Virtual Reality in Eating Disorders and Obesity: State of the Art and Future Directions

Prof. G. Riva, Ph.D.
Istituto Auxologico Italiano

E-mail: auxo.psylab@auxologico.it

http://www.cybertherapy.info
http://www.emergingcommunication.com
http://www.e-psychology.net

Summary

This presentation will focus on:

- The problems of treating these disturbances:
  - Resistance to treatment
  - Body Image disturbances
  - Multifactorial ethiology: genetic and behavioral antecedents
- The advantages of Virtual Reality
  - It can modify the body experience of the subject
  - It is a performance-based method supporting self-efficacy
- The Body Image Virtual Reality Therapy
  - Structure, sessions and role of Virtual Reality
- The Integrated Experiential Therapy
  - Structure, sessions and role of Virtual Reality
- Future trends

The treatment of Eating Disorders and Obesity

- *By clinical reputation,* ***eating disorders and obesity*** *are some of the most frustrating and recalcitrant forms of pathology.*
- *Between 2000 and 2001 obesity prevalence climbed from 19.8 percent of American adults to 20.9 percent of American adults: an increase of 74 percent since 1991.*
- *As noted by* Vitousek et al., *"Few symptom patterns evoke stronger reactions from professionals [than ED] and none may require more forbearance and self-questioning to manage…"*

Why these disturbances are so difficult?

*There are **four** main problems:*

- The complex etiology including *genetic and psychosocial issues;*
- *Losing weight is easy. Much more difficult is* maintaining the weight loss.
- *A toxic environment: exposure to energy-dense, heavily advertised, inexpensive, and highly accessible foods combined with an increasingly sedentary lifestyle.*
- *The* difficulty in treating *body image disturbances*.

Problem 1: Diet and exercize are difficult to maintain

- The evidence shows that fully 90%–95% of adult obese patients who lose weight during dietary and behavioral treatment will return to their baseline weight after 5 years (NIH, 1992).
- Ten years after treatment only 34% of obese children had a decreased percentage overweight; only 30% were no longer obese (Epstein et al., 1994).

The role of Virtual Reality (1)

Research datum: an important problem in actual obesity treatments is the lack of distinction between the objective of obtaining weight loss and the one of maintaining it.

Problem 1: maintenance requires “control self efficacy”;
Problem 2: maintenance requires “long-term behavioral change”;

VR advantage: **performance-based methods** - including VR- are the most effective in producing therapeutic change: in VR difficulties can be defeated, so improving their cognitive and behavioral skills for coping with stressful situations.

Problem 2: The yo-yo sindrome

496 adolescent girls who completed a baseline assessment at age 11-15 years and *4 annual follow-ups*

Table 2
Univariate Relations Between Time 1 Risk Factors and Future Risk for Obesity Onset During the 4-Year Follow-Up Period

Time 1 risk factor	OR	95% CI	*p*
High-fat diet	0.50	0.19–1.32	.162
Binge eating	2.34	0.29–19.11	.429
Exercise	1.21	0.96–1.53	.111
Dietary restraint	3.39	1.92–5.99	.001***
Compensatory behaviors	5.17	1.77–15.13	.003**
Depressive symptoms	4.62	1.67–12.74	.004**
Perceived parental obesity	4.58	1.53–13.64	.006**

Note. Logistic regression models excluded initially obese participants. OR = odds ratio; CI = confidence interval.
** $p < .01$. *** $p < .001$.

Table 3
Multivariate Relations Between Time 1 Risk Factors and Future Risk for Obesity Onset During the 4-Year Follow-Up Period

Time 1 risk factors	OR	95% CI	*p*
Dietary restraint	3.16	1.58–6.31	.001***
Compensatory behaviors	1.35	0.40–4.60	.632
Depressive symptoms	2.32	0.62–8.65	.210
Perceived parental obesity	3.97	1.24–12.72	.020*

Note. Logistic regression models excluded initially obese participants. OR = odds ratio; CI = confidence interval.
* $p < .05$. *** $p < .001$.

Stice et al, (2005), **Psychological and Behavioral Risk Factors for Obesity Onset in Adolescent Girls. A Prospective Study**, *Journal of Consulting and Clinical Psychology*, Vol. 73, No. 2, 195-202

The role of Virtual Reality (2)

Research datum: self-reported dietary restraint, and radical weight-control behaviors related to body image dissatisfaction are the best predictors of obesity onset (Strice et al, 2005.)
BUT dietary intervention, even if accompanied by significant weight loss, may be ineffective in reducing total body dissatisfaction and/or body distortion

Problem 1: weight loss do not address bodily dissatisfaction
Problem 2: modification of bodily experience is difficult and experiential: no discussion can make a subject aware of her real body
VR advantage: the change in bodily experience induced by immersive VR can be used to address body dissatisfaction.

