

## DISTORTED BODY IMAGE IN BULIMIC WOMEN

ULE FRANZEN, IRMELA FLORIN, SILVIA SCHNEIDER and MEIKE MEIER

(Received 1 March 1988; accepted in revised form 7 July 1988)

**Abstract**—Fifteen bulimic women (DSM III) and 15 women with no indication of an eating disorder, matched pairwise with respect to age, weight and height, were assessed via a distorting video image technique under four conditions. They were asked to: (1) estimate the width of a water bottle, (2) estimate the width of their own body, (3) repeat those estimates under a condition of reward for high accuracy, (4) focus attention on their bodily sensations and indicate how wide their body felt. While groups did not differ in their estimates under condition 1 (water bottle), significant differences were found between groups under conditions 2, 3 and 4 (own body), the percentage of overestimating being highest when subjects were to indicate how wide their body felt. Results suggest that modalities of perception other than visual are strongly involved in the body image distortion of bulimics.

### INTRODUCTION

RECENT research suggests that bulimic women, similar to or even more than anorexics, have a distorted visual perception of their own body, in that they specifically overestimate their body width [1-8] while they do not differ from healthy controls in their perception of neutral objects [6, 7]. In the majority of studies, however, control subjects with no indication of an eating disorder, if included at all, had not been closely matched with the bulimics in terms of weight for age and height. Yet such matching seems to be indicated, since differences in body image may be related to differences in body weight.

Although bulimics typically state that they experience a feeling of being fat which may indicate that bodily sensations are involved in their misperception of body size, this aspect has rarely been investigated in previous studies [9]. Instead, the investigation of the cognitive and visual representation of body boundaries has been emphasized [10].

Furthermore, it is unknown whether given visual body image distortions in bulimics reflect a stable visuospatial view of themselves which could indicate a specific defect in cortical function [11, 12] or whether the misperception is easily overcome if efforts are made to increase the subjects' motivation for high accuracy.

It was the aim of the present study to test the following hypotheses:

(1) Compared to women with no eating disorder, bulimic women do not overestimate the width of a neutral object.

(2) Bulimic women overestimate the actual width of their body more than controls.

(3) Even when reward is promised for correct assessment, bulimic women overestimate their actual body width more than controls.

(4) When bulimic women focus their attention on bodily sensations, their body 'feels' significantly wider than that of controls.

---

Department of Psychology, Philipps University at Marburg, Gutenbergstrasse 18, D-3550 Marburg, FR Germany.

(5) The difference between 'felt' body width and estimate of actual body width is larger for the bulimic group than for the control group.

## METHOD

### Subjects

The bulimic sample was recruited by articles in local newspapers and in the waiting rooms of primary health care physicians describing the syndrome of bulimia and asking for cooperation in a project aimed at a better understanding of the disorder. For recruitment of the control sample we asked the bulimic women to motivate a girl friend or acquaintance of their age to participate in the study as comparison subjects.

People contacting project staff were given a preliminary screening call to determine the likelihood that they would meet the study criteria. If the person seemed appropriate, an Eating Disorder Questionnaire was administered to screen for eating disorders (DSM III) both in general and specifically for bulimia (DSM III). Additional information on eating and weighing habits, satisfaction with body shape, etc., was assessed with the same questionnaire.

When a case of bulimia was identified, or a woman with no signs of an eating disorder reported weight relative to age and height that matched those of a previously diagnosed bulimic patient, an appointment was scheduled for the experimental study.

Fifteen women meeting DSM III criteria for a diagnosis of bulimia and 15 women with no indication of an eating disorder were admitted into the study. Bulimics and controls were matched pairwise with respect to age, deviation from ideal weight and educational status. The mean age was 25.1 yr (S.D. = 3.4) for the patients with bulimia and 25.8 yr (S.D. = 3.2) for the control subjects. Deviation from ideal weight (Minnesota Life Insurance Company) ranged from 0% to +19% with a mean of +8% (S.D. = 4) for the bulimic and +7% (S.D. = 5) for the control group. Additional data are contained in Table I.

