

VIRTUAL REALITY ENVIRONMENT FOR BODY IMAGE MODIFICATION: A MULTIDIMENSIONAL THERAPY FOR THE TREATMENT OF BODY IMAGE IN OBESITY AND RELATED PATHOLOGIES

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Objective: To investigate the possibility of inducing a significant modification on body image attitudes and behavior in obesity and related pathologies using a virtual reality (VR) based psychological approach.

Design: Clinical intervention study using 5 bi-weekly VR-based therapeutical sessions.

Subjects: 57 female obese, BED and EDNOS patients seeking treatment at the Weight Reduction Unit of the Istituto Auxologico Italiano, Verbania, Italy.

Measurements: Various body-image related psychometric tests (Body Satisfaction Scale, Body Image Avoidance Questionnaire, Figure Rating Scale, Contour Drawing Rating Scale) at baseline and after therapy

Results: In all samples the subjects improved their overall body satisfaction after the treatment. The improvement was always associated to a reduction in problematic eating and social behaviors.

Conclusions: The possibility of inducing a significant change in body image and its associated behaviors using a VR based short term therapy can be useful to improve the body satisfaction in traditional weight reduction programs.

Keywords: Body Image Treatment, Virtual Reality, Obesity, BED, EDNOS

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Introduction

The desire to improve body image is often the motivation to embark on weight reduction attempts and body image is a well known concern of many obese subjects (Rosen, 1996b) . However, one of the most intriguing lapses in research until the past few years is the lack of studies about the link between obesity and body image (Thompson, Heinberg, Altabe, & Tantleff-Dunn, 1999). Standard weight reduction programs usually provide less therapy, and have a smaller treatment effect, for body image compared with eating behavior (Rosen & Ramirez, 1998; Rosen, 1996a). Moreover, few clinical trials with these patients have incorporated body image interventions and measurements (Cash & Grant, 1995; Rosen, 1996a; Thompson et al., 1999).

Probably this situation can be explained by the common belief that the best way to improve one's body image is to lose weight. Indeed, weight reduction is probably the most used remedy for body image dissatisfaction. As reported by Rosen (1996b), the most common reason for attempting to lose weight in women is the desire to improve physical appearance.

However recent studies have questioned this belief: dietary intervention, even if accompanied by significant weight loss, may be ineffective in reducing total body dissatisfaction (Rosen, 1996a; Rosen, Orosan, & Reiter, 1995). For instance, Cash, Counts, and Huffine (1990) found that obese subject who had lost weight were similar in appearance evaluation to a currently overweight sample and more distressed than a group of non-obese subjects.

Given the importance of body image satisfaction for the quality of life of obese persons, these findings argue for the potential benefits of treatment strategies for improving appearance satisfaction for obese individuals, regardless of the success of their weight-management efforts (Thompson et al., 1999). Unfortunately, obesity researchers have not added yet body image interventions in their programs. In a recent review on the

behavioral obesity treatment literature Rosen (Rosen, 1996b) didn't find any study including psychological techniques specifically designed to modify body image.

There are two different approaches to the treatment of body image disturbances that are actually used from leading researchers and clinicians: cognitive-behavioral and feminist methodologies (Thompson et al., 1999).

Cash and Rosen are the leading figure in the development of cognitive-behavioral strategies for the treatment of body image in eating disorders (Cash, 1995; Cash, 1997; Rosen, 1996a; Rosen, 1996b). Their approach is based on assessment, education, exposure and modification of body image. The therapy both identify and challenge appearance assumptions, and modify self-defeating body image behaviours. Moreover the approach involves the development of body image enhancement activities used to support relapse prevention and maintenance of changes, and the integration with weight reduction programs (Cash, 1995; Cash, 1997; Rosen, 1996b).

The feminist approach tries to help women to accept and celebrate the body they have (Bergner, Remer, & Whetsell, 1995; Dionne, Davis, Fox, & Gurevich, 1995). However, feminist therapy, in general, varies from traditional forms of therapy in number of ways. Feminists believe that traditional therapy perpetuate the central role of man in the form of the doctor-patient relationship (Wooley, 1995). So, this approach place the therapist and client in equitable roles. Moreover feminist therapist usually include more experiential techniques, such as guided imagery, movement exercises, and art and dance therapy (Wooley, 1995; Wooley & Wooley, 1985). Other experiential techniques include free-associative writing regarding a problematic body part, stage performance, or psychodrama (Kearney-Cooke & Striegel-Moore, 1994; Wooley, 1995).

