

# The Effect of Obesity Management on Body Image in Patients Seeking Treatment at Medical Centers

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## Abstract

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**Objective:** Body image dissatisfaction is common in treatment-seeking patients with obesity. We aimed to investigate the effects of obesity management on body image in patients with obesity attending Italian medical centers for weight loss programs.

**Research Methods and Procedures:** A total of 473 obese patients seeking treatment in 13 Italian medical centers (80% females; age, 45.9 ± standard deviation 11.0 years; BMI, 36.8 ± 5.7 kg/m<sup>2</sup>) were evaluated at baseline and after a 6-month weight loss treatment. Body uneasiness, psychiatric distress, and binge eating were tested by Body Uneasiness Test (BUT, Part A), Symptom Checklist-90 (SCL-90), and Binge Eating Scale (BES), respectively.

**Results:** At 6-month follow-up, the percentage weight loss was significantly higher in men (9.0 ± 6.3%) than in women (6.8 ± 7.3%;  $p = 0.010$ ). Both men and women had a significant improvement in BUT Global Severity Index and in all of the BUT subscales with the exception of the

Compulsive Self-Monitoring subscale. Linear regression analysis selected baseline psychological and behavioral measures (global score of BUT and SCL-90) and improved psychiatric distress and binge eating as independent predictors of changes in basal body dissatisfaction in females, whereas in males, changes were associated only with baseline BUT-Global Severity Index score, binge eating, and its treatment-associated improvement. Pre-treatment BMI and BMI changes did not enter the regression.

**Discussion:** Obesity treatment, even with a modest degree of weight loss, is associated with a significant improvement of body image, in both females and males. This effect depends mainly on psychological factors, not on the amount of weight loss.

**Key words:** treatment outcomes, weight loss, treatment, body image, psychopathology

## Introduction

Body image dissatisfaction is common in treatment-seeking patients with obesity, in association with a few relatively well-defined characteristics and experiences (1). Prepubertal onset of obesity and the experience of weight-related criticism and teasing are associated with body image dissatisfaction in adulthood (2,3). Adults with binge eating disorder (4) or weight cycling (5) and those stigmatized for their excess weight (6,7), particularly women with obesity (8), report greater body image dissatisfaction. However, conflicting data are available on the relation of body image dissatisfaction to BMI (9,10).

Body image dissatisfaction is expected to have a negative clinical impact on individuals with obesity, influencing their behavior, quality of life, and psychological wellness. Women with overweight and obesity report a poor perceived health status and lower-than-norm quality of life in several psychosocial areas, specifically related to body image dissatisfaction (10). They report embarrassment in so-

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¶A complete list of participants in the QUOVADIS study has been previously published (*Diab Nutr Metab*. 2003;16:115–24).

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cial situations (e.g., work or parties) because of their excess weight and carry out body avoidance strategies (e.g., avoiding looking at their body in the mirror, camouflaging the body with clothing, changing their posture or body movements) (8). In treatment-seeking obese women, a relationship has been observed among body image dissatisfaction, depressive symptoms, and low self-esteem (2,8,11). However, while obese and non-obese women differ in body image dissatisfaction, they do not differ in self-reported depressive symptoms, self-esteem, and anxiety (6,12).

Body image dissatisfaction is one of the principal motivations of weight loss in individuals with obesity (1). Also, in medical centers for obesity, where the majority of attending patients report medical complications, improving appearance remains one of the primary goals for weight loss (13), particularly in young women. However, concern for appearance markedly increases the risk of dropout in comparison with health concern (14).

The effects of weight loss on body image have not been definitively assessed. Individuals with obesity who lose weight either through behavior therapy (11,15–17), treatment in a specialty hospital obesity clinic (18), or bariatric surgery (19,20) report a significant improvement in body image, but the results are minimally related to the amount of weight loss (15) and may also occur without any appreciable weight loss (21,22). In a randomized, controlled trial, adding body image therapy to a standard behavioral weight loss intervention increases neither weight loss nor the effect on body image (23). However, all of these results were obtained in research settings and cannot be generalized.

To improve our understanding of factors associated with body image dissatisfaction in the clinical setting of “real world” obesity centers, we analyzed the effect of weight loss on body image in treatment-seeking patients with obesity participating in a large Italian observational study (24).

