

# BODY-IMAGE DISTURBANCE IN EATING DISORDERS: A META-ANALYSIS

Ana Rosa Sepúlveda, Juan Botella and José Antonio León

*Psychology Faculty. Autónoma University of Madrid*

*The results of a meta-analytic study on the nature of body-image disturbance associated with eating disorders are reported. A total of 83 independent primary studies were admitted, all published between 1970 and 1998, and fulfilling the previously-established selection criteria. The studies produced 238 estimations of effect size, measured as *d* index. Degree of disturbance of the image was 0.545 for anorexia, 1.019 for bulimia and 1.185 for bulimarexia. However, the analysis revealed great heterogeneity across studies. The factor most frequently associated is the way the disturbance is assessed. The attitude measures, which include cognitive-affective components, show greater average values than the perceptual measures. Also analyzed was the influence of other moderating variables, such as type of instructions, patient status or diagnosis procedure. Alternative explanations of the findings and clinical implications are discussed.*

*Se presentan los resultados de un estudio meta-analítico sobre la naturaleza de la alteración de la imagen corporal asociada a los trastornos de la alimentación. Se admitieron 83 estudios primarios independientes, publicados entre 1970 y 1998, que cumplían con los criterios de selección establecidos, y que dieron lugar a 238 estimaciones de tamaños del efecto. El grado de distorsión estimada en la imagen, mediante el índice *d*, fue de 0.545 en anorexia, 1.019 en bulimia y 1.185 en bulimarexia. Sin embargo, los resultados revelan que hay una gran heterogeneidad entre los estudios. El factor más frecuentemente asociado es la forma de evaluar la alteración. Las medidas actitudinales, que tienen componentes cognitivo-afectivos, muestran valores superiores a las de las medidas perceptivas. Se analizó la influencia de otras variables moderadoras, como el tipo de instrucción, el estatus del paciente, el instrumento de diagnóstico, etc. Se discuten las posibles explicaciones de los resultados y sus implicaciones clínicas.*

**B**ody-image disturbance has been identified as one of the diagnostic criteria of anorexia nervosa in eating disorders (American Psychiatric Association, 1994). Given its important role in the onset and maintenance of illness, recovery from it is crucial to treatment (Bruch, 1962; Kolb, 1975). However, one of the problems with regard to this diagnostic criterion is that it has spread to other sectors of the population, giving rise to a marked increase, in general, in preoccupation with physical appearance and/or weight.

Although body image and its disturbance in eating disorders has been the subject of a large number of studies, the results have not been consistent, so that there is still no consensus on the nature of the problem. Some of this inconsistency may be due to the use of different diagnostic criteria or different methods of assessment, among other factors. Authors such as Smeets, Smit,

Panhuisen and Ingleby (1997) analyzed by means of meta-analysis the influence of different assessment methods in the estimation of body size in anorexic patients. They concluded that Slade's whole-body and visual procedure of size estimation methods assessed aspects of body image that were inter-related. In a later meta-analytic study, these same authors (Smeets, Panhuisen & Ingleby, 1998) studied the relationship between actual body size of anorexic patients and their Body Perception Index (BPI), obtaining a negative linear relationship; that is, the smaller their body size, the greater their overestimation with regard to their body.

By body-image disturbance we understand the presence of value judgements about one's body that do not coincide with the real characteristics. Although a certain margin of error is always to be expected in appreciations of one's own body, the presence of systematic biases in patients with eating disorders has led to the generalization of the concept of *body-image disturbance*.

Body image is made up of perceptual, cognitive-affective and behavioural components. A review of the empirical literature reveals the two main ways in which it has been attempted to assess these different components, to

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The original Spanish version of this paper has been previously published in *Psicothema*, 2001, Vol. 13, No 1, 7-16

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Correspondence concerning this article should be addressed to Ana Rosa Sepúlveda. Facultad de Psicología. Universidad Autónoma de Madrid. Cantoblanco s/n. 28049 Madrid. Spain.

