
Differences in the Nature of Body Image Disturbances Between Female Obese Individuals With Versus Without a Comorbid Binge Eating Disorder: An Exploratory Study Including Static and Dynamic Aspects of Body Image

Behavior Modification

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Abstract

Various components of body image were measured to assess body image disturbances in patients with obesity. To overcome limitations of previous

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studies, a photo distortion technique and a biological motion distortion device were included to assess static and dynamic aspects of body image. Questionnaires assessed cognitive-affective aspects, bodily attitudes, and eating behavior. Patients with obesity and a binge eating disorder (OBE, $n = 15$) were compared with patients with obesity only (ONB; $n = 15$), to determine the nature of any differences in body image disturbances. Both groups had high levels of body image disturbances with cognitive-affective deficits. Binge eating disorder (BED) participants also had perceptual difficulties (static only). Both groups reported high importance of weight and shape for self-esteem. There were some significant differences between the groups suggesting that a comorbid BED causes further aggravation. Body image interventions in obesity treatment may be warranted.

Keywords

body image disturbances, obesity, binge eating disorder, body image perception, therapy

Introduction

Recent studies have indicated an alarming increase in obesity among the general population in Western societies (Benecke & Vogel, 2003; Flegal, Carroll, Kuzcmarski, & Johnson, 1998) while the treatment outcome for obesity using conventional methods is mostly poor (Colquitt, Clegg, Sidhu, & Royle, 2003; Heymsfield et al., 2007). Despite there being several pathways leading to obesity (Ogden, Yanovski, Carroll, & Flegal, 2007), a recent review by Yanovski (2003) suggests that binge eating may be an important contributor to its development. Binge eating behavior could possibly be an emotion regulation strategy for coping with negative feelings such as frustration and even the depressive symptoms associated with body satisfaction. Binge eating leads to increased body weight due to a positive energy balance and subsequently may also interfere with weight loss or its maintenance after weight loss treatment. Approximately, 10% of the obese population (Bruce & Agras, 1992) and 30% of obese participants in weight reduction programs have a binge eating disorder (BED; de Zwaan & Mitchell, 1992; Spitzer et al., 1992, 1993; Striegel-Moore & Franko, 2003). In the review, Yanovski (2003) concluded that although the treatment and amelioration of BED in obese individuals does not result in large weight losses, it does result in small weight losses and decreased weight regain over time.

Whereas a disturbed body image is considered to be one of the main characteristics of patients with eating disorders, (Cash & Deagle, 1997; Stewart &

Williamson, 2004a, 2004b), increased levels of body dissatisfaction and a disturbed body image are also serious problems associated with obesity (Adami et al., 1998; Friedman & Brownell, 1995). Results of previous research suggest that the integration of therapy modules focusing on body image disturbance in the treatment of obesity could eventually have positive effects on weight loss and prevent further weight gain. For example, Wardle, Waller, and Rapoport (2001) demonstrate that the reduction of body dissatisfaction, as an important cognitive component of body image disorder in obese participants, also had the effect of reducing binge eating behavior. Wardle and colleagues (2001) therefore suggested addressing body dissatisfaction in the treatment of obesity. The aim of the present study therefore is to provide further information regarding the role of body image in obesity as it may prove useful in optimizing treatment for specific patient populations, such as individuals with obesity who also have a BED, as compared to individuals with obesity only.

Body image is the image a person constructs of how they appear and how they imagine they appear to others. It is thought to be multifaceted (Thompson, 2004), including perceptual, cognitive-affective, and behavioral components. Dissatisfaction with one's body image can lead to disturbance in the various components as they are thought to interact and influence each other. Previous studies revealed inconsistencies in relation to body image and its components in overweight and obese individuals; for example, a meta-analysis by Friedman and Brownell (1995) found being overweight to be moderately associated with a perceptual body image distortion (mean $d = .55$) with this effect being somewhat consistent across studies. A negative cognitive-affective body image in association with increased body dissatisfaction was also found for obese individuals in comparison to normal weight controls (mean $d = .85$; Friedman & Brownell, 1995). However, the generalization of these results is limited because of the fact that comorbid eating disturbances are mostly not taken into account. This seems to be of crucial importance when body image disturbances are addressed as they are strongly related to eating disorders (Cash & Deagle, 1997; Stewart & Williamson, 2004a, 2004b).

Some studies have examined the relationship between BED and body image disturbance in individuals with obesity but with variable findings. Most of these studies included heterogeneous samples of normal weight to overweight binge eaters and compared them to individuals diagnosed with bulimia nervosa or healthy controls. These studies found that the cognitive-affective component of body image to be disturbed in patients with BED mostly to the same degree as patients with anorexia or bulimia nervosa (Barry, Grilo, & Masheb, 2003; Striegel-Moore et al., 2001; Telch & Stice, 1998) and that avoiding and checking behaviors also occur in obese binge eaters. Individuals with obesity as well

as a BED, for example, have reported regularly checking their body for fatness by pinching areas of their body and avoiding wearing clothes that make them particularly aware of the shape of their body (Reas, Grilo, Masheb, & Wilson, 2005). The studies mostly compared individuals with obesity to normal weight controls, which may not be appropriate because of the weight-related stigmatization obese people experience in most parts of their life (Gortmaker, Must, Perrin, Sobol, & Dietz, 1993; Harris, 1990; Rand & MacGregor, 1990).

