VIRTUAL REALITY BASED EXPERIENTIAL COGNITIVE TREATMENT OF OBESITY AND BINGE-EATING DISORDERS

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Abstract. This paper describes the characteristics and preliminary evaluation of the Experiential Cognitive Therapy (Experiential CT), a VR based treatment to be used in obesity and binge-eating disorders' assessment and treatment.
Experiential CT is a relatively short-term, integrated, patient oriented approach that focuses on individual discovery. Main characteristic of this approach is the use of Virtual Reality, a new technology that allows the user to be immersed in a computer-generated virtual world.
Two preliminary clinical trials were carried out on female patients: 25 patients suffering from binge-eating disorders were included in the first study and 18 obese in the second one.
At the end of the in-patient treatments, the patients of both samples modified significantly their bodily awareness. This modification was associated to a reduction in problematic eating and social behaviors. No subjects experienced simulation sickness.

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1. Introduction

There is a growing recognition that Virtual Reality (VR) can play an important role in clinical psychology. Hodges et al. (1995) report on a project that makes use of virtual environments (VEs) to provide acrophobic patients with fear-producing experiences of heights in a safe situation. A similar research was conducted by Lamson (1994), who used a VE to treat 44 subjects with acrophobia.

In a more recent work Hodges ***et al.*** (1996) verified the possibility of using a virtual reality aeroplane for exposure therapy in the treatment of fear of flying. North ***et al.*** (1997), too, presented a case study of a 42 yr. old male with a fear of flying who was recruited for virtual reality therapy. Using a helicopter simulation, the authors exposed the patient to anxiety producing stimuli in progressively challenging situations. North ***et al.*** (1996) also verified the possibility of using VEs in the treatment of agoraphobia. In a controlled study the experimental group exposed to VR therapy reported significant improvement (North et al., 1996).

Strickland (1997) has begun to use VR in the treatment of autistic children. Infact VR is well matched to the needs of learning tools for children with autism and attention deficit disorders. The preliminary data obtained showed that this technique may be of value in helping autistic children learn to better react to their real world (Strickland et al., 1996).

Researchers from Japan (Hirose et al., 1997; Kijima et al., 1994) are exploring the use of VEs to reproduce sand box play, a technique used in the diagnosis of autism patients. The results support the possibility of using this approach in diagnosis of people with psychological and psychiatric difficulties such as autism and neurosis (Hirose et al., 1997).

One of the main advantages of a virtual environment 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 are used in order to simulate the real world and to assure the researcher full control of all the parameters implied.

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

> "Cognitively oriented therapists challenge assumptions in a variety of ways: they reason; they ask for evidence in favour of the assumption, hoping to expose its fallacious roots; they may try to uncover the origins of the assumption, the better to refute it; they identify the emotions that are associated with the maladaptive thinking; and so on. Nevertheless, people often have a hard time giving up their assumptions, no matter how self-defeating. One reason it is so difficult to get people to update their assumptions is that change often requires a prior step - recognising the distinction between an assumption and a perception. Until revealed to be fallacious, assumptions constitute the world; they seem like perceptions, and as long as they do, they are resistant to change. We anticipate using VR to help people in distress make the distinction between assumptions and perceptions" (Glantz et al., 1997, p.96).

In other words, using VR, the therapist can actually demonstrate that what looks like a perception doesn't really exist. This gets across the idea that a person can have a false perception. Once this has been understood, individual maladaptive assumptions can then be challenged more easily.

Starting from these assumptions, this paper describes the characteristics and preliminary evaluation of the Experiential Cognitive Therapy (Experiential CT), a VR based treatment to be used in obesity and binge-eating disorders' assessment and treatment. The approach was developed to support an in-patient eating disorder treatment program. Core feature of Experiential CT is the use of VEBIM 2 – Virtual Environment for Body Image Modification 2 - the virtual environment developed within the European Community funded VREPAR 2 – Virtual Reality Environment in Psycho-neuro-physiological Assessment and Rehabilitation 2 – research project (Project web site: http://www.psicologia.net).

2. Experiential Cognitive Therapy

The multifactorial vision of obesity and related pathologies considers biological, nutritional, psychological and social factors as interacting and concomitant in giving rise

to and maintaining these disorders. Treatment must therefore start from an overall assessment of the patient and from the dysfunctional situation presented.

Experiential Cognitive Therapy, which is currently being experimented at the Laboratory of Psychological Research of the Istituto Auxologico Italiano, proposes a new integrated approach to obesity and binge-eating disorders (OB&BEDs).

Experiential CT is a relatively short-term, integrated, patient oriented eating disorders treatment program that focuses on individual discovery (Riva et al., 1998a; Riva et al., 1998b). The treatment lasts approximately 6/8 weeks and it is administered by nutritionists, therapists having a cognitive-behavioral orientation, who work in conjunction with a clinical psychologist. This methodology is proposed as a treatment that integrates within a virtual environment the different cognitive, behavioural and visuo-motor techniques that are usually used to treat the various aspects of obesity and related disturbances. Moreover, Experiential CT applies the Socratic Method (Vitousek et al., 1998) to tackle the denial and resistance of the patients.