## Research Methods and Procedures

### *QUOVADIS Study Planning and Protocol*

The QUOVADIS (QUality of life in Obesity: eVALuation and DIsease Surveillance)<sup>1</sup> study planning and protocol were described in details in a previous article (24). QUOVADIS is an observational study on quality of life, body image, psychological distress, and eating behavior in obese patients seeking treatment at medical centers accredited by the Italian Health Service for the treatment of obesity. Twenty-five medical centers scattered throughout Italy participated in the study. The study was purely observational. All centers were expected to treat patients along the lines of their specific programs.

All individuals with obesity ( $\text{BMI} \geq 30 \text{ kg/m}^2$ ) consecutively seeking treatment were eligible for the study, provided that they were not on active treatment at the time of enrollment, were in the age range between 25 and 65 years, and agreed to fill out a package of self-administered questionnaires. A systematic evaluation of participants was planned at baseline, approximately one week before the beginning of treatment, and after 6 and 12 months. Only 13 centers participated in the 6-month evaluation, when maximum weight loss was usually observed, because of local constraints in other centers, and these data are the basis of the present report. Data were stored in a large database, accessed by individual centers through an extranet system and electronic forms.

The protocol was approved by the ethical committees of the individual centers, after approval by the ethical committee of the coordinating center (Azienda Ospedaliera di Bologna, Policlinico S. Orsola–Malpighi). All participants gave written informed consent for participation.

### *Measures*

*Case Report Form.* The Case Report Form was filled out by physicians at the time of enrollment by directly interviewing patients. It included demographic and weight data, a detailed diet history, and a question on the reasons for seeking treatment. For this specific question, patients were asked to choose the primary motivation among three different answers: 1) improving appearance, 2) improving future health, and 3) improving present health.

*Psychosocial Measures.* At baseline and at follow-up, the participants completed a battery of questionnaires measuring body image dissatisfaction, psychiatric distress, and binge eating. The Body Uneasiness Test (BUT) (25) is a self-administered questionnaire specifically designed to explore several areas in clinical and non-clinical populations: body shape and/or weight dissatisfaction, avoidance, compulsive control behaviors, feelings of detachment and estrangement toward one’s own body, and specific worries about particular body parts, shapes, or functions. The term “body uneasiness” was used to describe not only body dissatisfaction but also some associated emotions, such as anxiety, alarm, trepidation, worry, mistrust, misgiving, doubt, suspicion, and embarrassment. The BUT consists of two parts: 1) BUT-A consists of 34 items with a score ranging from 0 (never) to 5 (always). The scores are combined in a Global Severity Index and in 5 subscales resulting from factorial analysis (25,26): Weight Phobia (fear of being or becoming fat), Body Image Concerns (worries related to physical appearance), Avoidance (body image-related avoidance behavior), Compulsive Self-Monitoring (CSM, compulsive checking of physical appearance), and Depersonalization (feelings of detachment and estrangement toward the body); 2) BUT-B has 37 items arranged in eight factors that look at specific worries about particular

<sup>1</sup> Nonstandard abbreviations: QUOVADIS, QUality of life in Obesity: eVALuation and DIsease Surveillance; BUT, Body Uneasiness Test; CSM, Compulsive Self-Monitoring; SCL, Symptom CheckList-90R; GSI, General Severity Index; BES, Binge Eating Scale.

body parts or functions. For the aim of the present study, we used only Part A, because BUT-B also evaluates worries on specific body parts (e.g., mouth, moustaches, and skin) that are not modifiable with weight loss. The initial validation of BUT involved young subjects (women with eating disorders and a control group of adolescents) (25). More recently, BUT was also validated in a large non-clinical sample of individuals from adolescence to old age and in a large clinical sample of individuals suffering from eating disorders (26); in both cases, it showed good psychometric properties (25,26). Internal consistency was satisfactory (Cronbach's  $\alpha$  value: Weight Phobia, 0.84; Body Image Concerns, 0.90; Avoidance, 0.79; CSM, 0.82; Depersonalization, 0.85). The test-retest correlation coefficients were highly significant (BUT-Global Severity Index, 0.90). Finally, exploratory and confirmatory analyses found the same structural model for BUT-A in normal-weight, non-eating-disordered subjects (26), as well as in patients with obesity (27).