Dysfunctional attitudes referring to weight and shape are assumed to reflect the core eating disorder psychopathology of BED and are independent from the actual body mass index (BMI; Barry et al., 2003; Benecke & Vogel, 2003; Flegal et al., 1998; Hsu et al., 2002). Participants with obesity and a BED, for example, reported higher body dissatisfaction in comparison to obese participants without a BED (de Zwaan et al., 1995; Mussell et al., 1996; Sobara & Geliebter, 2002), but there are also studies showing no differences between these groups (Fichter, Quadflieg, & Brandl, 1993; Kuehnel & Wadden, 1994). Studies using silhouette techniques instead of self-report questionnaires to assess body dissatisfaction (discrepancy between actual and ideal weight, rated silhouettes) found variable results. Teenage girls with obesity and a BED, in comparison with teenage girls with obesity only, obtained higher discrepancy scores after controlling for weight (Striegel-Moore et al., 2004), whereas Sobara and Geliebter (2002) found no differences in their sample of obese male and female adult outpatients.

The inconsistencies of previous studies relating to BED and body image disturbances in obesity can therefore be attributed to a number of factors. One being variations in the choice of samples, as among the various studies mentioned there were differences in BMI ranging from mildly overweight to extremely obese. The implications therefore may not apply to patients with clinically relevant obesity who are severely overweight. The studies also examined different age groups, from teenage girls to middle-aged adults. Another factor could be the assessment techniques used to assess body image disturbances. Previous studies mostly employed questionnaires or silhouette techniques that focus more on the cognitive-affective component of body image and therefore do not take the multifaceted nature of body image disturbance into account.

Among the studies that have assessed body image and obesity, the comparison of obese individuals with and without a BED is rare. To our knowledge, there are also no studies that include motion aspects when assessing body image (dynamic body image; see also Vocks, Legenbauer, Rüdell, & Troje, 2007). In contrast to the assessment of static body image using photographs, the assessment of dynamic body image requires the presentation of a moving body. This can be achieved using the motion distortion technique, for example, where participants view a continuum of light points that are displayed on a

black background, which depict a walking figure in a frontal view perspective (Vocks et al., 2007). Such a technique makes it possible to study biological gait patterns without interference from shape and social attributes. The following studies demonstrate that motion may be very important for the process of creating and shaping one's own body image. In fact, brain imaging work in humans has provided the first suggestions that the brain is more responsive to conspecific action and movement patterns than it is to static images of a human figure (David & Senior, 2000; Jellema & Perrett, 2003; Kourtzi & Kranwischer, 2000; Peuskens, Vanrie, Verfaillie, & Orban, 2005). Furthermore, the movement of a human body contains information about body weight (Hills, 1992; Lausberg, von Wietersheim, & Feireis, 1996; Spyropoulos, Pisciotta, Pavlou, Cairns, & Simon, 1991) as well as a variety of different attributes, including identity (Troje, Westhoff, & Lavrov, 2005), sex (Hill & Johnston, 2001; Mather & Murdoch, 1994; Troje, 2002), and emotional states (Dittrich, Troscianko, Lea, & Morgan, 1996; Pollick, Paterson, Bruderlin, & Sanford, 2001). All of these attributes are socially relevant (Blakemore & Decety, 2001) and most likely play an important role in body image formation. Knowledge of the exact nature of any differences in body image disturbance between obese individuals with and without a BED therefore remains limited.

In light of the previously mentioned studies (Wardle et al., 2001; Yanovski, 2003)—indicating that a reduction in body dissatisfaction has a positive effect on binge eating behavior, which in turn has a positive effect on future weight gain—the aim of the present study is to gain further information on the role of body image disorder in obesity and its relation to binge eating behavior. Body image disturbances in relation to the various components and its associations with BED are therefore assessed in a severely obese inpatient treatment sample. To overcome the limitations of previous studies, several assessment techniques are used to measure body image disturbances. These include a digital photo distortion technique as well as a biological motion distortion device to assess cognitive-affective and perceptual aspects of static and dynamic body image. The program was administered for the first time in a study by Vocks and colleagues (2007) who examined patients with bulimia nervosa. The authors demonstrated that participants with a diagnosed bulimia nervosa perceived their own motion patterns as corresponding to a higher BMI than control participants. These results demonstrate that the assessment of dynamic body image has an important role in the investigation of body image disorder. The findings also support our notion to assess not only static body image but also the dynamic aspects of body image in obese patients with and without a BED. Accordingly, both techniques will be piloted in the following exploratory type study with a small sample of obese participants. Questionnaires are also used to assess cognitive-affective and behavioral aspects of body image disturbances as well as eating behavior.

We predict that for our sample of severely obese female inpatients, the presence of a BED will be associated with (a) higher body dissatisfaction (cognitive-affective component) as well as (b) a greater distortion in the perception of one's own body dimensions (perceptual component) in relation to both static and dynamic aspects of body image and (c) stronger body-related avoidance behaviors.

