousness, a sense of grandeur and self-referential ideas) was related to higher levels of sexual desire. A possible explanation could be that ideas of grandeur and self-reference are in line with male gender stereotypes, fostering macho and power beliefs. In this sense, the connection between "being a virile man" and reporting (not necessarily having) a high sexual drive is showed in literature [50, 51]. Moreover, sexual desire may be also related to an intimate wish of being connected to others, even if they are perceived as threats. In line with results of normal weight men [16, 52, 53], general satisfaction was the best predictor for sexual desire in obese men explaining a significant part of variance.

Regarding "erectile function," factors emerged as significant from the regression models were relational status, hypertension, sexual intercourse frequency, first sexual intercourse satisfaction, orgasmic function, intercourse satisfaction, general satisfaction, and avoidance. Erectile function was higher for men currently in a relationship, who may have higher frequency of partnered sexual activity. Finding a sexual partner may be more difficult for obese men asking for bariatric surgery, not only because they may not fit with the esthetic standards, but also because of impairments in their social life and resistance to approaching new partners [54]. Hypertension is acknowledged to have a direct connection to erectile problems in the literature [52]. As discussed in relation to sexual desire, it seems that a higher frequency of sexual intercourses per month, higher satisfaction at the first sexual intercourse, higher orgasmic function, higher intercourse and general sexual satisfaction may foster a general positive memory of sexual experience, which is connected to the possibility to have more satisfactory erections [55]. This association can be interpreted both ways, whereas having good erections may encourage more satisfying sexual intercourse. Lower scores on erectile function were also associated to avoidance behavior regarding body image. Low self-esteem and body concerns may directly affect comfort in sexuality, making these men avoid the possibility of showing their bodies and feeling rejected in intimate experiences [56].

Regarding "orgasmic function," the factors that emerged as significant from the regression models were relational status, sexual intercourse frequency, first sexual intercourse satisfaction, DIF, DEP, erectile function, and occupational activities. Some of the discussions previously made for sexual desire and erectile function could be valid for orgasm too: the circular direct effect of other phases of sexual response (e.g., erection) was confirmed [46, 47]. Difficulties in recognizing emotions may affect the way positive sensations are mentalized, having as outcome a delayed or premature ejaculation [26, 57]. In addition, higher presence of DEP symptoms was related to more problems in reaching orgasm in these men. This is not surprising, as generally DEP may negatively influence the global sexual experience, making men also less sensitive to pleasurable sensations [17].

Following the second aim of this study, we considered the factors affecting sexual satisfaction related to sexual intercourse and general sexual experience. Considering "sexual intercourse satisfaction," the factors that emerged as significant from the regression models were relational status, hypertension, sexual intercourse frequency, first sexual intercourse satisfaction, and erectile function. As described in the IIEF [33], the intercourse satisfaction dimension describes the enjoyment directly experienced in sexual intercourse in the last 4 weeks (considering only penetrative practices). Thus, it is strictly related to the frequency and

functionality of erection (and factors affecting the erection physiology, such as hypertension). Giving this premise, it is not surprising that the quality of erection was the main predictor of intercourse satisfaction explaining a large amount of variance.

More interestingly, talking about "general sexual satisfaction," which includes the whole sexual and intimate experience, the situation is different: relational status, sexual intercourse frequency, first sexual intercourse satisfaction, SOM, sexual desire, erectile function, and avoidance, respectively, emerged as significant from the regression models, reflecting a more complex situation not only influenced by sexual domains. Men currently in a relationship, who may have higher frequency of partnered sexual activity, report a higher satisfaction in their general sexual experience. The presence of somatic symptoms could represent an important contextual factor in the determination/maintenance of sexual dysfunctions. Moreover, high levels of somatic symptoms in men with sexual dysfunction could be related to the sexual symptom itself [58]. Higher body-avoidance behavior was also associated with lower sexual satisfaction, possibly expressing the discomfort of these men in intimate experiences [56]. In any case, erectile function was once again the main predictor of general satisfaction, indicating that obese man may be "erection centered" in their sexual experience. This element highlights the common idea of "quantity" primacy over "quality" (e.g., more importance given to penis size, intercourse duration, and orgasms, rather than pleasure and intimacy). A strong focus on male stereotypic ideas is recognized as an important risk factor for sexual health, fostering unreal and unreachable expectations of sex as well established by the "Good-Enough Sex" model [59].

The consequences of the patterns highlighted may be of great clinical relevance in sexual medicine. These results show the need for clinicians involved in the care of obese men to explore sexuality. According to the BPS model, the clinician who takes care of the obese patient should follow a holistic approach. But too often clinicians focus only on the bodily and physiological characteristics of obesity or on the behavioral and dietary habits, excluding the affective and emotional experiences of these men [60]. Erectile dysfunction in obese men is shown to be a common symptom that should be better investigated during visits and bariatric consultations for the possible disruptions on general QoL. Although it is suggested that a positive memory of sexuality could aid the overall sexual functioning, this idea should be confirmed with future studies focused on sexual dysfunction therapy.

Findings from the current study should be interpreted with caution due to some limitations. The role of physiological variables on sexual function in obese men was not controlled. The influence of obesity treatments on sexual function and satisfaction should be better investigated in the future. This study was composed of self-report questionnaires. The IIEF was the main measure used and it was chosen for its diffusion and ease of use, but the IIEF is not a comprehensive measure for sexual desire and orgasmic function, as far as only counts for two items in each dimension, describing quality and quantity of desire/orgasm. Moreover, the IIEF-15 items version is widely used in Italian studies, but validating study is available on indexed journals. The group is not representative of the general obese population, as some men may have falsified their answers due to the assessment setting (psychological assessment for bariatric surgery eligibility).

Future studies should include some biological variables. Another issue is to extend the study to different populations, such as other sexual orientations (e.g., gay and bisexual men). Moreover, other important constructs should be considered as the personality traits, attachment styles, and emotional intelligence.

Conclusions

This study highlighted that sexual function and satisfaction in obese men asking for bariatric surgery may be significantly associated with important BPS variables. Current results are useful not only to deepen the understanding of male sexual response, but for their possible clinical applications. During the assessment phase in bariatric departments, clinicians are strongly suggested to explore the highlighted variables and evaluate them as predisposing, precipitating, maintaining, contextual, and protective factors [30]. Sexual dysfunction is very common among obese men asking for bariatric surgery and requests for help may remain unheard. Psycho-sexologists should be included in the obesity care since improving the sexual experience may positively affect the QoL and the holistic understanding of obesity.

Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest.

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