The Symptom CheckList-90R (SCL) (28) is a tool for identifying psychopathological distress. The 90 items of the test, measuring how much a problem distressed the respondents during the previous week (from 0 to 4), are summarized into 9 domains (Somatization, Obsessive-Compulsive thoughts, Interpersonal Sensitivity, Depression, Anxiety, Hostility, Phobic Anxiety, Paranoid conceiving, Psychotic behavior), and a General Severity Index (GSI), indicating the overall psychological distress. For the purpose of the present study, we used only the SCL-GSI score.

The Binge Eating Scale (BES) (29) measures the severity of binge eating through 16 items. It examines both behavioral signs (eating large amounts of food) and feeling or cognition during a binge episode (loss of control, guilt, fear of being unable to stop eating).

*Weight and Height.* Weight was measured on a medical balance and height by a stadiometer by a medical doctor at every center involved in the study. Patients were dressed in underwear without shoes. Weight change was examined from baseline to 6 months. No data on body weight were collected at 6 months for patients who interrupted treatment.

### Statistical Analyses

All weight data (in kg) were transformed into BMI units to improve comparison between genders. A first descriptive analysis was used to obtain a qualitative evaluation of clinical data, response to questionnaires, and patients' outcomes. Changes in clinical parameters at 6 months were tested for significance by means of *t* test for paired data and were transformed into effect sizes for an immediate assessment of their magnitude (30). Correlation analysis was performed to establish links between BUT-GSI and  $\Delta$ BUT-GSI scores and other examined variables. All variables that proved to be significantly correlated with  $\Delta$ BUT-GSI were included in a linear regression analysis to identify the de-

terminants of body image change at 6-month follow-up. Variables were entered into the analysis following a block procedure. In the first step, we entered baseline BUT-GSI; in the second step, we entered age, BMI, and baseline psychological variables. In the last step, we entered changes in BMI and psychological variables. This analysis was done for the whole sample and separately for females and males. Data are reported as mean  $\pm$  standard deviation or percentage.

## Results

### Baseline Characteristics

The baseline characteristics of the whole QUOVADIS sample were described in detail in previous reports (13,24). Table 1 presents baseline data of the 473 patients available at follow-up, among the 1034 patients enrolled by the 13 centers where the 6-month control was programmed. A post hoc analysis showed that the group available at follow-up differed from the total entry population in a few characteristics (age,  $46 \pm 11$  vs.  $44 \pm 11$  years in total sample,  $p = 0.006$ ; BMI,  $26.1 \pm 0.3$  vs.  $26.7 \pm 0.3$  kg/m<sup>2</sup>,  $p < 0.001$ ; SCL-GSI,  $69.8 \pm 2.3$  vs.  $76.5 \pm 2.2$ ;  $p = 0.030$ ; BES,  $13.9 \pm 0.4$  vs.  $16.1 \pm 0.4$ ;  $p < 0.001$ ; BUT-GSI,  $1.56 \pm 1.01$  vs.  $1.42 \pm 0.99$ ,  $p = 0.012$ ). No significant differences were found between males and females with regard to age, current BMI, and primary motivation for weight loss. Males had a significantly higher BMI at age 20, whereas females had the expected higher scores in BUT-GSI and in all BUT-A subscales (26,27), in SCL-GSI, and in BES.

BUT-GSI score was negatively correlated with age ( $r = -0.10$ ;  $p < 0.05$ ) and positively correlated with BMI ( $r = 0.28$ ;  $p < 0.01$ ), SCL-GSI ( $r = 0.62$ ;  $p < 0.01$ ), and BES scores ( $r = 0.58$ ;  $p < 0.01$ ).

### Six-month Changes

Both females and males had a significant reduction in BMI, SCL-GSI, BES, and BUT scores at the 6-month follow-up (Table 2), with the notable exception of the BUT-CSM subscale in women. The mean weight loss percentage was significantly higher in men ( $9.0 \pm 6.3\%$ ) than in women ( $6.8 \pm 7.3\%$ ) [ $F(1,464) = 6.7$ ;  $p = 0.010$ ]; 71.9% of men and 56.2% of women in follow-up achieved a weight loss larger than 5%. No significant differences emerged between women and men in  $\Delta$ BUT-GSI score [ $F(1,472) = 0.2$ ;  $p =$  not significant].