E-mail: ana.sepulveda@uam.es

which end a variety of techniques have been created. These two ways are:

(a) *Accuracy in the estimation of subject's body size*, based on purely perceptual judgements. There are two main forms of assessing it, according to the object of estimation. On the one hand, in some techniques the width of certain parts of the body is measured, such as the face, the hips or the waist. With these data a body image index can be obtained (BPI, *Body Perception Index*) as proposed by Slade & Russell (1973), which relates size estimated by the subject to real size measured by an anthropometer [ $BPI = (\text{perceived size}/\text{real size}) \times 100$ ]. Other frequently used techniques are the *Movable Caliper* (Slade & Russell, 1973) or the *Marked Image* (Askevold, 1975), as well as whole-body techniques of estimation, such as that of *Video Camera* (Allebeck, Hallberg & Espmark, 1976) or *Silhouettes* (Williamson, Kelly, Davis, Ruggerio & Blouin, 1985), to which Slade's index is also applied.

(b) *The individual's attitude and feelings towards his or her own body*, which reflects attitudinal, affective and cognitive variables. This approach has been developed by means of questionnaires designed to measure attitude to weight and body shape, as well as attitude to food, binge-eating and dieting; they provide a *Body Dissatisfaction Index*. There are also more specific questionnaires on body image, such as the *BSQ* (Cooper, Taylor, Cooper & Fairburn, 1987) and other more general ones, such as the *EAT* (Garner & Garfinkel, 1979).

The importance of being able to offer a clearer and more consensus-based view of this concept in the field of eating disorders led us to make it the main objective of a meta-analysis. Although it has been attempted to integrate the results obtained in this research field by means of narrative reviews (Steinhausen & Glanville, 1983; Cash, 1995), it is important to complement them with procedures that allow a quantitative overview of the results, as well as to detect and clarify the inconsistencies observed in the primary studies (Glass, 1976; Smith & Glass, 1977; Sánchez & Ato, 1989).

The general objective of the present meta-analysis is to update and complement the results of the meta-analysis by Cash & Deagle (1997) on body image in eating disorders. Specifically, our meta-analysis not only covers a larger number of studies (83, published between 1970 and 1998, as against the 66 of Cash & Deagle, published between 1974 and 1993), but it also includes more

works carried out with European and Asian samples (Cash and Deagle restricted themselves almost exclusively to North-American samples). Moreover, we studied a larger quantity of moderating variables, such as type of instruction, status of patients, type of diagnosis or type of control group used.

## OBJECTIVES AND HYPOTHESES OF THE META-ANALYSIS

Our specific objectives are: (A) To integrate in a quantitative manner the results of studies that assess body-image disturbance in eating disorders; (B) To analyze a range of characteristics of the studies, as potential moderators of the results; (C) To study the nature and extent of the concept of body image, taking into account the type of component that is dysfunctional: the perceptual component (disturbance of body size) and the cognitive component (body dissatisfaction); (D) To suggest therapeutic lines based on the conclusions drawn.

In accordance with the objectives set and the review of the existing literature, we proposed a series of hypotheses referring both to the nature of the body image and to the moderating variables that may have influenced the results. As regards the *nature of the body image*: (A) Following the conclusions and suggestions of various authors (Huon & Brown, 1986; Gleghorn, Penner, Powers & Shulman, 1987; Mizes, 1992; Probst, Vandereycken, Van Coppenolle & Vanderlinden, 1995; Lovell & Williamson, 1997), we expect the cognitive component, assessed as body dissatisfaction, to show a greater effect size than the perceptual component, measured as body disturbance; (B) In accordance with previous research (Lindholm and Wilson, 1988; McKenzie, Williamson and Cubic, 1993), we expect to observe greater dissatisfaction with the image and greater perceptual disturbance in bulimia than in anorexia, given that in bulimia there is greater discrepancy between real body size and ideal body size. As far as *subject characteristics* are concerned, we propose that the magnitude of the effects will be associated with age and relative body mass index (BMI); in sum, we expect effect size to increase with age and BMI (Halmi, Goldberg & Cunningham, 1977; Birchnell, Lacey & Harte, 1985; Sánchez-Carracedo & Saldaña, 1998).

With regard to the *methodological* variables, we expect to obtain results similar to those of previous studies, in which it was found that body perception techniques

show a greater effect size for disturbance than perceptual techniques of body parts (Mizes, 1992; Probst, Vandereycken, Van Coppenolle & Pieters, 1995; Probst, Vandereycken, Van Coppenolle & Vanderlinden, 1995).

We shall also analyze other variables that have aroused theoretical interest more recently, such as type of diagnosis, type of instructions and body part rated as largest in the perceptual assessment, given the possibility that these factors may covary with the effect sizes.