TABLE I.—CLINICAL FEATURES OF THE BULIMIC SAMPLE ( $n = 15$ )

Age at onset of severe binges	$\bar{X}$ 16.9 S.D. 2.9
Age at onset of self-induced vomiting	$\bar{X}$ 19.3 S.D. 3.8
Number of patients with weight loss of more than 25% earlier in life	5 (30%)
Number of vomits	13 (86%)
Number of women with binges occurring:	
Once or several times per day	5 (33%)
Once or several times per week	9 (60%)
Several times per month	1 (7%)

### Procedure

Friends or relatives participating in the study were scheduled right after each other in order to prevent premature exchange of information about the experiment. Subjects were asked not to use alcohol the night before participation and not to smoke or eat for 2 hr prior to the appointment.

Before the beginning of the experiment, participants were asked to mark in a calendarium the first day of their last menstrual bleeding and the expected first day of the next bleeding. In addition, they were asked to note whether or not they took oral contraceptives.

After this, they were subjected to a sequence of four experimental conditions. Using a 'distorting video images technique' subjects *first* had to estimate the width of a water bottle. In the *second* condition they were asked to estimate their actual body widths. In the *third* condition they were asked to repeat the estimate of their actual body width, but were promised a financial reward (up to 3 German Marks), the amount depending on the precision of their estimates. In the *fourth* condition they were asked to focus their attention on their bodily sensations and to indicate how wide their body 'felt'.

*Distorting video images technique*

The distorting video images technique was chosen as a reliable method to measure body size estimates [1].

The experimental room was equipped with a black and white television monitor above which a video camera was placed. Attention was given to keep the background behind the subject visually neutral, so that no cues were provided to aid the subject in estimating her body width [1]. Video recordings were taken against a light background for maximum contrast in body contours [13].

Subjects were individually tested. They were wearing a blue leotard to reduce visual cues and to eliminate variance due to wardrobe [1]. Subjects were standing at a distance of 3.4m from the monitor which showed a picture of their whole frontal body. Using a turning knob they were able to horizontally distort the image on the monitor up to a maximum of about 30% in both directions.

Horizontal distortions of the image were linearly related with changes in the electric potentials of the monitor ( $p < 0.0001$ ). Thus, it was possible to use voltage as a direct measure of distortion. The voltmeter was placed in an adjacent room. It was calibrated so that a voltage of 85 indicated an undistorted picture. A Body Image Distortion Index (BID) was calculated according to the formula of Slade and Russell [14]. BID equals estimated body width divided by 85 (i.e. accurate estimation of body width), multiplied by 100. Thus, BID scores of 100 represent correct estimates, whereas scores below or above 100 correspond to underestimation or overestimation, respectively.

Each condition consisted of two trials. In one trial, the experimenter set a switch which adjusted the television picture to the widest possible extent, in the other the picture was set to its narrowest. The sequence of trials was varied systematically. Instructions were given by audiotape.

## RESULTS

A Group  $\times$  Condition  $\times$  Trial analysis of variance for dependent samples showed significant main effects for the Group and the Condition factor ( $F = 27.7$ , d.f. = 1;210,  $p < 0.0001$  and ( $F = 9.1$ , d.f. = 3;210,  $p < 0.0001$  respectively). In addition, a significant interaction between Group and Condition was found ( $F = 4.1$ , d.f. = 3;210,  $p < 0.01$ ).

Separate analyses of variance for each experimental condition were performed for further data analysis (see Table II).

There was no significant difference between bulimic women and women with no eating disorder in their estimates of the width of a neutral object.

The bulimic group gave significantly higher estimates of the actual width of their body than did the control group.

TABLE II

	Bulimia $\bar{X}$ (S.D.)	No bulimia $\bar{X}$ (S.D.)	d.f.	<i>F</i>	<i>P</i>
Estimates of width of water bottle	111 (8.6)	109 (7.6)	1;42	.95	ns
Estimates of own actual body width (no reward)	106 (8.7)	101 (9.5)	1;42	6.5	< 0.01
Estimates of own actual body width (reward)	106 (11.8)	101 (11.6)	1;42	4.5	< 0.04
'Felt' body width	113 (12.0)	101 (11.3)	1;42	22.3	< 0.0001

Estimates given by bulimics and controls under the four experimental conditions

Even when reward was promised, the bulimic group gave significantly higher estimates of their own actual body width than did the control group.

When indicating how wide their body 'felt', again, the difference between bulimic women and controls was highly significant.

A three-way analysis of variance showed that there was a significant interaction between Group and Conditions 4 and 2. That is, the bulimic women in comparison to their controls, showed a significantly larger difference between 'felt' body width and their estimate of actual body width ( $F = 5.35$ , d.f. = 1;98,  $p < 0.001$ ) (see Fig. 1).