Method

Participants

Fifteen female participants with severe obesity and a binge eating disorder (OBE) as well as 15 female participants with obesity only (ONB) were included in the study. Both groups were inpatients from an inpatient treatment centre (Psychosomatic Hospital, St. Franziska-Stift, Bad Kreuznach), which specializes in the treatment of affective disorders, eating disorders, posttraumatic stress disorders, cancer as well as somatoform disorders. Patients with current substance dependence or who were acutely suicidal were not accepted for treatment. All patients were screened with the Composite International Diagnostic Interview (CIDI; Wittchen, 1994) and diagnosed by trained psychotherapists according to *Diagnostic and Statistical Manual of Mental Disorders* (4th ed., American Psychiatric Association, 1994). The study was approved by the ethics committee of the medical council of Rheinland-Pfalz as part of a body image therapy study. All participants gave informed consent.

For the OBE group ($n = 15$), the mean age was 33.8 years ($SD = 10.5$) with a minimum of 27.9 years and a maximum of 39.6 years. The average height was 168.9 cm ($SD = 3.1$) with a range between 167.2 cm and 170.6 cm. The average weight was 121.1 kg ($SD = 23.9$) with a range between 107.8 kg to 134.3 kg. The average BMI was 42.5 kg/m² ($SD = 8.5$) with a range between 37.7 to 47.3 kg/m².

For the ONB group ($n = 15$), the mean age was 40.7 years ($SD = 9.4$) with a minimum of 34.8 and a maximum of 45.2 years. The average height was 167.1 cm ($SD = 7.6$) and ranged between 162.9 cm to 171.3 cm. The average weight was 120.2 kg ($SD = 24.4$) and ranged between 106.7 kg and 133.8 kg. The average BMI was 43.0 kg/m² ($SD = 7.6$) with a range between 38.7 kg/m² to 47.1 kg/m². Some of the participants reported one or more additional psychiatric disorders. This included 11 participants of the OBE group (depressive syndromes, $n = 9$; dysthymia, $n = 1$; social phobia, $n = 1$; specific phobia, $n = 1$; panic disorder, $n = 1$; somatoform pain disorders, $n = 1$) and 10 participants of the ONB group (depressive syndromes, $n = 5$; panic disorder, $n = 2$;

social phobia, $n = 1$; agoraphobia, $n = 1$; somatization disorder, $n = 2$; psychogenic dizziness, $n = 1$). To compare sample characteristics between the groups, t tests for independent samples were carried out with no significant differences found for age, height, weight, and BMI.

Questionnaires

To assess body image disturbances and eating behavior, the Eating Disorder Examination Questionnaire (EDE-Q; Fairburn & Beglin, 1994; Tuschen-Caffier, Pook, & Hilbert, 2005) and selected subscales from the Eating Disorder Inventory (EDI-2; Garner, 1991; Paul & Thiel, 2005) as well as the Multidimensional Body Self Relations Questionnaire (MBSRQ, Cash, 2000, German version: Vocks & Legenbauer—unpublished data), the Body Image Avoidance Questionnaire (BIAQ; Rosen, Srebnik, Saltzberg, & Wendt, 1991; German version: Legenbauer, Vocks, & Schütt-Strömel, 2007), and a German questionnaire of body image assessment (FKB-20; Clement & Löwe, 1996) were administered in this study. The questionnaires are well established in eating disorders research and assess cognitive-affective and behavioral aspects of body image disturbances.

The EDE-Q assesses the number and frequency of relevant characteristics of eating disorders that have occurred during the previous 28 days. Items are rated on a 7-point, forced-choice scale from “0” to “6,” with higher scores reflecting greater severity or frequency. The questionnaire includes 14 single items and four subscales: Restraint, Eating Concern, Shape Concern, and Weight Concern. The Restraint subscale measures the desire to restrain or avoid food intake, the Eating Concern subscale measures preoccupation with thoughts about calories or eating, and the Shape and Weight concern subscales measure both preoccupation with shape and weight and the importance of body shape and body weight on self-esteem. Norms are provided for normal controls as well as individuals with eating disorders. Normative scores for normal controls on the subscale Restraint Eating are $M = 1.1$ ($SD = 1.3$), on the subscale Eating Concerns are $M = 0.6$ (0.9), on the subscale Weight concerns $M = 1.3$ ($SD = 1.3$), and $M = 1.7$ ($SD = 1.3$) for Shape Concerns. The subscales show satisfactory internal consistencies ($\alpha = .84$ to $.93$), and the test–retest reliability over a period of 3 months was between $r_{tt} = .68$ and $.74$.