## METHOD

### *Search for information in the literature*

The information search was based on the following sources: a) Computerized databases from 1974 to 1998 (PsycLIT, MEDLINE and CSIC), searched in October 1998; b) Direct review of specialized journals, such as *The International Journal of Eating Disorders* up to May 1999 and its references, books and monographs. We analyzed a total of 258 articles, from which we selected 83 studies that fulfilled the following criteria: (A) It included at least one clinical group with known diagnostic criterion of anorexia or bulimia nervosa. We also decided to include a third clinical group of patients with bulimarexia. Although this category is not yet recognized specifically within a diagnostic criterion, it is currently accepted and employed by the medical community to discriminate those patients that have passed through a previous anorexia and developed bulimia, alternating in different periods the symptoms of one or the other; (B) It included one or more control groups. Some studies included two groups of normal controls that differed in that one presented restrained eating behaviour and the other did not; (C) It assessed the presence of body image disturbance in cognitive or perceptual aspects or both; (D) It included sufficient information to be able to calculate the effect size; (E) Although it may have included standardized or projective assessments, perceptual aspects should be kept independent of cognitive aspects.

### *Coding of categorical characteristics and variables*

The characteristics of the studies were coded according to nature of the body image and of the dependent variables. The characteristics were distributed in the following categories (Sánchez & Ato, 1989). As *substantive variable*, the aspect of body image studied, categorized as perceptual aspects versus cognitive aspects. The *sub-*

*ject variables* were coded as: (a) type of group by eating disorder (anorexia, bulimia and bulimarexia); (b) age of subjects (patients and controls equal, patients older or patients younger); (c) body mass index (equal, patients higher, patients lower); (d) patient's status (inpatients, outpatients or mixture); (e) status of control group (psychiatric, non-psychiatric). We coded two *contextual variables*: (a) decade of publication of the article (1970-79, 1980-89, 1990-99); (b) origin of the samples (North America, Australia, Europe and Asia). The *methodological variables* coded were: (a) method of body image evaluation (perceptual methods could be whole body or parts of body, and attitudinal questionnaires on dissatisfaction could refer to weight/shape or global attitude); (b) within perceptual methods it was analyzed which part of the body was estimated as largest (head, shoulders, hips, waist, stomach or thighs); (c) diagnostic procedure used (Russell, Feighner, DSM-III, DSM-III-R, DSM-IV or various); (d) type of instructions given to subjects in the perceptual evaluation, which was divided into 6 possible categories: *Ambiguous instructions* ("assess four body parts" or "give four trial estimates each of actual frontal and actual profile size"); *cognitive instructions* ("how she thought it reflected her real image" or "how I think I look"); *affective instructions* ("what she felt her body was like" or "how I feel I look"); *both affective and cognitive* (the study specifically mentions results for cognitive and affective instructions); *not specified* (no information); *unnecessary* (studies that use attitudinal methods by means of questionnaire).

Effect size was calculated for each assessment method. With regard to techniques for assessing body parts, we opted to code the score for greatest disturbance for a part of the body. This perceptually most distorted part was coded, in turn, as dependent variable. In studies that had obtained results of various measures of body image, an effect size was calculated for each measure separately. In the process of coding of the results it was necessary to adopt different types of judgements, which were resolved by consensus between the two coders.

### *Measurement of effect size and analysis techniques*

With the aim of comparing the results of the studies, we obtained the initial effect size (*d*), before the treatment. For this purpose we calculated the difference between the mean values in distortion in the clinical and control groups, divided by the standard deviation of the control