In this study we tried to integrate these two methods (cognitive-behavioural and feminist) within a virtual environment. Such choice of would make it possible to use the psycho physiological effects provoked by the virtual experience on the body schema for therapeutical purposes (Riva, 1998a; Riva, 1998c).

Previous studies have suggested that Virtual Reality (VR) can be effective in clinical treatment (Hodges, Bolter, Mynatt, Ribarsky, & Van Teylingen, 1993; Hodges et al., 1995; Hodges, Rothbaum, Watson, Kessler, & Opdyke, 1996; North, North, & Coble, 1996; North, North, & Coble, 1997). One of the main advantages of a virtual environment (VE)

for clinical psychologists is that it can be used in a medical facility, thus avoiding the need to venture into public situations. Infact, in most of the previous studies, VEs were used in order to simulate the real world.

However, it seems likely that VR can be more than a tool to provide exposure and desensitisation (Glantz, Durlach, Barnett, & Aviles, 1996). As noted by Glantz *et al.*, "VR technology may create enough capabilities to profoundly influence the shape of therapy" (Glantz, Durlach, Barnett, & Aviles, 1997, p.92). In particular, they expect that VR may enhance cognitive therapy.

In practically all VR systems the human operator's normal sensorimotor loops are altered by the presence of distortions, time delays and noise (Riva, 1997c). Such alterations, that are introduced unintentionally and usually degrade performance, affect body perceptions, too. The somesthetic systems has a proprioceptive subsystem that senses the body's internal state, such the position of limbs and joints and the tension of the muscles and tendons. Mismatches between the signals from the proprioceptive system and the external signals of a virtual environments alter body perceptions and can cause discomfort or simulator sickness (Sadowsky & Massof, 1994). Perceptual distortions, leading to a few seconds of instability and a mild sense of confusion, were also observed in the period immediately following the virtual experience.

Such effects, attributable to the reorganisational and reconstructive mechanisms necessary to adapt the subjects to the qualitatively distorted world of VR, could be of great help during the course of a therapy aimed at influencing the way the body is experienced (Riva & Melis, 1997), because they lead to a greater awareness of the perceptual and sensory/motorial processes associated with them. When a particular event or stimulus violates the information present in the body schema (as occurs during a virtual experience), the information itself becomes accessible at a conscious level (Baars, 1988). This facilitates the process of modification and, by means of the mediation of the self (which tries to integrate and maintain the consistency of the different representations of the body), also makes it possible to influence body image.

In previous studies this approach was tested on non-clinical subjects (Riva, 1997a; Riva, 1998a; Riva, 1998c). The results indicated that the virtual experience induced in the subjects a significantly more realistic view of their body._

Starting from these assumptions, this paper describes the characteristics and preliminary clinical evaluation of the Virtual Environment for Body Image Modifications - VEBIM 2, a VR based treatment to be used for body image therapy in obesity and related pathologies - Binge-Eating Disorders and Eating Disorders Not Otherwise Specified. The approach was developed to support an in-patient weight-reduction program.

METHODS AND SUBJECTS

VEBIM 2: Hardware

Virtual Environment for Body Image Modification - VEBIM 2 is an enhanced version of the original VEBIM virtual environment, previously used in two preliminary studies on non-clinical subjects (Riva, 1997a; Riva, 1998a). VEBIM and VEBIM 2 were developed within the European Community funded VREPAR projects (HC1053/1055).

VEBIM 2 is implemented on a Thunder 400/C virtual reality system by Virtual Engineering of Milano-Italy. The Thunder 400/C is a Pentium II based immersive VR system (400mhz, 64 mega RAM, graphic engine: Matrox MGA 200, 8MB WRAM) including a head mounted display (HMD) subsystem.