To operationalize the cognitive-affective aspect of body image, the subscales Body Dissatisfaction and Drive for Thinness from the EDI-2 were used (Garner, 1991; Paul & Thiel, 2005). These scales contain attitudes and beliefs referring to the fear of getting fat, thoughts about diets as well as rumination about weight and weight gain (Paul & Thiel, 2005). Normative scores displayed in

the manual for normal controls are $M = 30.2$ ($SD = 10.3$) for the subscale Body Dissatisfaction and $M = 17.3$ ($SD = 6.8$) for Drive for Thinness. In addition, we assessed the subscale Bulimia to compare the groups with reference to eating disorder pathology. Norms for this subscale were provided, with $M = 10.6$ ($SD = 3.4$) for normal weight controls. The instrument supplies good psychometric properties with internal consistencies ranging from $\alpha = .79$ to $.88$ and test-retest reliability between $r_{tt} = .86$ and $.89$, which included an intervening period of 7 days (Paul & Thiel, 2005).

To assess further aspects of body image, we administered the MBSRQ (Cash, 2000). This is a self-report measurement with 69 items. Questions concern evaluation and orientation about appearance, physical fitness, and health. In addition, "body area satisfaction," "overweight preoccupation," and "self-classified weight" are registered on three scales. The internal consistencies were between $\alpha = .73$ and $.90$ for all subscales in a female sample. The 1-month retest-reliability lay between $r_{tt} = .74$ and $.94$ for a female college sample (Cash, 2000). We only assessed the degree of body area satisfaction, which has a normative score of $M = 3.23$ ($SD = 0.7$) for normal controls. In addition, we analyzed the single screening item for "crash diets," to assess differences in eating patterns between the groups.

The BIAQ was administered to assess the behavioral aspect of body image (Rosen et al., 1991) and the frequency with which one engages in body image-related avoidance behaviors. The German version of this self-report scale consists of 11 items assigned to three subscales, which describe avoidance behaviors relating to Clothing, Social Activities, and Eating Restraint. Internal consistencies of the subscales were judged to be satisfactory, ranging between Cronbach's alpha of $.64$ and $.80$. The subscales correlated with convergent questionnaires assessing body image and eating disorder symptoms (Legenbauer et al., 2007).

The body image questionnaire FKB-20 (Clement & Löwe, 1996) uses 20 items on two subscales (Negative Body Evaluation and Vital Body Image), to measure two different body image components. The validity coefficients were 0.56 to 0.65 . The sensitivity of the questionnaire was 82% to 90% , the specificity 90 to 97% , and the total error rate was 8% to 10% . The FKB-20 is found to have good validity and is used for the diagnosis of body image disturbances. Only the subscale Negative Body Evaluation was used in this study, which includes the evaluation of one's own attractiveness and well-being. The mean score of normal controls were provided by the manual and added up to $M = 20.55$ ($SD = 7.10$).

Photo Distortion Technique

To ensure high construct and ecological validity, we assessed interpretations of static body dimensions with an optical method using a computer program for

digital distortions of photographs taken of the participants in leggings and a tight-fitting T-shirt. The picture was presented on a computer screen with the following questions: "What do you really look like?" (actual body image), "What do you feel you look like?" (felt body image), and "What would you like to look like?" (ideal body image; Huon & Brown, 1986; Probst, Vandereycken, Vanderlinden, & Vanoppenolle, 1998). The "actual" body image assesses the perceptual aspect of body image, whereas the "felt" and "ideal" body image assess the cognitive-affective aspect. By pressing keys, participants could interactively adjust the width of the presented picture, thus making their body appear thinner or fatter. For each of the three questions, the initially presented picture was distorted twice in the smaller direction (80%) and twice in the larger direction (120%) to avoid anchor effects of the initial distortion (Brodie & Slade, 1988; Whitehouse, Freeman, & Annandale, 1988). Thus, participants had to correct the degree of distortion for each question four times. A value of 100% of the participant's adjustment indicated the original size of the photo; values below 100% indicate a distortion toward a slimmer body and values above 100% toward a larger body. Intrasubject reliability was measured by means of Cronbach's alpha in all three conditions. It ranged from $\alpha = .78$ to $.88$. This technique was used for the first time in a study assessing body image in participants with bulimia nervosa (Vocks et al., 2007). They examined the validity of this method by performing a correlation analyses between the results of the photo distortion technique and scales measuring different components of body image. The results of the validation study demonstrate that strong weight and shape concerns as well as a strong drive for thinness go along with a high discrepancy between the estimated "ideal" body dimension and the original picture as well as the "actual" or "felt" body dimensions measured by photo distortion technique. Further details are given elsewhere (Vocks et al., 2007).

Motion Distortion Technique

For assessing interpretations of dynamic body dimensions, we used a motion distortion technique, making it possible to study biological gait patterns without interference from shape and social attributes. A continuum of 15 point-light displays (white dots on a black background) depicting a walking figure in a frontal view perspective was presented to the participants on a computer screen. It generates a vivid impression of a body in motion (Dittrich et al., 1996; Troje, 2002). By pressing keys the animation of walking patterns could be actively altered by the participants along a BMI axis (being z scored) corresponding to higher or lower BMIs. Analogous to the photo distortion technique, participants had to adjust the motion patterns to best reflect the estimation of their "actual" ("What do you really look like?"), "felt" ("What do you feel you look like?"),