**Table 1**  
**Description of the moderating variables**

Variables	Categories	Frequency	%
Year of publication	1. 1970-1979	9	10.8
	2. 1980-1989	44	53
	3. 1990-1999	30	36.1
Origin of the samples	1. North America	46	55.4
	2. Australia	9	10.8
	3. Europe and rest	27	32.5
	4. Asia	1	1.2
Status of patient	1. Internal patients	25	23.1
	2. External patients	66	61.1
	3. Mixture	9	8.3
	4. Not specified	8	7.4
Clinical group	1. Anorexia nervosa	50	44.6
	2. Bulimia nervosa	55	49.1
	3. Bulimarexia	7	6.25
Status of controls	1. Psychiatric	3	3.3
	2. Non-psychiatric	88	95.6
	3. Not specified	1	1
Diagnosis	1. Russell	6	7.2
	2. Feighner	11	13.2
	3. DSM-III	13	15.6
	4. DSM-III-R	27	32.5
	5. DSM-IV	1	1.2
	6. Various	12	14.5
	7. Not specified/not known	13	15.7
Type of instructions	1. Ambiguous	12	23
	2. Cognitive	21	40
	3. Affective	5	9
	4. Both	6	11
	5. Not specified	9	17
Body part rated largest	1. Face	11	39
	2. Shoulders	1	3.5
	3. Waist	8	28
	4. Hips	3	10.7
	5. Stomach	3	10.7
	6. Thighs	2	7
Body-image measures	1. Perceptual whole-body <sup>1</sup>	30	22.7
	2. Perceptual body parts <sup>2</sup>	36	27.3
	3. Attitudinal weight/shape <sup>3</sup>	32	24.2
	4. Attitudinal global <sup>4</sup>	34	25.7
Age <sup>5</sup>	1. Equal	54	46.1
	2. Patients older	34	29
	3. Patients younger	7	5.9
	4. Not specified	22	18.8
BMI <sup>5</sup>	1. Equal	13	11.1
	2. Patients higher	5	4.2
	3. Patients lower	26	22.2
	4. Not specified	73	62.4

<sup>1</sup> Techniques such as BIDOD, BMS, BID or DPT are coded as global perceptual measures.

<sup>2</sup> Techniques such as BIA, IM, MCT or KSEA are coded as body parts perceptual measures.

<sup>3</sup> Assessment techniques such as EDE, BATH, BMQ, CBT, SRBI, BCS or BISE are coded as weight/shape attitudinal measures.

<sup>4</sup> Assessment techniques such as EDI (DT, D), MAC, RS, EAT, BULIT, BES, SCS, BCDS, BIAQ, BPSQ, BDQ, BSC, BAT, BSS or Stroop are coded as global attitudinal measures.

<sup>5</sup> Age and BMI are considered equal when the mean values are identical or differ by a maximum of 0.5.

group corrected to avoid estimation bias (Hedges & Olkin, 1985). Effect size reflects whether there is body-image disturbance in patients with eating disorders or not. Given that it is the standardized mean difference between patients and controls with respect to a measure, this was calculated on the values before subjects underwent any kind of treatment. If the value of  $d$  is positive, it means that the group with eating disorders presents greater disturbance or dissatisfaction than the normal subjects. However, we should make clear that this says nothing about the absolute value of the disturbance – only about the “relative” disturbance between the clinical and normal groups.

The effect sizes were calculated from the means and standard deviations. When these statistics could not be obtained directly from the studies, they were obtained manually from other statistics in the article, such as  $t$ -tests or  $F$  ratios.

The meta-analysis was carried out by applying the statistical method of Hedges & Olkin (1985), using the Johnson DSTAT (1993). After analyzing in a descriptive way the characteristics of the studies, we took weighted averages (by means of the sample sizes) of the estimations of effect size, and confidence intervals were calculated with  $1-\alpha=0.95$ . Subsequently, we studied the homogeneity of the effect sizes with the Q statistic and we carried out analyses of the moderating variables, by means of analyses of variance, creating the appropriate categorical models, and weighted regression analyses.

## RESULTS

### *Analysis of the characteristics of the participating studies*

Table 1 shows a quantitative description of the variables coded in the studies. Several aspects of the data are worthy of particular mention. On the one hand, the similar degree of presence of the clinical groups of anorexia and bulimia, while the bulimarexia group represents just 6%. Sixteen percent of the studies do not specify the diagnostic criteria used for selecting their patient samples, whilst a similar percentage use a variety of diagnostic criteria. The type of instructions most frequently used are cognitive, with 40%, whilst 17% do not specify the type of instructions given to participants. The body parts most commonly used for the evaluations are the face and the waist. With regard to age and BMI, 19% do not specify the former and 62% fail to specify the latter.

Half of the 238 effects were obtained with questionnaires that assessed body image in a global way (Table 2), with attitudinal questionnaires on body shape and weight representing just 10.1%. In only 20 studies was a single effect size obtained. The mean of effect sizes per study is three, and in three studies as many as 12 effects were obtained, due to the use of several clinical groups and several body-image measures. Mean age of the different clinical and control groups does not differ significantly, the mean being 22 years. As far as BMI is concerned, the lowest mean is that of the anorexia sample (16.3), and the highest mean is that of the control sample (21).