### Correlation of Body Image Changes With Clinical and Psychological Characteristics

The changes in all BUT subscales, with the notable exception of the  $\Delta$ CSM subscale, were negatively associated with age and positively associated with anthropometric and psychological variables or their changes after treatment (Table 3). Notably, BMI changes, as well as BMI at age 20,

**Table 1.** Baseline data of patients included in the analysis [means  $\pm$  SD or % (interquartile range)]

	Females ( <i>N</i> = 377)	Males ( <i>N</i> = 96)	<i>F</i>	<i>p</i>
Demographic variables				
Age (years)	45.9 $\pm$ 11.0	46.7 $\pm$ 10.3	0.4	NS
BMI (kg/m <sup>2</sup> )	37.0 $\pm$ 5.8	36.1 $\pm$ 4.7	3.5	NS
BMI at age 20 (kg/m <sup>2</sup> )	24.9 $\pm$ 4.5	25.9 $\pm$ 5.0	4.3	0.038
Primary motivation for weight loss				
Appearance (% within sex)	55 (14.6)	11 (11.5)	0.682	
Present health (% within sex)	189 (50.3)	49 (51.0)		NS
Future health (% within sex)	132 (35.1)	36 (37.5)		
Body Uneasiness Test, Part A				
Global Severity Index	1.5 $\pm$ 1.0	0.9 $\pm$ 0.9	30.8	<0.001
Weight Phobia	1.9 $\pm$ 1.2	1.2 $\pm$ 1.0	29.6	<0.001
Body Image Concerns	2.2 $\pm$ 1.2	1.4 $\pm$ 1.1	28.7	<0.001
Avoidance	1.1 $\pm$ 1.1	0.6 $\pm$ 0.9	18.5	<0.001
Compulsive Self-Monitoring	0.9 $\pm$ 0.8	0.5 $\pm$ 0.8	17.4	<0.001
Depersonalization	1.1 $\pm$ 1.2	0.5 $\pm$ 0.8	21.4	<0.001
SCL-90 (General Symptom Index)	68.9 $\pm$ 50.9	51.3 $\pm$ 41.9	9.7	0.002
Binge Eating Scale	13.8 $\pm$ 9.2	10.2 $\pm$ 7.7	12.2	0.001

NS, not significant.

but not BMI at baseline, were systematically associated with  $\Delta$ BUT GSI and with the changes in BUT subscales (again, with the exception of  $\Delta$ CSM for BMI at age 20). Among psychological variables, both baseline SCL-GSI and BES were significantly correlated with  $\Delta$ BUT subscales, as were changes in BES. Finally, no significant correlation was observed between  $\Delta$ SCL-GSI score and  $\Delta$ BUT subscales in the total population, but a significant correlation was observed in females ( $\Delta$ SCL-GSI vs.  $\Delta$ BUT-GSI,  $r = 0.43$ ,  $p < 0.001$ ).

Linear regression analysis revealed that changes in body image were not independently associated with either baseline BMI or BMI loss (Table 4). In the whole sample, the independent predictors of improved body image ( $\Delta$ BUT-GSI) were the pre-treatment BUT-GSI and reduced BES ( $\Delta$ BES). The same predictors were identified in males, whereas in females, improved body image was largely associated with baseline psychiatric distress (SCL-GSI) and its improvement after treatment ( $\Delta$ SCL-GSI), with a minor effect of reduced binge eating ( $\Delta$ BES).

## Discussion

This study confirms that individuals with obesity have a high prevalence of body dissatisfaction, which is improved at 6-month follow-up after treatment, independently of the amount of weight loss.

The study has two main strengths. First, its observational design allows a comprehensive analysis of the effect of obesity treatment in the “real world” of medical obesity centers, with heterogeneous protocols of care in patients of white origin, who are at higher risk of body dissatisfaction (31). Second, it included a large sample of obese males, a group rarely considered in studies of body image in obesity (32). Third, it tested the influence of some psychological variables (e.g., psychiatric distress and binge eating severity) on body image changes associated with weight loss.