and “ideal” motion patterns (“What would you like to look like?”). Comparable to the previous experiment, each question had to be answered four times, twice with a starting stimulus distorted toward a lower BMI (z score = -1.2) and twice with a starting stimulus distorted toward a higher BMI (z score = $+1.2$). After the registration of each final estimation, the z scores were transformed into the corresponding BMI values. It is important to mention that in variance to the photo distortion program, the starting original motion pattern was the same for each participant. The generation of the coordinates of the BMI axis are based on empirical data previously collected from $N = 40$ females (BMI: $M = 21.05 \text{ kg/m}^2$, $SD = 2.32$) in the “Bio Motion Lab” at the Ruhr-University Bochum, Germany. A detailed description of the technique and the generation of the coordinates of BMI axis are given elsewhere (Vocks et al., 2007). Intra-subject reliability was measured by means of Cronbach’s alpha. The values of all three conditions ranged from $\alpha = .90$ to $.96$. Accordingly, internal consistency was regarded as sufficient. The validity of the method was examined in the original study by Vocks and colleagues (2007) who performed a correlation analyses between the results of the motion distortion technique and scales measuring different components of body image. In the sample of participants diagnosed with bulimia nervosa, the “felt” motion patterns were positively associated with the EDI-2 scale Social Insecurity. In addition, the estimation of the “actual” and “felt” body dimensions correlated significantly with the sum score of the BIAQ, indicating that the more socially insecure the participants were and the more they displayed body-related avoidance behavior, the more divergent their estimates for “actual” and “felt” motion patterns were.

Statistical Analyses

All statistical analyses were performed using the SPSS version 13.5. We performed t tests for independent samples to compare mean scores of questionnaires regarding eating disorder pathology and body image dissatisfaction. In addition, we performed Chi-square analysis to reveal any differences in the distribution of ratings within each group for the single items from the EDE-Q, referring to the importance of weight and shape on self-esteem.

To analyze body image distortions, assessed with the photo distortion program and the motion distortion technique, we performed statistical analyses for the perceptual (“What do you really look like?”) and the cognitive-affective aspects of body image (“What do you feel you look like?” and “What would you like to look like?”). For the photo distortion program, two scores were calculated: First, we calculated the mean score for the estimated body dimensions and performed t tests for independent samples to detect differences between the groups. Second, we calculated the aberration of the estimated body dimension

from the original picture and performed *t* tests for dependent samples to assess whether there were any statistically significant aberrations from the original photo within each group. For the motion distortion technique, we only calculated mean scores for the BMI values and performed *t* tests for independent samples to detect group effects. It was not useful to calculate the aberrations from the original motion pattern because, in contrast to the photo distortion program, the original motion pattern was not created individually for each participant. Furthermore, effect sizes for group differences were calculated (Cohen, 1977) for both methods. We assessed any possible covariates of body image perception (e.g., BMI, age) and performed ANCOVAs only if significant influences of covariates were indicated.

Results

Differences Between Sample Characteristics Regarding Eating Behaviors

We investigated differences between the groups (OBE, ONB) for eating behavior using the subscale from the EDI-2 Bulimia and the Restraint subscale from the EDE-Q as well as the screening item “crash-diets” from the MBSRQ. We found statistically significant differences between ONB and OBE only for the EDI-2 subscale Bulimia, $t(28) = 6.718, p < .001, d = 3.07$, with OBE displaying higher scores for bulimia ($M = 28.5, SD = 5.0$) than ONB ($M = 13.1, SD = 5.1$). In addition, OBE showed a trend toward going on crash diets more often than ONB—OBE: $M = 1.4, SD = 0.37$ vs. ONB: $M = 1.2, SD = .32; t(28) = 2.025, p = .052, d = 24$).

Questionnaire Measurements

The comparison of OBE with ONB showed higher body dissatisfaction in general for the OBE group. Patients with OBE reported higher dissatisfaction for all parts of the body as well as a trend toward statistical significance for dissatisfaction with problematic zones such as belly, buttocks, and legs, as assessed by the EDI-2 (Body Dissatisfaction subscale). Furthermore, Drive for Thinness (EDI-2) was statistically significantly higher in the OBE group compared with the ONB group indicating that OBE had a stronger wish for a slimmer body than ONB. For the subscale Negative Body Evaluation (FKB-20), only a trend toward significance could be found. The comparison of OBE and ONB showed no significant differences in the behavioral component of the body image measured by the BIAQ. Table 1 displays the means and standard deviations of statistical scores for both groups.

Table 1. Degree of Body Image Disturbance Assessed With Various Questionnaires

	Obese binge eaters		Obese nonbinge eaters		t test			
	M	SD	M	SD	t	df	p	d
Negative body evaluation (FKB-20)	42.8	6.3	37.7	8.1	1.929	28	.064	.72
Body dissatisfaction (EDI-2)	51.0	4.8	45.6	9.0	2.058	21.365	.052	.75
Drive for thinness (EDI-2)	33.6	6.3	28.8	6.8	2.195	28	.037	.86
Body part satisfaction (MBSRQ)	2.2	0.5	2.6	0.5	-2.152	28	.040	.79
BIAQ total score	53.9	8.1	51.5	8.3	.780	28	.442	.29

Note: Means scores (*M*), standard deviations (*SD*), and *T*-scores (*t*), degree of freedom (*df*), probability level (*p*), and pooled effect size (*d*) separated for groups obese binge eaters and obese nonbinge eaters.