It was considered useful, when there were two non-psychiatric control groups that differed only in level of concern about dieting or of restraint in eating, to compare them both with the clinical group.

### Summary of estimations of effect size

The effect size for the anorexia group was positive; this means that the anorexia patients distort or feel dissatisfaction to a greater extent than the controls, the weighted mean of the effect size being 0.545. Effect size for the bulimia group was also positive, that is, they also distorted more or were more dissatisfied than the controls, 1.019 being the estimated value. It should be underlined that this group presents higher levels of disturbance than that of anorexia. The bulimarexia group obtained the highest value, with 1.185. Table 3 shows the results of the homogeneity tests for the groups, all three of which are significant. In sum, body-image disturbance is greater in bulimia and bulimarexia patients, but since the homogeneity tests are significant, we deduce that there is still greater heterogeneity than that which would be expected as mere random fluctuations. We shall therefore move on to studying the possible effects of those moderating variables that may have some influence on these results.

### Perceptual measures versus attitudinal measures

With the aim of studying the nature of body image disturbance, Table 4 shows the indices for the perceptual estimation of body size (body perception index) and for those measured by the questionnaire (body dissatisfaction index).

Patients with eating disorders present greater body-image disturbance if they employ attitudinal or cognitive measures ( $d = .92$ ) than if they employ perceptual

measures ( $d = .55$ ) ( $Q_B(1) = 100.5, p < .0001$ ). On carrying out this analysis for each group we find that the anorexia group presents a significantly higher average in the attitudinal measures than in the perceptual ones [ $Q_B(1) = 25.739; p < .007$ ]; the same occurred with the bulimia group [ $Q_B(1) = 69.710; p < .001$ ]. With regard to the bulimarexia group, the difference is not significant [ $Q_B(1) = 1.104; p < .293$ ], but it should be borne in mind that the analysis of this categorical model is based on a considerably smaller number of estimations.

As regards the model for type of clinical group, the anorexia groups differ less than the control groups on evaluating their disturbance or body dissatisfaction, while the bulimia groups present a significantly higher level with respect to their controls in disturbance or body dissatisfaction [ $d = .53$  and  $d = .94; Q_B(1) = 121.5, p < .0001$ ].

On comparing the anorexia and bulimia nervosa groups we obtain a significant effect of type of diagnosis [ $d = .38$  and  $d = .70; Q_B(1) = 29.17, p < .0001$ ], while in the meta-analysis by Cash & Deagle (1997) no significant effect is obtained. Given that the values are ordered in the same way, we can attribute this different conclusion

VARIABLE	CATEGORY	NUMBER OF EFFECTS
Body-image measures	Perceptual whole body	42 effects (17.6%)
	Perceptual body parts	53 effects (22.3%)
	Attitudinal weight/shape	24 effects (10.1%)
	Attitudinal global	119 effects (50%)
AVERAGES		
Age	Anorexia	21.1
	Bulimia	22.7
	Bulimarexia	22.9
	Controls	21.3
BMI	Anorexia	16.3
	Bulimia	20.5
	Bulimarexia	20.4
	Controls	21.1

Clinical group	k	g	CI 95%	Q <sub>W</sub>	P
Anorexia	91	0.545	0.49/0.60	1826.94*	0.001
Bulimia	135	1.019	0.97/1.07	2270.32**	0.001
Bulimarexia	12	1.185	1.07/1.30	313.1***	0.001

\* Excluding the study by Garner 1983b, in which two effect sizes were obtained.  
 \*\* Excluding the studies by Gleghorn 1987 (BPSQ) and by Powers 1987 (BPSQ). One effect size was obtained in each study.  
 \*\*\* Excluding the study by Garner 1983b, in which two effect sizes were obtained.

to the fact that in our study the statistical analysis is more powerful, on being applied to a larger number of studies.

**Whole-body or body parts perceptual measures of disturbance**

With regard to the perceptual measures, they can be divided into two more categories that we should compare: techniques that assess the whole body and techniques that assess the body by parts. Table 4 shows the statistics for the anorexia and bulimia nervosa groups; the bulimarexia group is excluded due to the fact that, with only one effect size for each technique, it offers little information.