At baseline, BMI was not different between males and females, but the concern for body image, weight phobia, dysfunctional behaviors (e.g., body avoidance and compulsive self-monitoring), and feelings of detachment and estrangement toward the body were remarkably higher in females than in males, confirming the well-known presence of a gender difference (27), also observed in normal-weight individuals (33). Body image uneasiness, in both females and males, was negatively associated with age, as previously reported (34), and positively associated with binge eating and psychiatric distress, underlining the importance of psychological variables and eating behavior on this multifaceted construct.

At the 6-month follow-up, mean weight loss averaged 9% in males and 6.8% in females. This modest weight loss is potentially effective in reducing several risk factors for

**Table 2.** BMI and psychosocial measures at baseline and at the 6-month follow-up, according to sex (mean  $\pm$  SD)

	Sex	Baseline	6-month	Effect size	t	p	Average norm*
BMI	F	37.0 $\pm$ 5.8	34.5 $\pm$ 5.7	0.44	19.6	<0.001	—
	M	36.1 $\pm$ 4.7	33.2 $\pm$ 4.5	0.63	12.8	<0.001	—
Body Uneasiness Test, Part A							
Global Severity Index	F	1.54 $\pm$ 0.98	1.29 $\pm$ 0.98	0.25	7.3	<0.001	1.11
	M	0.93 $\pm$ 0.87	0.63 $\pm$ 0.66	0.39	4.9	<0.001	0.52
Weight Phobia	F	1.90 $\pm$ 1.17	1.66 $\pm$ 1.18	0.20	6.1	<0.001	1.64
	M	1.18 $\pm$ 1.04	0.82 $\pm$ 0.80	0.44	4.3	<0.001	0.83
Body Image Concerns	F	2.16 $\pm$ 1.19	1.76 $\pm$ 1.21	0.39	9.3	<0.001	1.34
	M	1.44 $\pm$ 1.11	0.93 $\pm$ 0.92	0.50	6.3	<0.001	0.58
Avoidance	F	1.11 $\pm$ 1.11	0.92 $\pm$ 1.05	0.18	5.0	<0.001	0.51
	M	0.56 $\pm$ 0.87	0.39 $\pm$ 0.67	0.22	2.0	0.043	0.18
Compulsive Self-Monitoring	F	0.94 $\pm$ 0.96	0.89 $\pm$ 0.86	0	1.6	NS	1.29
	M	0.55 $\pm$ 0.87	0.42 $\pm$ 0.68	0.17	2.2	0.030	0.68
Depersonalization	F	1.09 $\pm$ 1.20	0.80 $\pm$ 1.09	0.25	6.3	<0.001	0.62
	M	0.48 $\pm$ 0.85	0.32 $\pm$ 0.55	0.22	2.3	0.021	0.21
SCL-General Symptom Index	F	70.3 $\pm$ 52.7	58.9 $\pm$ 48.8	0.22	6.4	<0.001	—
	M	50.1 $\pm$ 41.1	40.2 $\pm$ 42.0	0.24	3.9	<0.001	—
Binge Eating Scale	F	13.9 $\pm$ 9.2	10.9 $\pm$ 8.7	0.34	7.9	<0.001	—
	M	10.3 $\pm$ 7.6	8.7 $\pm$ 7.7	0.21	2.6	0.010	—

\* Normative values for BUT are derived from the non-clinical sample of normal-weight subjects (BMI <25 kg/m<sup>2</sup>), used to validate the test (26), considering a median age of 40 years.

Paired *t* test and *p* values of differences, as well as effect sizes, are also reported, together with average values of normal population for the BUT test and its individual scales. F, females (*n* = 377); M, males (*n* = 96). NS, not significant.

medical complications associated with obesity (35) but remains much lower than the expectations that patients report at the beginning of treatment (13). Despite the failure to achieve weight loss goals, body image uneasiness improved, both in females and in males, although the scores remained above the average values measured in normal-weight, age-matched subjects used to validate the BUT questionnaire (26). The treatment of obesity improved, but did not normalize, the main expressions of body image uneasiness: after 6 months, the scores of four BUT scales (weight phobia, body image concerns, body image-related avoidance behavior, and feelings of detachment and estrangement toward the body) were significantly lower than those observed at baseline; CSM was the notable exception. The average improvement was small, with an estimated effect size ranging from 0.18 to 0.39 in females and from 0.17 to 0.50 in males; the improvement was also small in relation to the wide range of basal values. In general, our data are in keeping with two cross-sectional previous reports, showing that normal-weight women with a history

of obesity maintain higher levels of body dissatisfaction (36), and formerly overweight women maintain overweight preoccupation and dysfunctional appearance investment (6). The role of this residual body image uneasiness in long-term weight control should be evaluated by future research.