To assess whether the degree of importance of weight and shape on self-esteem differed between patients with OBE and patients with ONB, the single diagnostic items from the EDE-Q were analyzed. The mean importance of weight reported by the OBE group was $M = 4.80$ ($SD = 1.86$) and for shape $M = 5.27$ ($SD = 1.28$), whereas ONB patients reported a slightly lower importance of weight ($M = 4.40$, $SD = 2.12$) and shape ($M = 4.30$, $SD = 2.22$). The *t* test for independent samples did not reveal any statistically significant differences between the groups. To analyze intragroup variation, a chi-square test was performed which revealed a statistically significant accumulation of higher ratings for the assessment category: importance of weight. The scale ranged from 1 (*not important*) to 6 (*very important*), indicating that 66% of OBE reported a high importance of their weight on self-esteem, whereas only 53% of ONB reported such a high importance for weight—ONB: $\chi^2(3) = 6.60$, $p = .080$; OBE: $\chi^2(5) = 20.60$, $p \leq .001$). In contrast, we only found high accumulation for a high importance of shape on self-esteem for OBE, $\chi^2(4) = 20.6$, $p \leq .001$, but not for ONB.

Photo Distortion Technique

“*What do you really look like?*”. No significant differences were found between OBE and ONB in relation to the perception of body dimensions. We then analyzed the aberration pattern for each group and found statistically significant effects

Table 2. Mean Scores for the Estimated Body Dimensions Assessed With the Photo Distortion Technique

	Obese binge eaters		Obese nonbinge eaters		t tests		
	<i>M</i>	<i>SD</i>	<i>M</i>	(<i>SD</i>)	<i>t</i>	<i>df</i>	<i>p</i>
"What do you really look like?"	1.09	0.13	1.03	0.09	1.457	28	.156
"What do you feel you look like?"	1.11	0.14	1.06	0.12	0.993	28	.329
"What would you like to look like?"	0.76	0.17	0.78	0.12	-0.311	28	.758

Note: Mean scores (*M*), standard deviations (*SD*), and *T*-scores (*t*) for photo distortion techniques separated for groups obese binge eaters and obese nonbinge eaters.

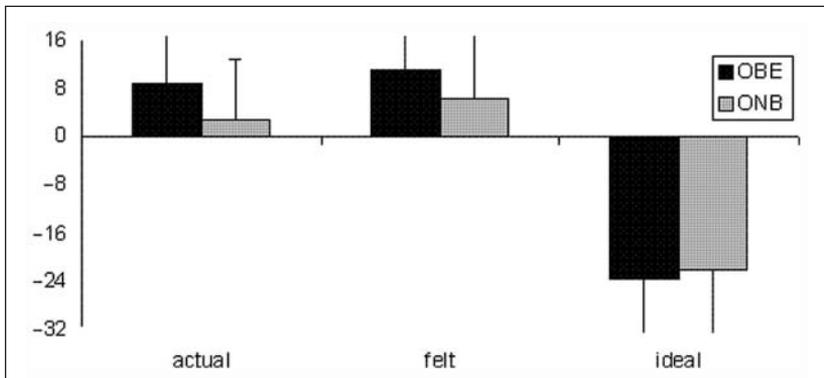


Figure 1. Aberration rate (%) from the original picture for the "actual" body image ("What do you really look like?"), "felt" body image ("What do you feel you look like?"), and "ideal" body image ("What would you like to look like?") separated for groups obese binge eaters (OBE) and obese nonbinge eaters (ONE).

for OBE patients. Their estimations differed significantly from the original picture, with about 9% aberration, $t(14) = 2.761$, $p = .015$, whereas for ONB patients, estimations did not differ significantly from the original picture. Mean scores and standard deviations as well as scores from *t* tests are displayed in Table 2, aberration rates are shown in Figure 1.

"What do you feel you look like?". There were no statistically significant differences found between the groups regarding the "felt" body image. When calculating aberration rates from the original picture, we found that OBE patients felt themselves to be significantly larger (11%) than they really were,

$t(14) = 3.018, p = .009$, whereas there was only a trend toward overestimation of 6% in felt body dimensions for ONB patients, $t(14) = 1.983, p = .067$.

“What would you like to look like?”. There were no significant differences between OBE and ONB in relation to “ideal” body dimensions. Regarding deviations from the original picture, the pattern within each group indicated that OBE patients (25%), $t(14) = -5.382, p < .001$, as well as ONB patients (22%), $t(14) = -6.983, p < .001$, wished for a shape thinner than their actual shape was. The amount of deviation from the original picture in relation to actual, felt, and ideal body estimations for ONB and OBE are displayed in Figure 1.

Motion Distortion Technique

“What do you really look like?”. The results for dynamic body image revealed that obese patients with BED perceived their “actual” motion patterns as corresponding to a BMI of 41.75 kg/m^2 ($SD = 18.57$), and obese patients without BED to a BMI of 38.34 kg/m^2 ($SD = 24.73$). The group difference failed to reach statistical significance for “actual” walking patterns, $t(28) = .426, p = .673, d = .16$.