On evaluating the different types of perceptual measures used, we find that the body parts measures show a slightly stronger, but significant, effect than the whole-body measures [ $d = .66$  and  $d = .44$ ;  $Q_B(1) = 14.44$ ;  $p < .001$ ]. This result is not consistent with that of Cash & Deagle. Smeets and cols. (1997, 1998) also obtain a greater effect with whole-body measures, but it should be borne in mind that their study only included anorexia

groups, and that Slade & Russell's (1973) technique, which measures the body by parts, shows exceptional results in their meta-analysis. The majority of our studies used mainly this technique in their evaluations of body image.

Body parts techniques obtain effect sizes statistically greater than whole-body techniques in the two clinical groups [anorexia,  $Q_B(1) = 6.942$ ;  $p < .008$ ; bulimia,  $Q_B(1) = 8.61$ ;  $p < .003$ ].

**Global versus shape/weight attitudinal measures**

Table 4 shows the mean of effect sizes of the attitudinal measures for the three diagnostic groups. In this analysis we made an explicit separation according to whether or not there were included two studies (Garner, 1983; Powers, 1987) whose values are quite different from the others, so that they can be considered as *outliers*. Whilst Cash & Deagle failed to obtain a significant effect for this categorical model, we obtained a significantly greater difference in global attitudinal measures than in shape/weight measures [ $d = 1.06$  and  $d = .26$ ;  $Q_B(1) = 206.3$ ,  $p < .001$ ].

**Table 4**  
**Analysis of the categorical models generated, for the clinical groups, as a function of type of measure, of whether the perceptual measure was carried out for the whole body or by parts, and of whether the attitudinal measure was of shape/weight or global**

GROUP		k	d	CI 95%	Qw	P
TYPE OF MEASURE						
Anorexia	Perceptual	48	0.384	0.301/0.466	251.1	0.001
	Attitudinal	41	0.673	0.597/ 0.748	1530.7	0.001
Bulimia	Perceptual	45	0.707	0.628/0.786	185.3	0.001
	Attitudinal	89	1.122	1.065/1.179	2135.5	0.001
Bulimarexia	Perceptual	2	1.344	1.026/1.662	0.91	0.634
	Attitudinal	8	1.162	1.04/1.28	311.1	0.001
WHOLE BODY OR BY PARTS						
Anorexia	Parts	27	0.490	0.376/0.605	139.1	0.001
	Whole	21	0.269	0.150/0.387	105.1	0.001
Bulimia	Parts	25	0.835	0.721/0.950	142.3	0.001
	Whole	20	0.590	0.480/0.699	33.7	0.028
ATTITUDE SHAPE/WEIGHT OR GLOBAL						
Anorexia	Shape/weight	12	0.549	0.376/0.722	388.1	.001
	Global	31	0.920	0.837/1.000	3128.5	.001
	Global*	29	0.700*	0.618/0.786	1140.1	.001
Bulimia	Shape/weight	12	0.079	-0.064/0.221	403.1	.001
	Global	78	1.259	1.198/1.321	1676.3	.001
	Global**	77	1.180**	1.116/1.243	1591.0	.001
Bulimarexia	Global	10	1.534	1.413/1.654	2492.6	.001
	Global*	8	1.162*		311.1	.001

\* Excluding the study by Garner (1983b).  
 \*\* Excluding the study by Powers (1987).

The bulimia nervosa group has a greater effect size in the global mode of assessment of cognitive aspects, this difference being statistically significant [ $Q_B(1) = 224.5$ ;  $p < .001$ ]. Furthermore, this group takes the lowest value for the measurement of the body according to weight and shape. The values for the anorexia nervosa group also show significant differences with respect to the different attitudinal measures [ $Q_B(1) = 14.36$ ;  $p < 0.001$ ].

From a more general perspective, of the four forms of evaluating body image, the global attitudinal measure is the category that shows the greatest effects, whilst the lowest value is produced on making an attitudinal evaluation of the weight and shape of the body.