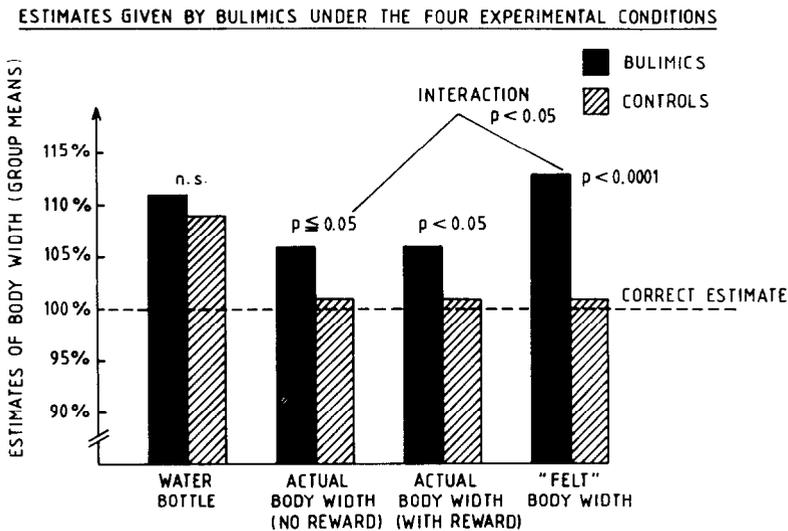


FIG. 1.

#### DISCUSSION

Control group data indicate that women with no indication of an eating disorder are fairly accurate in estimating their body image. The judgement error in the present study was only about 1%. This finding is congruent with the data reported by other investigators using various assessment techniques in women of normal weight [3, 4, 13, 16, 17]. In contrast, the bulimic women, when asked to give as accurate an estimate of their body width as possible, overestimated their body width by a mean of about 6%, their estimates being significantly higher than those of the women with no eating disorder. Again, our finding that bulimic women overestimate the width of their own body more than controls with no eating disorder corroborates the results that have been almost unanimously obtained by other research groups (for an exception see [6]). It should be noted that the differences in accuracy found in the present study between the bulimic and the control sample's view of their own body cannot be attributed to differences in weight, height or age, as the samples were carefully matched with respect to these variables. Moreover, these differences cannot be attributed to differences in

menstrual status or in the use of oral contraceptives since the distribution of these variables was also similar for both groups.

Additionally, our data document that the percentage by which body width was overestimated does not decrease when reward is promised for more accurate estimates. It may be argued that 3 Deutschmarks is a rather low incentive and that a higher amount of money might have yielded different results. Our finding, however, lends support to the assumption that it is not easy for bulimic women to voluntarily control the distorted perception of their body. Thus, the overestimation error has to be viewed as reflecting a relatively fixed attitude to body size which may not only involve visual input but may also be influenced by, for example, proprioceptive, viscerosensitive, kinaesthetic and/or tactile experiences [4].

The view that the body image distortion of bulimics does not reflect a general disorder of visual perception is supported by the fact that our bulimic sample did not differ significantly from the control sample with respect to their estimates of the width of a neutral object. This finding is in line with the results reported by Whitehouse *et al.* [7].

Interestingly, when the bulimic women were asked to focus their attention on their bodily sensations and to indicate how wide their body 'felt', overestimation increased to a mean of 13%, while the experience of how wide the body 'felt' corresponded well with the actual body width in the control sample. This finding suggests that factors other than visual ones, namely bodily sensations, are strongly involved in the body image distortion of bulimic subjects. In this context, it is of interest to note how closely these variables are interrelated. Correlational analyses separately performed for control subjects and bulimic women revealed the following: the control subjects' estimates of their actual body width under reward and no reward were highly correlated with each other as well as with 'felt' body width ( $r = 0.82$ ,  $p < 0.001$  each). In the bulimic sample, in the no-reward condition, estimates of actual body width were not significantly related to 'felt' body width ( $r = 0.25$ ). Under the reward condition, however, a significant correlation (though somewhat lower than in the control group;  $r = 0.65$ ,  $p < 0.01$ ) between these two aspects of the body image were obtained. This indicates that whether or not reward is promised, women with no eating disorder estimate their bodily dimensions essentially the same as their body feels. In contrast, bodily sensations and visual or cognitive factors of the body image in bulimic subjects seem to be less congruent. When incentives were promised for accurate estimates, the bulimic women did not become more precise and overestimates did not decrease; however, their estimates seemed to be more closely oriented at how wide their body felt.