“What do you feel you look like?”. The results show that obese participants with BED estimate their “felt” motion patterns as corresponding to a BMI of 41.83 kg/m^2 ($SD = 17.51$) and obese participants without BED to a BMI of 33.65 kg/m^2 ($SD = 23.97$). The difference between OBE and ONB did not reach statistical significance, $t(28) = 1.067, p = .295, d = 0.39$.

“What would you like to look like?”. The results reveal that obese patients with BED chose an “ideal” walking pattern that corresponds to a BMI of 20.18 kg/m^2 ($SD = 5.75$), whereas obese women without a BED chose an “ideal” walking pattern that corresponds to a BMI of 15.71 kg/m^2 ($SD = 6.32$). The group difference between OBE and ONB in estimation of “ideal” motion patterns showed a trend toward statistical significance, $t(28) = 2.026, p = .052, d = 0.74$.

Discussion

This study measured the various components of body image, comparing patients with OBE to patients with ONB to assess the nature of any differences in body image disturbances. A digital photo distortion technique and a biological motion distortion device were included to measure cognitive-affective and perceptual aspects of static and dynamic body image. Both groups were found to have high levels of body image disturbance in comparison to normative scores with some significant differences found between the groups for static body image but not in relation to dynamic aspects of body image. It appears that when a

person with obesity also has a comorbid BED, this seems to aggravate body image disturbances even further.

The results of the photo distortion technique showed that in relation to cognitive-affective aspects of static body image, both patient groups overestimated their “felt” body dimensions (“What do you feel you look like”) in comparison to the original photo. OBE showed significant aberrations from the original picture (11%), whereas ONB showed only a trend in the same direction (6%). OBE therefore overestimated “felt” body dimensions similarly to patients with bulimia nervosa in the study by Vocks and colleagues (2007), whereas ONB were more within the range of the normal controls who reported only 5% overestimation of “felt” body dimensions. In reference to the “ideal” shape, both groups marked body dimensions well below their actual weight with no significant differences found between the groups. There is a large volume of research showing similar results concerning the desire to be thinner, even where the actual weight is normative (Crawford & Campbell, 1999; Kiefer, Leitner, Bauer, & Rieder, 2000; Kjaerbye-Thygesen, Munk, Ottesen, & Kruger Kjaer, 2004; Ortega et al., 1996). It could therefore be assumed that normal weight controls prefer ideal shapes with relatively underweight figures, whereas obese patients would be satisfied being only slightly overweight. For the perceptual aspect of static body image, it was found that similar to patients with bulimia and anorexia nervosa (Vocks et al., 2007), OBE overestimated their “actual” body dimensions whereas ONB did not. The decreased ability of OBE to correctly perceive their “actual” body size corresponds with studies of patients with anorexia or bulimia nervosa (Cash & Deagle, 1997; Shafran & Fairburn, 2002; Vocks et al., 2007) and a study including individuals with obesity (Gardner, Martinez, Espinoza, & Gallegos, 1988). The lack of deficits in the perceptual aspect of body image for ONB are similar to previous studies (Brodie & Slade, 1988; Sobara & Geliebter, 2002) but contradict the findings of another study (Valtolina, 1998) that found an underestimation of particular body parts for women with obesity. As Valtolina (1998) did not assess total body dimensions but instead asked for an estimation of specific body parts such as belly and hips, comparability is questionable. In addition, the author did not control for binge eating, which could have influenced the results. Perceptual aspects of body image therefore seem to be influenced more by the presence of an eating disorder than the amount of excess weight.

Assessment of dynamic body image with the biological motion device revealed no significant differences between the groups for either the cognitive-affective or perceptual aspects of body image. It could be that, as suggested in a previous study, the motion pattern is related to features that are not influenced by the eating disorder but by the amount of excess weight alone (Vocks et al., 2007).

For the cognitive-affective component of body image disturbance, operationalized with the subscales of various questionnaires (EDI-2, EDE-Q, MBSRQ, FKB-20), mostly a trend toward statistically significant differences between OBE and ONB were found with moderate to high effect sizes. This indicates that OBE showed a stronger cognitive-affective body image disturbance than ONB. The mean scores for ONB, as well as for OBE, differed more than two standard deviations for ONB and nearly three standard deviations for OBE, from normative scores of normal controls provided by the manuals. The mean scores of questionnaires administered in this study therefore indicate cognitive-affective body image disturbances in both OBE and ONB, even though patients with OBE were more strongly impaired. This result corresponds with former findings that found patients with obesity to have significantly elevated body dissatisfaction in comparison to normal weight controls, (Adami, Meneghelli, Bressani, & Scopinaro, 1999) as well as higher body dissatisfaction in OBE in comparison with ONB (Mussell et al., 1996).