VEBIM 2 uses as its display system the Glasstron head-mounted display (HMD) from Sony Inc. The Glasstron uses LCD technology (two active matrix colour LCD's) displaying 180000 pixels each. Sony has designed its Glasstron so that literally no optical adjustment at all is required, aside from tightening a two ratchet knobs to adjust for the size of the wearer's head. There's enough "eye relief" (distance from the eye to the nearest lens) that it's possible to wear glasses under the HMD. This means that no focus adjustment is required. The "exit pupil" (size of the lens nearest the eye) is large enough that no interpupillary distance adjustment is needed. Without the tracker, they weigh just eight ounces; even with the tracker they come in at just under 14 ounces. The 14-ounce weight is well-distributed, since the tracker is at the back of the head and balances the optics and displays at the front.

The motion tracking is provided by Intersense through its InterTrax 30 gyroscopic tracker (Azimuth: ± 180 degrees; Elevation: ± 80 degrees, Refresh rate: 256Hz, Latency time: $38\text{ms} \pm 2$).

The used HMD does not have a stereoscopic display. Previous research regards stereoscopy as important because it provides the user with good cues of depth (Barham & Mc Allister, 1991). However, the refresh rate of graphics decrease by 50% for the need of two different images for each eye. Consequently, we decided against implementing a stereoscopic display. To compensate for the lack of binocular cues, we included perspective cues (light and shade, relative size, textural gradient, interposition and motion parallax) in the virtual environment (Dolecek, 1994).

The data glove-type motion input device is very common in virtual environments for its ability of sensing many degrees of freedom simultaneously. However the operator is also frequently confused for the difficulty in correctly using it, especially when there is a time delay contained in the feed-back loop.

To provide a easy way of motion, we used in VEBIM 2 a two-button joystick-type input device: pressing the upper button the operator moves forward, pressing the lower button the operator moves backwards. The direction of the movement is given by the rotation of operator's head.

VEBIM 2: Therapeutical Sessions

VEBIM 2 was developed by IBM Semea Sud, Naples-Italy, using VRT 5 from Superscape Ltd. (UK). The virtual environment is composed by different zones, each one individually used by the therapist during a session with the patient.

The first session is used to assess any stimuli that could elicit abnormal eating behavior. In particular the attention is focused on the patient's concerns about food, eating, shape and weight. This assessment is normally part of the Temptation Exposure with Response Prevention protocol (Schlundt & Johnson, 1990).

The next four sessions are used to assess and modify:

- *the symptoms of anxiety related to food exposure*. This is done by integrating different cognitive-behavioral methods (see Table 1): Countering, Alternative

Interpretation, Label Shifting, Deactivating the Illness Belief and Temptation Exposure with Response Prevention (Riva, 1998c; Schlundt & Johnson, 1990).

- *the body experience of the subject.* To do this the virtual environment integrated the therapeutic methods (see Table 1) used by Butter & Cash (Butters & Cash, 1987) and Wooley & Wooley (Wooley & Wooley, 1985). In particular in VEBIM we used the virtual environment in the same way as guided imagery (Leuner, 1969) is used in the cognitive and visual/motorial approach.

In all the sessions, the therapists followed the *Socratic style* (Vitousek, Watson, & Wilson, 1998): they used a series of questions, related to the contents of the virtual environment, to help clients synthesise information and reach conclusions on their own.

Session 1: In this zone the subject becomes acquainted with the appropriate control device, the head mounted display and the recognition of collisions. To move into the next rooms subjects have to weigh themselves on a virtual balance. The balance is used for two functions:

- it is intended to be an inevitable obstacle for the user, who must focus her attention on this object, representing the importance of the "weight" dimension in the experiences to come thereafter;
- it can be used, if needed by the therapist, to display the initial weight of the subject, as acquired in the dialogue box at the beginning of the Body Image Virtual Reality Scale (see Session 3).

The next three rooms show a sitting-room, a dining-room and a study. Each of these rooms is furnished with typical items, and contains different foods and drinks. These are used by the therapist to investigate any symptoms of anxiety related to food exposure in the patients and their concerns about food, eating, shape and weight. The data collected are used to plan the next sessions.

Session 2: This zone is composed by different rooms showing a kitchen, a closet and a bed-room. Each of these rooms is furnished with typical items, and contains different foods and drinks.