Compulsive self-monitoring was minimally or not at all affected by treatment, but these scores were, on average, lower than those observed in a non-clinical sample and in a clinical sample of people suffering from eating disorders (anorexia nervosa and bulimia nervosa) in both genders (26). In both men and women with obesity, the typical behavioral expression of body image uneasiness is body avoidance, measured by the A subscale, not mirror body checking (the compulsive checking of physical appearance measured by the CSM subscale of BUT). Unfortunately, the BUT questionnaire does not measure other body checking behaviors (e.g., pinching body areas to check for fatness), which very recent studies have found to be common in patients with obesity (37,38).

**Table 3.** Correlation matrix between changes in BUT subscales at the 6-month follow-up and baseline clinical and psychological data and their changes after 6 months

	Changes in Body Uneasiness Test, Part A					
	$\Delta$ GSI	$\Delta$ WP	$\Delta$ BIC	$\Delta$ A	$\Delta$ CSM	$\Delta$ D
Age (years)	-0.18*	-0.15*	-0.19*	-0.11*	-0.05	-0.12*
BMI (kg/m <sup>2</sup> )	0.06	0.03	0.06	0.10†	0.02	0.10†
BMI at age 20 (kg/m <sup>2</sup> )	0.12*	0.11†	0.16*	0.12†	0.01	0.10†
$\Delta$ BMI	0.21*	0.10†	0.24*	0.16*	0.11†	0.16*
Body Uneasiness Test (GSI)	0.37*	0.29*	0.28*	0.38*	0.22*	0.41*
Symptom CheckList-90 (GSI)	0.15*	0.10†	0.09	0.22*	0.00	0.30*
$\Delta$ Symptom CheckList-90 (GSI)	0.03	0.00	0.02	0.03	0.09	0.05
Binge Eating Scale	0.18*	0.14*	0.11†	0.20*	0.11†	0.28*
$\Delta$ Binge Eating Scale	0.30*	0.23*	0.28*	0.30*	0.10	0.34*

GSI, General Severity Index; WP, Weight Phobia; BIC, Body Image Concerns; A, Avoidance; CSM, Compulsive Self-Monitoring; D, Depersonalization.

\*  $p < 0.01$ .

†  $p < 0.05$ .

Improved body image was independently associated with a few basal characteristics of the patients, namely, basal body image uneasiness, psychiatric distress, and binge eating. Interestingly, basal BMI was not associated with the improvement in BUT-GSI. As expected, the improvement was greater in

relation to a greater BMI loss, but BMI loss was not an independent predictor of improved body dissatisfaction. Other factors, largely dependent on gender, were selected as independent predictors. Gender differences may derive partly from the different sample size and the much larger number of

**Table 4.** Predictors of changes in the Global Severity Index of the Body Uneasiness Test, Part A ( $\Delta$ BUT-GSI) for the total sample, and separately for males and females

Parameter	Total			Males				Females			
	$\beta$	T	$p$	Parameter	$\beta$	T	$p$	Parameter	$\beta$	T	$p$
BUT-GSI	0.31	3.82	<0.001	BUT-GSI	0.66	4.61	<0.001	BUT-GSI	0.44	6.09	<0.001
$\Delta$ BES	0.24	3.26	0.001	BES	-0.47	3.42	0.001	SCL-GSI	-0.40	-5.31	<0.001
				$\Delta$ BES	0.24	3.35	0.001	$\Delta$ SCL-GSI	0.51	8.71	0.001
								$\Delta$ BES	0.11	1.66	0.099
Parameters not in the equation											
Age	-0.13	-1.68	0.094	BMI-20	0.02	0.22	0.826	Age	0.01	0.24	0.813
BMI-20	0.10	1.58	0.116	SCL-GSI	0.04	0.27	0.790	BES	0.04	0.47	0.635
SCL-GSI	-0.06	-0.79	0.431					$\Delta$ BMI	0.02	0.33	0.739
BES	-0.02	-0.29	0.769								
$\Delta$ BMI	0.09	1.43	0.153								