Actual VR Approaches

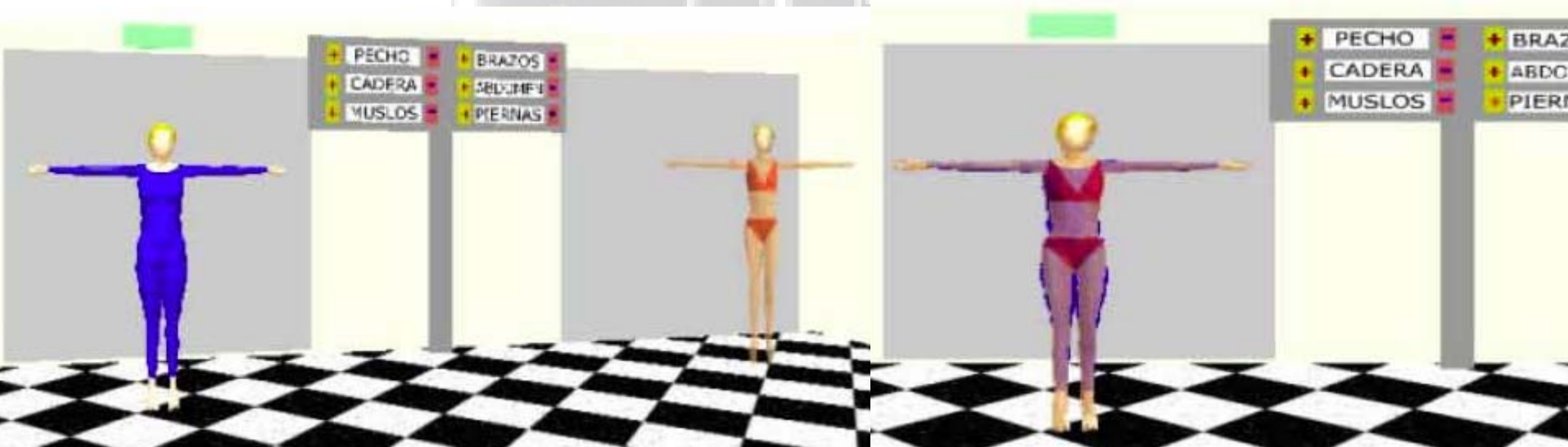
Body Image treatment (Cristina Botella Group):
- Tested in controlled trials on ED patients
- Outpatient

Body Image plus emotional control - Integrated Experiential Therapy (Giuseppe Riva Group)
- Tested in controlled trials on ED and Obese patients
- Inpatient

Relaxation protocol to reduce anxiety eating (Giuseppe Riva Group - see Cesa presentation)
- Tested in controlled trials on Obese patients
- Inpatient and outpatient

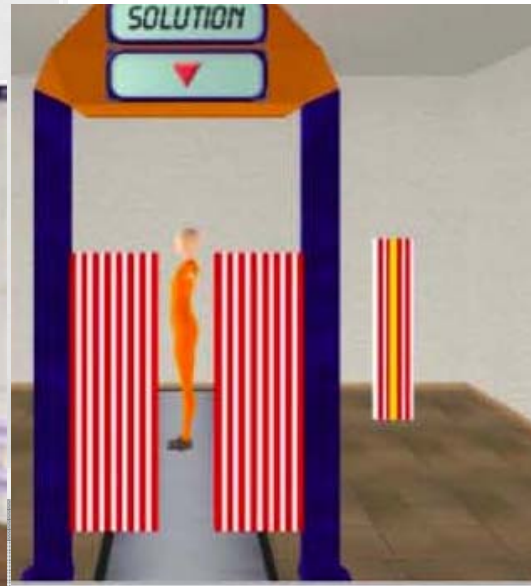
Body Image VR Therapy (1)

- Developed by Cristina Botella and her team:
  - based on Cash body Image treatment
  - includes **six different virtual environments** including a 3D figure whose body parts (arms, thighs, legs, breasts, stomach, buttocks, etc.) could be enlarged or diminished.