When the user decides to "eat" or "drink" something, all she/he has to do is to "touch" a specific item. In this way the food is "eaten" and the corresponding caloric intake is automatically recorded in a text file, which is used later to calculate the total income of

calories. At the end of the zone is located a second virtual balance. According to the "eaten" food and to the caloric intake inserted at the beginning of the session, the balance will show the new weight of the subject (in kilograms). As in the previous session, the therapist analyses the reactions elicited by food. Moreover, any dysfunctional belief and/or feeling is discussed with the patient according to the Label Shifting and Objective Counters methods. Finally, are analyzed and matched all the reactions induced by the view of the final balance.

Session 3: This zone - the Body Image Virtual Reality Scale - BIVRS - is a three part virtual environments in which the user have to choose between 7 figures of different size which vary from underweight to overweight (Riva, 1997b; Riva, 1998b).

Subjects are asked to choose the figures that they think reflect their current and their ideal body sizes. The discrepancy between these two measures is an indication of their level of dissatisfaction. In the first two zones (one for real body and one for ideal body) the subject chooses between seven 2D images that are shown at the same time. In the third zone the subject chooses between seven 3D rotating images. The 3D images can be changed using two arrow buttons located around the images.

We decided to use both 2D and 3D images to improve the effectiveness of the scale. Even if existing body image scales use mainly 2D images, using 3D it is easier for the subject to perceive the differences between the silhouettes, especially for specific body areas (breasts, stomach, hips and thighs).

Session 4: This zone is composed by a four-room working environment. Interaction with the virtual environment follows the same guidelines as Session 2. The main difference is the analysis of any link between the patient's job/working environment and the eating disturbance.

Session 5: In the first room the patient is exposed to a series of panels textured with pictures of models, in the typical way of the advertising world. The images are used as stimuli to support a cognitive approach: the elicited feelings are subject to an analysis by the therapist according to the Label Shifting and Objective Counters methods. The feelings and their associated beliefs are identified, broken down into their logical components, replaced with two or more descriptive words, and then critically analysed.

In the next zone the patient find a large mirror. Standing by it the subject can look at her real body, previously digitised using an EPSON Photo PC camera. The vision of her own body usually elicits in the user strong feelings that can be matched using the Counterattacking and the Countering cognitive methods. The mirror is also used, as indicated by Wooley and Wooley (1985), to instruct the user to imagine herself as different on several dimensions including size, race, and being larger or smaller in particular areas. The subject is also asked to imagine herself as younger, older, what they look and feel like before and after eating and social successes/failures.

After the mirror, the patient finds a long corridor ending with a room containing five doors of different dimensions. The subject can move into the last room only by choosing the door corresponding exactly to his width and height.

Before start, and after the end of the session, the patient is administered the same battery of paper-and-pencil tests used in Session 3.

Samples

The VEBIM 2 approach was tested in three different clinical trials involving different pathologies: obesity, BED and EDNOS. In each trial the subjects experienced five sessions of VEBIM 2 during bi-weekly meetings with the therapist.

Subjects were consecutive patients seeking treatment at the Weight Reduction Unit of the Istituto Auxologico Italiano, Verbania, Italy. Individuals were excluded if they were acutely suicidal, medically ill or pregnant, had abused alcohol or drugs within the last year or had evidence of cardiac conduction disease. Before starting the trial, the nature of the treatment was explained to the patients and her written informed consent was obtained.

The obese individuals included were 18 women (Mean weight: 107,95 \pm 13,01 Kg.; mean height: 160 \pm 7,13 cm; mean B.M.I.: 42,11 \pm 5,43) between the ages of 18 and 45 years. A prerequisite for admittance was a B.M.I. > 35.

The BED sample was composed by 25 women (Mean weight: 108,77 \pm 18,68 Kg.; mean height: 162 \pm 5,92 cm; mean B.M.I.: 41,82 \pm 7,81) between the ages of 18 and 45 years who met DSM IV (APA, 1994) research criteria for binge eating disorders for a minimum of 6 months as determined by an independent clinician on clinical interview.