### *Analysis of moderating variables*

In order to evaluate the possible moderation of the eleven selected characteristics we applied variance and weighted regression analyses. As far as subject characteristics are concerned, neither age nor status of the controls modified the differences between the clinical samples and the controls, but there can be appreciated a significant association with BMI of the clinical group in the case of bulimia. Specifically, on carrying out a weighted regression analysis with BMI as predictor, on the effects obtained with bulimia nervosa groups, a significant effect was obtained [ $Q_R(1) = 14.528$ ,  $p < .001$ ;  $Q_E(49) = 208.313$ ,  $p < .001$ ;  $R^2 = .065$ ]. The negative sign of the slope ( $-.14$ ) indicates that in the bulimia nervosa patients, the higher the BMI, the smaller the difference in body-image disturbance with respect to the controls. This appears to be a reasonable result, since the greater the degree of obesity, the more realistic (less distorted) the negative image perceived. Patients' status was relevant in its influence on the effect sizes, since inpatients presented higher values in body image ( $d = .80$ ,  $1.2$  and  $1.6$  for the anorexia nervosa, bulimia nervosa and bulimarexia groups, respectively, all being statistically significant).

As regards the contextual variables, there is no significant association with the effect sizes. Publication date of the study differs according to clinical group, the 1980s for the anorexia nervosa group ( $d = 0.67$ ) and the 1990s for bulimia nervosa and bulimarexia ( $d = 1.1$  and  $1.2$ ). Comparable results are found for origin of the sample, where the European and Australian studies ( $d = .65$  and  $.60$ ) obtain greater and similar effect sizes for the anorexia nervosa group. In contrast, the bulimia nervosa and

bulimarexia groups ( $d = 1.5$  and  $1.5$ ) coincide in having a higher index in the European studies, but greater heterogeneity among the studies is implied.

With regard to the remaining methodological variables, the body part with greatest disturbance differed between groups, with the waist and thighs obtaining the greatest effect size ( $d = 1.85$ ) in bulimia and the thighs and face in anorexia ( $d = 1.4$ ). These results contrast with our expectations, which situated the head as the most distorted part in the evaluation of body image. As regards type of diagnosis used, greater effect sizes were obtained with the DSM-III-R and the simultaneous use of various diagnostic criteria ( $d = 0.7$ ,  $1.3$  and  $1.2$ , respectively, for anorexia, bulimia and bulimarexia). These differences are significant for anorexia [ $Q_B(5) = 104.3$ ;  $p < .001$ ] and bulimia [ $Q_B(3) = 284.67$ ;  $p < .001$ ]. The affective instructions in the anorexia nervosa group produce the greatest differences between clinical and control subjects ( $d = 0.8$ ), while for bulimia and bulimarexia it is ambiguous instructions that produce the greatest differences ( $d = .95$  and  $1.3$ ); differences are statistically significant in all the clinical groups.

Special attention should be given to the model that distinguishes between studies in which the control group's behaviour is normal and those in which the controls present restrained eating behaviour. If the control group is restrained, the difference between it and the clinical group decreases, compares to the cases where it is not restrained [ $d = .55$  and  $d = 1.6$ ;  $Q_B(1) = 72.8$ ,  $p < .0001$ ]. If we take into account type of clinical group, we find that whilst there is scarcely any difference between the anorexia nervosa groups and the groups with restrained behaviour, this difference is large and significant in the case of the bulimia nervosa groups [ $d = .06$  versus  $d = .98$ ;  $Q_B(1) = 34.3$ ,  $p < .0001$ ].

### *Sources of bias and limitations of the meta-analysis*

Our study did not include unpublished research, so that there is a potential lack of representativeness of our sample of studies (Rosenthal, 1979). On calculating the number of unpublished studies that would be necessary to alter the direction of our results (Rosenthal, 1991), we obtained a figure of 142,895 ( $1-\alpha = 0.95$ ). Consequently, we believe our study to be safe from this threat to its validity.

With regard to independence within a single study (Rosenthal & Rubin, 1986), we used up to twelve effect sizes of the same study. The decision to proceed in this

way was made taking into account that the evaluation techniques varied, and that several studies had two control groups, one normal and the other with restrained behaviour. We do not believe, then, that this threat was realistically applicable to our meta-analysis.

## CONCLUSIONS

The main conclusions of our meta-analysis are as follows:

(1) The fact of whether the *perceptual evaluation* is made through estimations of the whole body or by parts is important: greater effect sizes are obtained in the latter case. Therefore, results based on these two ways of evaluating image disturbance should not be mixed.