In light of these findings, it seems important that other variables than the visual representation of the body image (e.g. measures of tactile sensitivity [18, 19] or of responsivity to proprioceptive or visceral input) be included in future investigations of body image disturbances in bulimic subjects. In fact, the results of a preliminary investigation [18] and additional data obtained from the population of the present study [19] indicate that deficits in pressure sensitivity are more common in bulimic patients than in control women.

## REFERENCES

1. FREEMAN R, THOMAS C, HUNTER MA. A modified video camera for measuring body image distortion: technical description and reliability. *Psych Med* 1984; **14**: 411–416.
2. FREEMAN R, THOMAS C, SOYMON L, MILES J. Body image disturbances in anorexia nervosa: a reexamination and a new technique. In *Recent Developments in Research* (Edited by GARFINKEL PE, GARNER DM, DARBY, COSCINA) pp. 117–127. New York: Alan Liss, 1983.
3. TIPTON CR, ADAMS HE. The assessment of body image in bulimics and normals. Unpublished manuscript. Medical University of South Carolina, University of Georgia, 1984.
4. NORRIS DL. The effects of mirror confrontation on self-estimation of body dimensions in anorexia nervosa, bulimia and two control groups. *Psych Med* 1984; **14**: 835–842.
5. TOUYZ SW, COWIE I, COLLINS JK, BEUMONT PJ. Body shape perception in bulimia and anorexia nervosa. *Int J eat Dis* 1985; **4**: 259–266.
6. BIRCHNELL S, LACEY JH, HARTE A. Body image distortion in bulimia nervosa. *Br J Psychiat* 1986; **149**: 98–103.
7. WHITEHOUSE AM, FREEMAN CL, ANNANDALE A. Body size estimation in bulimia. *Br J Psychiat* 1986; **149**: 98–103.
8. THOMPSON JK, BERLAND NW, LINTON PH, WEINSIER RL. Utilization of a self-adjusting, light beam in the objective assessment of body distortion in seven eating disorder groups. *Int J eat Dis* 1986; **5**: 421–439.
9. POWERS P, SCHULMAN RG, GLEGHORN AA, PRANGE ME. Perceptual and cognitive abnormalities in bulimia. *Am J Psychiat* 1987; **144**: 1456–1459.
10. HUON GF, BROWN LB. Body images in anorexia and bulimia nervosa. *Int J eat Dis* 1986; **5**: 421–439.
11. GARNER DM, GARFINKEL PE. Body image in anorexia nervosa: measurement, theory and clinical implications. *Int J Psychiat Med* 1981; **11**: 263–284.
12. THOMPSON JK, DOLCE JJ, SPANE RE, REGISTER A. Emotionally versus intellectually based estimates in body size. *Int J eat Dis* 1987; **6**: 507–513.
13. COLLINS JK, BEUMONT PJ, TOUYZ S, KRASS J, THOMPSON P, PHILIPS T. Variability in body shape perception in anorexic, bulimic, obese, and control subjects. *Int J eat Dis* 1987; **6**: 633–638.
14. SLADE P, RUSSELL G. Awareness of body dimensions in anorexia nervosas: cross-sectional and longitudinal studies. *Psych Med* 1973; **3**: 188–199.
15. THOMSON K. Body size distortion in anorexia nervosa: reanalysis and reconceptualization. *Int J eat Dis* 1987; **6**: 379–384.
16. COLLINS JK. Self recognition of the body and its parts during late adolescence. *J Youth Adolesc* 1981; **10**: 243–254.
17. TOUYZ SW, BEUMONT PJ, COLLINS JK, MCCABE MP, JUPP JJ. Body shape perception and its disturbance in anorexia nervosa. *Br J Psychiat* 1984; **144**: 167–171.
18. HENKE I, FRANZEN U, FLORIN I. Pressure sensitivity threshold and subjective sensibility to bodily signals in women with bulimia: a pilot study. *Psych Beitrage* 1984; **26**: 479–485.
19. FLORIN I, FRANZEN U, MEIER M, SCHNEIDER S. Pressure sensitivity in bulimic women: a contribution to research in body image distortion. *J psychosom Res* (in press).