The EDNOS patients included were 14 women (Mean weight: 105,07 \pm 34,05 Kg.; mean height: 163 \pm 8,95 cm; mean B.M.I.: 39,01 \pm 11,30) between the ages of 18 and 45 years who met DSM IV (APA, 1994) criteria for EDNOS for a minimum of 6 months as determined by an independent clinician on clinical interview.

Assessment

Subjects were assessed by one of three independent assessment clinicians who were not involved in the direct clinical care of any subject. They were two MA-level chartered psychologists and a PhD-level chartered psychotherapist. For the clinical interview they used a semistructured interview based on the Italian version of the Eating Disorders Examination (Fairburn & Cooper, 1993). All the subjects were assessed at pre treatment and upon completion of the clinical trial.

The following psychometric tests were administered at each assessment point:

- Italian version (Riva & Molinari, 1998a) of the Body Satisfaction Scale - BSS (Slade, Dewey, Newton, Brodie, & Kiemle, 1990); The scale consists of a list of 16 body parts, half involving the head (above the neck) and the other half involving the body (below the head). The subjects rate their satisfaction with each of these body-parts on a seven-point scale: the higher the rating, the more dissatisfied the individual. A total score and three subscale scores are computed for head, torso and limbs items (Riva & Molinari, 1998a). The scale was designed for work in health-related fields. In particular the scale was used by the authors to assess body dissatisfaction in eating disorders, to monitor changes in body satisfaction in subjects undergoing surgical treatment for breast cancer and to determine the psychological effects of either maxillary or mandibular joint surgery (Riva & Molinari, 1998a).
- Italian version (Riva & Molinari, 1998b) of the Body Image Avoidance Questionnaire - BIAQ (Rosen, Srebniak, Saltzberg, & Wendt, 1991). The BIAQ is 19-item self-report questionnaire on avoidance of situations that provoke concern about physical appearance, such avoidance of tight-fitting clothes, social outings, and physical intimacy. In particular the questionnaire measures the avoidance behaviors and grooming habits associated with negative body image (Rosen et al., 1991). The questionnaire uses a 6-point scale to rate frequency of behavior: never, rarely,

sometimes, often, usually, and always. A total score and four subscales are computed for: clothing, social activities, eating restraint and grooming/weighting;

- the Figure Rating Scale - FRS (Thompson & Altabe, 1991) a set of 9 male and female figures which vary in size from underweight to overweight.
- the Contour Drawing Rating Scale - CDRS (Thompson & Gray, 1995), a set of 9 male and female figures with precisely graduated increments between adjacent sizes.

In the last two tests subjects rate the figures based on the following instructional protocol, (a) current size and (b) ideal size. The difference between the ratings is called the *self-ideal discrepancy score* and is considered to represent the individual's dissatisfaction.

The findings of Keeton, Cash, and Brown (1990), support the usefulness of the self-ideal discrepancy score in the assessment of body image, as it was shown to relate to other body-image indices and other clinically relevant measures. All the scales have good test-retest reliability (Rosen et al., 1991; Slade et al., 1990).

Statistical analysis

A power calculation was made to verify the opportunity to obtain statistically significant differences between the pre and post-treatment scores. Given the low statistical power, due to the relatively small number of subjects, we decided to use the exact methods, a series of non-parametric statistical algorithms developed by the Harvard School of Public Health, that enable researchers to make reliable inferences when data are small, sparse, heavily tied or unbalanced (SPSS, 1995) The exact method used to compare the scores was the marginal homogeneity test (Agresti, 1990).

RESULTS

In Table 2 are reported the means and standard deviations for the body image scores obtained before and after the VEBIM 2 therapy by the first sample (Obese subjects). The marginal homogeneity test reported significant differences in the BIAQ Clothing and

Social Activities scores, in the BSS Limbs and Total scores, and in the CDRS Real score.

The BSS total score and CDRS Real score indicate that the therapy reduced the general level of body dissatisfaction in the subjects. Moreover, the treatment was able to induce a more realistic perception of the limbs as stated by the BSS Limbs score. This reflected also on the behavior of the subjects. Infact, BIAQ scores show that after the therapy the subjects are less concerned about social judgement. In particular patients improved their social activity and reduced the use of disguising clothes.