In particular, Experiential Cognitive Therapy is based on:

- psychodiagnostic assessment (initial interview and psychometric tests);
- individual interviews;
- group meetings aimed at motivation to change;
- group meetings aimed at assertiveness;
- virtual reality sessions.

Each therapist carries out one ***step*** of the psychological process, in both individual and group sessions. The individual work involves psychometric tests, weekly supportive psychological talks and five VR sessions. The group work is aimed both at the acquisition of assertive skills, and supporting motivation. Moreover patients participate in bi-weekly psycho-nutritional groups held by nutritionists***.***

2.1 Virtual Reality therapy

We think that Virtual Reality has enough capabilities to profound influence the shape of therapy by offering new approaches that can match at least the first two topics discussed above. VR can in fact be described as a "cognitive technology", a technology created to influence cognitive operations (Biocca, 1996).

2.21 VR and body experience

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 as 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 and Massof, 1994).

It is also well known that key biases can distort perception of the location and orientation of objects and surfaces in virtual environments. While virtual environment interfaces may be argued to be "natural" in principle, there are many features that can disrupt or distort the natural coupling of actual reaching and walking, so as to create problems of stability and disorientation, lessons that have been well learned in the flight community (Kennedy and Stanney, 1996; Riccio, 1995). Four critical issues relate to gain, time delay order, travel-view decoupling, and field of view (Wickens and Baker, 1995).

In a recent study, Cioffi (1993) analysed these effects and found that, in VR, the self-perception of one's own body undergoes profound changes that are similar to those achieved in the 1960s by many psychologists in their studies of perceptual distortion. In particular, about 40% of the subjects felt as if they had "dematerialised" or as if they were in the absence of gravity; 44% of the men and 60% of the women claimed not to feel their bodies. 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 and 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, through the mediation of the self (which tries to integrate and maintain the consistency of the different representations of the body), also influences 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.

2.22 VR and motivation for change

According to Vitousek et al. (Vitousek et al., 1998), a well suited approach to face denial and resistance typical of OB&BEDs is the ***Socratic method***. In this method, the therapist uses different questions to help patients synthesise information and reach conclusions on their own. Usually the therapist poses hypothetical, inverse, and third-person questions (Vitousek et al., 1998): for example, would the significance of body shape change if the OB patient became stranded on a desert island? Would a patient swallow a magic potion that could remove her fear of normal weight? Would a BED client exchange her bingeing for a 5- or 10-pound gain?

VR is well suited to this approach, for its ability of immersing the patient in a real-like situation that she/he is forced to face. Infact, the key characteristic of VR is the high level of control of the interaction with the environment without the constrains usually found in real life. VR is highly flexible and programmable. It enables the therapist to present a wide variety of controlled stimuli and to measure and monitor a wide variety of responses made by the user (Riva, 1998b). Both the synthetic environment itself and the manner in which this environment is modified by the user's responses can be tailored to the needs of each client and/or therapeutic application. Moreover, VR is highly immersive and can cause the participant to feel "present" in the virtual rather than real environment. It is also possible for the psychologist to follow the user into the synthesised world.

The advantages of a VR-based Socratic method are clear. It minimises distortion in self-report, since there is no script for conforming clients to parrot or oppositional clients

to reject. Moreover, it circumvents power struggles because the therapist can be invisible to the patient and presents no direct arguments to oppose. Finally, evidence is more convincing and conclusions better remembered because they are one's own. As noted by Miller & Rollnick (Miller and Rollnick, 1991) people are "more persuaded by what they hear themselves say than by what other people tell them" (p. 58).

2.23 VEBIM 2 - Virtual Environment for Body Image Modification

Starting from the above rationale the VREPAR European Community funded research projects have developed the Virtual Environment for Body Image Modification 2 - VEBIM 2 - to be used in Experiential CT. 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).

The virtual reality system

VEBIM 2 is implemented on a Thunder 500/C virtual reality system by Virtual Engineering of Milano-Italy. The Thunder 500/C is a Pentium III based immersive VR system (500mhz, 128 mega RAM, graphic engine: Matrox MGA 400 Max 32MB WRAM) including a head mounted display (HMD) subsystem.

The display system

A HMD with 40° H and 30° V field of view (50° diagonal) provided the visual display. The HMD, developed by Retinal Displays Inc. - Los Altos (CA), displays 800 lines of 225 pixels (180,000 active dots) to each eye and uses LCD technology. The provided head tracker was used to sense head rotation.

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 and 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).

Motion input system

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.

The virtual environment

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 and 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 and 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 and Cash, 1987) and Wooley & Wooley (Wooley and 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: 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 virtual environment.

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. In particular the therapist uses a pre-defined protocol composed by different questions that are asked to the patient during the experience. 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. The patient is asked to give a running commentary that is discussed by using a pre-defined protocol. 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. In particular, the different words used and their possible meanings are discussed with the patient.