GSI, General Severity Index; BES, Binge Eating Scale; BMI-20, BMI at age 20 years; SCL, Symptom CheckList 90R. Data are derived from stepwise linear regression analysis and are presented in the order in which they were entered into the regression. Note that only the parameters significantly correlated with  $\Delta$ BUT-GSI were entered into the regression and that they were different in relation to gender. The final variance due to regressions is:  $r^2 = 0.192$ ,  $r^2 = 0.435$ ,  $r^2 = 0.386$ , respectively, for the total sample and for males and females, respectively.

females, but also indicate that the improvement of body image associated with obesity treatment is a complex phenomenon, determined by a variety of psychological and behavioral factors not specifically dependent on the amount of weight loss.

Improved binge eating was one of these factors. A few studies have associated binge eating with weight and shape concerns (39), even after controlling for depression (40), which is frequently associated with binge eating (41). This may also explain the association of psychiatric distress, assessed by SCL-90 in the present analysis, with body image uneasiness, as well as the beneficial effects of improved SCL-GSI on body image in our female patients.

These data have clinical implications. The advantage of addressing body image concerns in obese patients remains unquestioned (1). Obese patients treated in a real world setting with heterogeneous modality of care achieve a significant improvement in body image with only a 5% to 10% weight loss, and the beneficial effects on body image are dependent largely on reduced binge eating and psychiatric distress. A weight loss approach is, therefore, preferable to specific treatments for body image dissatisfaction (21) because it addresses simultaneously the medical complications and the cardiovascular risk factors associated with obesity. Direct measures to improve body image could theoretically be reserved for those patients in whom body dissatisfaction does not improve with weight loss and those whose body concern creates an obstacle to weight loss and weight loss maintenance. However, in a preliminary study (23), adding body image therapy to a standard behavioral protocol neither increased the amount of weight loss nor improved the effect on body image, and the theory that the treatment of body dissatisfaction may be effective in improving weight loss maintenance (42–44) has not been supported by outcome research. Our analysis also indicates that a direct approach to disordered eating or psychiatric symptoms (e.g., depression) might be a potential way to improve body image concern in obese patients with binge eating or psychiatric distress.

The study has some limitations. First, our observations were restricted to patients with obesity seeking treatment in a medical setting and, therefore, do not provide information on the large number of individuals who do not seek treatment or who seek help in non-medical settings. The most frequent primary motivation for weight loss reported by our sample was a desire to improve present health. It is very possible that patients with obesity seeking help in non-medical centers are motivated to lose weight principally to improve appearance, and weight loss could have a different impact on their body image in this specific setting. Second, the study did not examine other determinants of body uneasiness (e.g., family history of obesity, age at onset of obesity, critical comments received in the past on shape and weight, attitudes toward exercise, obesity-related comorbidities). Third, the effect of obesity treatment on body

image was limited to a 6-month follow-up. We do not know whether the improvement in body image will be maintained in the long term, at least in patients who achieve weight loss maintenance, and what will happen to patients who regain weight. Fourth, the design of our study does not permit a determination of whether the improvement of body image among patients with obesity may be the result of other unspecific factors not assessed in the present study (e.g., the quality of the therapeutic relationship, or simply being cared for over the course of 6 months by therapists). Finally, we tested only the subgroup of participants available at follow-up, who were shown at post hoc analysis to differ from dropouts in several clinical and psychological baseline variables, and no inference can be made regarding the total sample of patients with obesity.

Future studies should also investigate the long-term effect of modest weight reduction on body image and the exact role of body image concern in the outcome of obesity treatment, in particular in weight loss maintenance, the crucial issue in the management of obesity. At present, the best and easiest option for improving body image in obese patients seems to be the promotion of a modest weight loss through standard weight loss programs, which also considerably improves psychological distress.

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