In Table 3 are reported the means and standard deviations for the body image scores obtained by the BED sample before and after the treatment. The marginal homogeneity test reported significant differences in the BIAQ Clothing and Social Activities scores, in all the BSS scores, and in the FRS and CDRS Real Body scores.

Also in the BED sample the treatment was able to reduce the level of body dissatisfaction in the subjects. A significant improvement was reported for both the general level of body satisfaction - as showed by the BSS Total score and by the CDRS and FRS Real Body scores - and for the different body areas: head, torso and limbs.

As in the first sample the improvements in body image reflected on the behavior of the subjects, less concerned about social judgement. In particular the subjects of the sample improved their social activity and reduced the use of disguising clothes.

The means and standard deviations for the body image scores obtained by the EDNOS sample before and after the virtual experience are shown in Table 4. Using the marginal homogeneity test we found significant differences in the BIAQ Clothing, Social Activities and Total scores, and in the CDRS Real score.

In this sample the reduction in body dissatisfaction was less marked than in other samples. Nevertheless, in EDNOS sample too, the treatment was able to induce a more realistic perception of the real body and an improved body satisfaction.

Moreover, the treatment influenced the behavior of the EDNOS subjects. After the therapy, as in the previous samples, EDNOS subjects were less concerned about social judgement, improving their social activity and reducing the use of disguising clothes.

No subjects from the samples experienced simulation sickness.

DISCUSSION

Although there is much potential for the use of immersive virtual reality environments in clinical psychology, some problems have limited their application in this field. Some users have experienced side-effects, during and after exposure to virtual reality environments (Lackner, 1992). The symptoms experienced by these users are similar to those which have been reported during and after exposures to simulators with wide field-of-view displays (Kennedy, Hettinger, Harm, Ordy, & Dunlap, 1996). These side-effects have been collectively referred to as "simulator sickness" (Kennedy & Stanney, 1996) and are characterised by three classes of symptoms: ocular problems, such as eyestrain, blurred vision and fatigue; disorientation and balance disturbances; nausea. Exposure duration of less than 10 minutes to immersive virtual reality environments has been shown to result in significant incidences of nausea, disorientation and ocular problems (Regan & Ramsey, 1996).

The first interesting result of this study is the lack of side effects and simulation sickness in our samples after the experience in the virtual environment, confirming the possibility of using VEBIM 2 for body image treatment. This result, confirmed in all the studies, is even more interesting given the sample used. Infact, females tend to be more susceptible to motion sickness than males (Griffin, 1990).

The other obtained result is the possibility of inducing a significant modification on body image attitudes and behavior using a strict psychological approach, without any intervention to modify eating, exercise, or weight.

In all the three samples the subjects improved their overall body satisfaction. And this improvement was always associated to a reduction in problematic eating and social behaviors.

Usually the traditional body-image treatment involves a cognitive/behavioural or a feminist therapy that require many sessions. The possibility of inducing a significant change in body image and its associated behaviors using a VR based short term therapy (five bi-weekly sessions) can be useful to improve the body satisfaction in traditional weight reduction programs.

Of course these results are preliminary only. Although treatment outcome is encouraging, the long term effectiveness of this approach is unknown. Moreover the benefits of integrating body image treatment in traditional obesity treatment programs is also unknown. Nonetheless there is an unmet need for body image intervention. The results in our clinical trials are good enough to suggest further investigations of these issues by other investigators and clinicians.

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Table 1. Therapeutical methods integrated in VEBIM 2