(2) *Attitudinal measures* also present two modes of evaluation. The differences between patients and controls in relation to attitude towards global body image are greater than those in relation to attitude measured according to weight and body shape. These two modes of evaluation of cognitive-affective aspects of body image do indeed discriminate clinical groups (indices for the anorexia nervosa group referring to weight/shape and global,  $d = 0.54$  and  $d = 0.92$ , whilst for the bulimia nervosa group the figures are  $d = 0.08$  and  $d = 1.2$ , respectively). It can be concluded that body dissatisfaction in the clinical groups is greater when evaluation of their bodily appearance and attractiveness is involved.

The results of our meta-analysis differ markedly in some respects from those of the meta-analyses by Cash & Deagle (1997) and Smeets and cols. (1997, 1998). First of all, in the perceptual measures we obtained a difference between the anorexia and bulimia nervosa groups in the same direction as they did, but in our case it is statistically significant, whilst in their case it was not. Secondly, we obtained a difference between the whole body measures and those by body parts that was not obtained by them. We attributed this difference to the fact that in our meta-analysis there is less relative presence of anorexia groups and a larger number of studies that employ Slade & Russell's (1973) technique. Thirdly, whilst the other meta-analyses did not obtain a significant difference between the global attitudinal measures and those of shape/weight, we obtained a significantly greater effect for the global measures. If we distinguish between diagnostic groups, those of anorexia show a clearly greater effect in the global attitude measures, whilst those of bulimia do not show such a large

effect. In our view, this means that in the anorexia nervosa groups the cognitive-affective factors have greater relative weight, since their physical appearance is characterized by slimness. In fact, in the meta-analysis by Smeets et al. (1998), in the anorexia group, lower BMI is associated with greater body overestimation, indicating a greater cognitive bias in the appreciation of their body. For their part, the bulimia nervosa groups have more justified body dissatisfaction if we bear in mind the model of slimness they wish to attain, and moreover, they have generally identified some parts of the body as those they would most like to reduce. Finally, the moderating variable relating to the control group was found to be highly relevant in the estimations of the effects. In fact, the control groups with restrained eating behaviour showed no differences in body dissatisfaction with respect to the anorexia groups, whilst in the case of normal controls a significant difference was appreciated. On considering bulimia groups we once again obtain a difference according to control group, though in this case there is indeed a significant difference even with respect to controls with restrained eating behaviour.

Our results show that attitudinal measures of body image have given rise to greater effect sizes than perceptual measures; therefore, it can be assumed that it is attitudes and beliefs about oneself that show the closest association with dissatisfaction.

Moreover, we should treat with caution the perceptual aspects of the so-called "disturbance of the body image", since they are influenced by attitudinal aspects in relation to one's own body. Thus, the diagnostic criterion for anorexia nervosa expressed as "disturbance of body figure perception" may be inappropriate for evaluating the concept of body image in eating disorders (Hsu, 1982; Reis et al., 1982). Specifically, this criterion, currently expressed in these terms, is not useful for discriminating clinical subjects from subjects from the normal population, since a large majority of adolescents and young adults perceive their weight or figure as unsatisfactory (Perpiñá & Baños, 1990; Paxton, 1993; Doll & Fairburn, 1998). In any case, we should like to insist on the fact that the diagnostic criterion expressed in perceptual terms as the evaluation of a young person within this disorder is not discriminative, and that the description of this disturbance is merely a projection of dissatisfaction with the body, and not of a perceptual deficit. Therefore, it would be recommendable to modify this



criterion in terms more related to attitude and beliefs about one's body.

Many homogeneity tests are significant, even when restricted to a particular clinical group and to a specific category of a categorical model. This indicates to us that there is still great variability in the results, due to one or more variables that we did not delimit clearly in the study, despite having analyzed a large quantity of variables. A tentative explanation may be found in the diagnostic criteria used in the selection of patients, not because of the criteria themselves but because of the patients, as many of them may be in a transitional stage of their illness.

Finally, one of our objectives was to suggest therapeutic lines based on the results obtained; the main one of these is the recommendation that future interventions and research should address cognitive-affective aspects, that is, patients' attitudes and beliefs about their body-image disturbance. All eating disorder treatment should include specific attention to body image. This attention should focus on the following attitudinal dimensions: a) the evaluation of one's own body; b) a set of self-schemata (excess weight, body ideals); and c) affect towards one's own body in relation to specific situations. The duration of this intervention should be lengthy, since negative body image is probably one of the factors that initiates the disorder and prolongs it.

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