Session 3: This zone - the Body Image Virtual Reality Scale - BIVRS - is a three part virtual environment in which the users 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 is located a long corridor ending with a room containing five doors of different dimensions. The patient can move into the last room only by choosing the door corresponding exactly to her width and height.

3. Two preliminary studies

In the next paragraphs are presented two preliminary clinical trials involving obese and binge-eating patients.

3.1 Binge Eating Disorders

3.11 Subjects

Subjects were consecutive patients seeking treatment at the Eating Disorder Unit of the Istituto Auxologico Italiano, Verbania, Italy.

The individuals included were 25 women (Mean weight: 108,77 ±18,68 Kg.; mean height: 162 ±5,92 cm; mean B.M.I.: 41,82 ±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.

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.

3.12 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 and 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 (Butcher, 1990) of the Minnesota Multiphasic Personality Inventory 2 - MMPI 2.
- Italian version (Garner, 1995) of the Eating Disorders Inventory 2 - EDI 2.
- Italian version (Riva and Molinari, 1998a) of the Body Satisfaction Scale - BSS (Slade et al., 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. 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 and Molinari, 1998a).
- Italian version (Riva and Molinari, 1998b) of the Body Image Avoidance Questionnaire - BIAQ (Rosen et al., 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. 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/weighing.
- the Figure Rating Scale - FRS (Thompson and 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 and 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 (1 - anorectic subject - to 9 – obese) 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).

3.13 Treatment

During their stay the patients experienced all the Experiential CT phases as described in Chapter 2. Moreover patients, who eat 1,200 Kcal per day, participate in bi-weekly psycho-nutritional groups held by nutritionists.

3.14 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 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).

3.15 Outcome

Table 2 shows the means and standard deviations for the body image scores obtained 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 scores.

These results show that the treatment was able to reduce the level of body dissatisfaction in the subjects, both for the total body and for the different body areas.

This reflected also on the behavior of the subjects, who improved their social activity and reduced the use of disguising clothes. No subjects experienced simulation sickness.

3.2 Obesity

3.21 *Subjects*

Subjects were consecutive patients seeking treatment at the Weight Reduction Unit of the Istituto Auxologico Italiano, Verbania, Italy. A prerequisite for admittance was a B.M.I. > 35.

The individuals included were 18 women (Mean weight: 107,95 ± 13,01 Kg.; mean height: 160 ±7,13 cm; mean B.M.I.: 42,11 ±5,43) between the ages of 18 and 45 years. 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.

3.22 Assessment

As in the previous study, subjects were assessed by one of three independent assessment clinicians who were not involved in the direct clinical care of any subject. The same psychometric tests were used.

3.23 Treatment

During their stay the patients experienced all the Experiential CT phases as described in Chapter 2. Moreover patients, who eat 1,200 Kcal per day, participate in bi-weekly psycho-nutritional groups held by nutritionists.

3.24 Statistical analysis

As in the previous study, we used an exact method - the marginal homogeneity test -to compare the scores.

3.25 Outcome

In Table 3 are reported the means and standard deviations for the body image scores obtained before and after the therapy. 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.

These results indicate that the therapy was able to reduce the level of body dissatisfaction in the subjects. In particular 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, less concerned about social judgement: patients improved their social activity and reduced the use of disguising clothes. No subjects experienced simulation sickness.

4. Conclusions

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 et al., 1996). These side-effects have been collectively referred to as "simulator sickness" (Kennedy and 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 and 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 in Experiential CT. This result, confirmed in both 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 significant modification induced by the treatment on the body image of the patients. This modification was associated to a reduction in problematic eating and social behaviors. Usually body-image treatment involves a cognitive/behavioural or a visuomotor therapy that require many sessions. The possibility of inducing a significant change in body image and its associated behaviors using a short term therapy can be useful to improve the efficacy of the existing approaches. As such, the procedure can be considered as a comprehensive treatment package to break through the "resistance" to treatment in clinical subjects (Vandereycken, 1990).

Of course these results are preliminary only. From a clinical view point the issues that we have to address in the future are:

- ***further testing of Experiential CT***. Even if the data obtained in the two preliminary studies using Experiential CT are very promising, we have to test this approach in controlled studies.

- a follow-up study to check how long the influence of the virtual environment lasts.

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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	***Countering***: 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.
	Alternative Interpretation: 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.
	Label Shifting: 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.
	Deactivating the Illness Belief: 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	***Temptation Exposure with Response Prevention*** : 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	***Awareness of the distortion***: 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.
	Modification of the body image: 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 2: 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	-
Body Satisfaction Index	1,84	1,81	-
FRS			
Real Body	6,88	6,48	,025
Ideal Body	3,92	4,04	-
Body Satisfaction Index	1,82	1,62	,011

Table 3: 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	-
Body Satisfaction Index	1,82	1,69	-
FRS			
Real Body	6,72	6,44	-
Ideal Body	4,06	4,11	-
Body Satisfaction Index	1,68	1,59	-

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