Methods	Procedures
Socratic style	The therapist uses different questions, usually hypothetical, inverse, and third-person ones to help patients synthesise information and reach conclusions on their own.
Cognitive	<i>Countering</i> : Once a list of distorted perceptions and cognitions is developed, the process of countering these thoughts and beliefs begins. In countering, the patient is taught to recognise the error in thinking, and substitute more appropriate perceptions and interpretations.
	<i>Alternative Interpretation</i> : The patient learns to stop and consider other interpretations of a situation before proceeding to the decision-making stage. The patient develops a list of problem situations, evoked emotions, and interpretative beliefs. The therapist and patient discuss each interpretation and if possible identify the kind of objective data that would confirm one of them as correct.
	<i>Label Shifting</i> : The patient first tries to identify the kinds of negative words she uses to interpret situations in her life, such as bad, terrible, obese, inferior, and hateful. The situations in which these labels are used are then listed. The patient and therapist replace each emotional label with two or more descriptive words.
	<i>Deactivating the Illness Belief</i> : The therapist first helps the client list her beliefs concerning eating disorders. The extent to which the illness model influences each belief is identified. The therapist then teaches the client a cognitive/behavioural approach to interpreting maladaptive behaviour and shows how bingeing, purging, and dieting can be understood from this framework.
Behavioural	<i>Temptation Exposure with Response Prevention</i> : The rationale of temptation exposure with response prevention is to expose the individual to the environmental, cognitive, physiological, and affective stimuli that elicit abnormal behaviours and to prevent them from occurring. The TERP protocol is usually divided into three distinct phases: (1) comprehensive assessment of eliciting stimuli, (2) temptation exposure extinction sessions, and (3) temptation exposure sessions with training in alternative responses.
Visual motorial	<i>Awareness of the distortion</i> : The patients are instructed to develop an awareness of the distortion. This is approached by a number of techniques including the presentation of feedback regarding the patient's self-image. Videotape feedback is also usually used. Patients are videotaped engaging in a range of activities.
	<i>Modification of the body image</i> : The patients are instructed to imagine themselves as different in several aspects including size, race, and being larger or smaller in particular areas. They also are asked to imagine themselves as younger and older, and to imagine what they look and feel like before and after eating, as well as before and after academic-vocational and social successes and failures.

**Table 3: Mean BIAQ, BSS, CDRS and FRS scores
before and after treatment (BED patients)**

BIAQ	BEFORE TREATMENT	AFTER TREATMENT	p
Total score	31,12	28,44	-
Eating Restraint	3,84	4,68	-
Clothing	13,60	10,96	,015
Grooming/Weighing	3,92	4,36	-
Social Activities	9,76	8,44	,024
BSS			
Total score	57,72	51,04	,001
Head	14,88	13,32	,050
Torso	20,68	18,76	,012
Limbs	22,16	18,96	,000
CDRS			
Real Body	8,32	7,80	,024
Ideal Body	4,72	4,64	-
Self-ideal discrepancy score	1,84	1,81	-
FRS			
Real Body	6,88	6,48	,025
Ideal Body	3,92	4,04	-
Self-ideal discrepancy score	1,82	1,62	,011

Table 2: Mean BIAQ, BSS, CDRS and FRS scores before and after treatment (Obese patients)

BIAQ	BEFORE TREATMENT	AFTER TREATMENT	p
Total score	33,28	30,00	-
Eating Restraint	4,39	6,11	-
Clothing	14,11	12,00	,029
Grooming/Weighing	4,28	4,94	-
Social Activities	10,50	6,94	,004
BSS			
Total score	54,05	47,17	,044
Head	13,89	12,28	-
Torso	20,22	17,83	-
Limbs	19,94	17,06	,044
CDRS			
Real Body	8,61	8,06	,004
Ideal Body	4,94	4,94	-
Self-ideal discrepancy score	1,82	1,69	-
FRS			
Real Body	6,72	6,44	-
Ideal Body	4,06	4,11	-
Self-ideal discrepancy score	1,68	1,59	-

**Table 4: Mean BIAQ, BSS, CDRS and FRS scores
before and after treatment (EDNOS patients)**

BIAQ	BEFORE TREATMENT	AFTER TREATMENT	p
Total score	31,57	26,36	,037
Eating Restraint	3,43	5,79	-
Clothing	13,86	10,50	,014
Grooming/Weighing	3,71	4,36	-
Social Activities	10,57	5,71	,003
BSS			
Total score	50,79	48,21	-
Head	14,36	14,57	-
Torso	18,29	16,86	-
Limbs	18,14	16,79	-
CDRS			
Real Body	8,29	7,57	,025
Ideal Body	4,31	4,57	-
Self-ideal discrepancy score	1,99	1,70	,033
FRS			
Real Body	6,50	6,14	-
Ideal Body	3,93	3,93	-
Self-ideal discrepancy score	1,66	1,60	-

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