As dysfunctional attitudes referring to weight and shape are thought to reflect the core eating disorder psychopathology of BED, it was also speculated that the cognitive-affective body image disturbance would be expressed as an elevated importance of shape and weight for self-esteem. This assumption was confirmed by chi-square tests, given that about two thirds of OBE reported a high relevance of weight on self-esteem and about the same percentage also expressed high relevance for shape on self-esteem. These findings correspond with previous findings for people with a BED who are not obese (Masheb & Grilo, 2003). In addition, OBE exceeded even the reported scores for weight and shape importance for patients with anorexia and bulimia nervosa (Shafran & Fairburn, 2002; Shafran, Fairburn, Robinson, & Lask, 2004). In the current study, no significant differences were found between OBE and ONB, which is the same as the findings of Brody, Walsh, and Devlin (1994) but is in contrast to findings of two other studies (Decaluwé & Braet, 2003; Striegel-Moore, Wilson, Wilfley, Elder, & Brownell, 1998). An explanation for the conflicting results could be the differences in sample characteristics: Both studies (Decaluwé & Braet, 2003; Striegel-Moore et al., 1998) included men and women from population-based pools as well as children and adolescents from ambulatory settings, respectively, whereas in the current study, inpatients with a more severe case of obesity were investigated. In addition, the present study only included female patients, as body image concerns tend to be more salient for women than for men (Barry & Grilo, 2002; Varnado-Sullivan, Horton, & Savoy, 2006). Also, as women with obesity have been found to report higher body dissatisfaction and higher importance of shape and weight than normal weight controls (Adami et al., 1998), it is possible to assume that these variables may be of even more importance for women with severe obesity.

The behavioral aspect of body image was assessed with the BIAQ and revealed no significant differences between the groups. It is possible that because of the amount of excess weight, avoidance behavior is similar in both groups, and therefore in patients with severe cases of obesity, the BIAQ may not be sensitive enough to differentiate between obese patients with a BED and obese patients without a BED.

There were some limitations to the current study that need to be mentioned. One being that the participants in this study looked for treatment because of their obesity and therefore the mean BMI was noticeably higher than the reported BMI from outpatient studies or studies with participants from the general population (Striegel-Moore et al., 1998, 2001). Nevertheless, the results of this study do still correspond with most of the studies reported (Santonastaso, Ferrara, & Favaro, 1999; Sobara & Geliebter, 2002; Striegel-Moore et al., 2001). Another limitation is that some of the results lack statistical significance even though moderate to strong effects were found. With only 15 participants per group, the sample size is therefore very small. The consequence being that the study is most likely underpowered, which may in turn explain the high rate of "trends" toward significance. A replication of the study is therefore necessary with a larger sample size, to identify differences between OBE and ONB in more detail. A further limitation is that the study design only demonstrates speculations on associations between body image and binge eating behavior in obese individuals. Further research using longitudinal designs and addressing causality for clarifying the nature of the association between body image disturbance and BED is needed. Finally, the large number of patients with additional comorbid psychiatric disorders is a limiting factor as comorbid mental disorders may have influenced results. In particular, social phobia and affective disorders can have a biasing influence on body image judgments. For individuals with social phobia, a specific judgment bias toward self-relevant social information has been demonstrated, for the reason that they tend to overestimate their performance in a social situation as negative and insufficient (Heinrichs & Hofmann, 2001). Further research points out that this bias may be due to selective attention to negative self-related information (Mellings & Alden, 2000).

It is assumable that for individuals with both social anxiety and a body image disorder, the appearance of their own body in a picture triggers body-related schemas that lead to selective attention toward negative aspects of their appearance because of the ego-threatening character of stimuli. Also, in a previous study, individuals diagnosed with depression have been found to lack a self-serving attributional bias in comparison to healthy individuals (Mezulis, Abramson, Hyde, & Hankin, 2004). It is possible that the lack of a self-serving bias might increase a negative judgment bias in individuals with both body image disorder and depressive symptoms.

Even though there are some limitations, the results of this exploratory study still indicate that it is important to examine the influence of BED on body image in obese individuals. Taking into account the findings of a study by Wardle et al. (2001) demonstrating with a pre- and postdesign the reduction of binge eating behavior as a consequence of the decrease of body dissatisfaction and also the findings of Yanovski (2003), showing that BED is associated with future weight gain, the preliminary findings of the present study do still seem relevant for therapeutic programs as until now body image therapy is mostly not included in either the therapy of BED or in the psychological treatment of obesity. Although there was only a small sample size, the moderate to strong effects indicate that ONB have similar body image dissatisfaction and body image disturbances to OBE, especially for the cognitive-affective component. In addition, the influence of weight on self-esteem was found to be more important for both OBE and ONB than for normal weight controls, which may be due to the weight-related stigmatization these people experience in most parts of their life (Gortmaker et al., 1993; Harris, 1990; Rand & MacGregor, 1990). In conclusion, disturbances in the cognitive-affective component of body image seem to be a salient feature in patients with obesity, independent of the occurrence of eating disorder symptomatology. Obese patients with a BED do however seem to have a more distorted view of themselves than patients with obesity who do not have a BED. The presence of BED symptoms appears to aggravate body dissatisfaction and the relevance of weight and shape for self-esteem in obese patients. Both self-esteem and body image features should therefore be addressed in the treatment not only of BED but also of ONB to enhance self-esteem and establish long-term success in weight reduction (Devlin, 2001).

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