Body Image VR Therapy (2)

- The body image therapy includes:
  - the body can be evaluated wholly or in parts;
  - the body can be placed in different contexts (for instance, in the kitchen, before eating, after eating, facing attractive persons, etc.);
  - behavioural tests can be performed in these contexts, and several discrepancy indices related to weight and figure can be combined



Body Image VR Therapy (3)

- The results of the clinical trial:
  - **18 outpatients**, who had been diagnosed as suffering from eating disorders (anorexia nervosa or bulimia nervosa) according to the DSM-IV criteria,
  - randomly assigned to one of the two treatment conditions:
    - the VR condition (cognitive-behavioural treatment plus VR)
    - the standard body image treatment condition (cognitive-behavioural treatment plus relaxation).
  - Thirteen of the initial 18 participants completed the treatment. Results showed that following treatment, all patients had improved significantly (significant differences at 12-months follow up)

The Integrated Experiential Therapy (1)

- Developed by Giuseppe Riva group:
  - integrates 10 virtual reality sessions;
  - is a relatively short-term, integrated, patient oriented approach that focuses on individual discovery;
  - the treatment lasts 8/12 weeks;
  - it is administered by therapists having a cognitive-behavioral orientation.
  - Inpatient treatment

The Integrated Experiential Therapy (2)

It shares with CBT the use of a **combination of cognitive and behavioral procedures** to help the patient identify and change the maintaining mechanisms. However it is different for:

- Its focus on the **negative emotions related to the body**, a major reason patients want to lose weight .
- **Its focus on supporting the empowerment process**. VR has the right features to support empowerment process, since it is a special, sheltered setting where patients can start to explore and act without feeling threatened >**Results soon**

Future Plans (1)

The data from the clinical trials suggest that VR was effective in dealing with two key features of these disturbances not always adequately addressed by cognitive-behavioral therapy: body experience disturbances and self-efficacy.

Our attempt is to develop a **new generation of virtual reality tools** more suitable to the taste of obese children and integrated with **wireless experiences on portable phones/advanced videogames**.

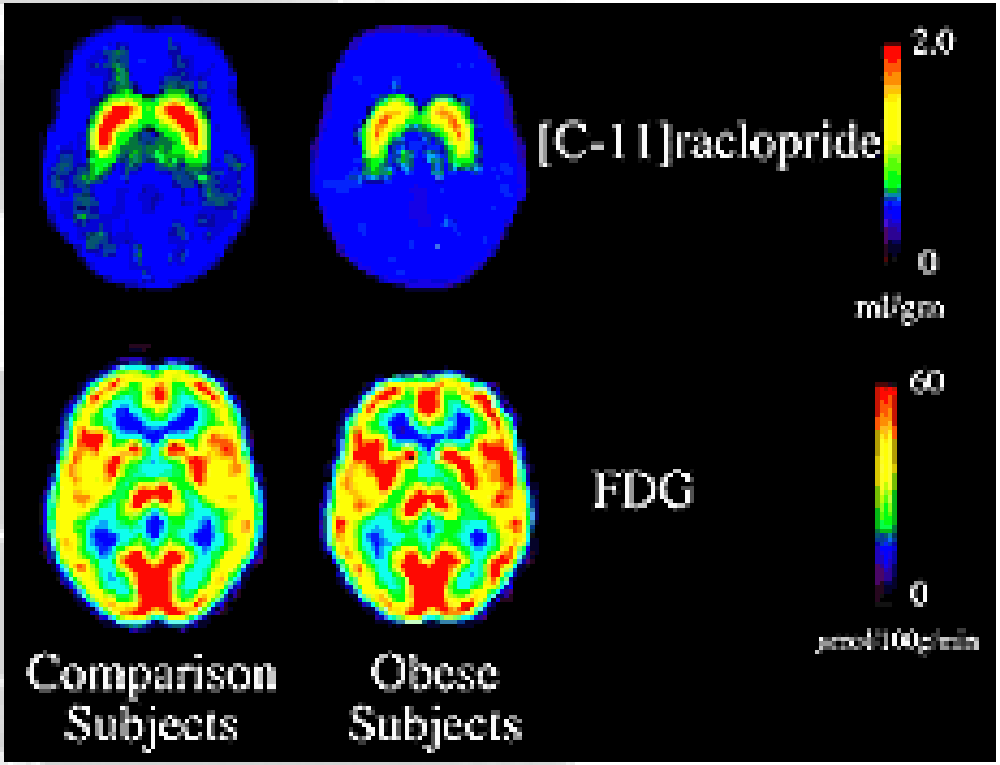
Future Plans (2)

- **N-gage** from Nokia:
  - 150 Euro
  - Symbian OS
  - Bluetooth and GPRS
  - Graphic Power similar to a Playstation 1, MP3
- **PSP from Sony**:
  - 250 Euro
  - Palm OS
  - Bluetooth and Wi-FI
  - VGA output
  - Graphic Power similar to a Playstation 1, MP3

Future Plans (3)

A recent study published on **Lancet** (Wang et, 2001), used PET to demonstrate that:

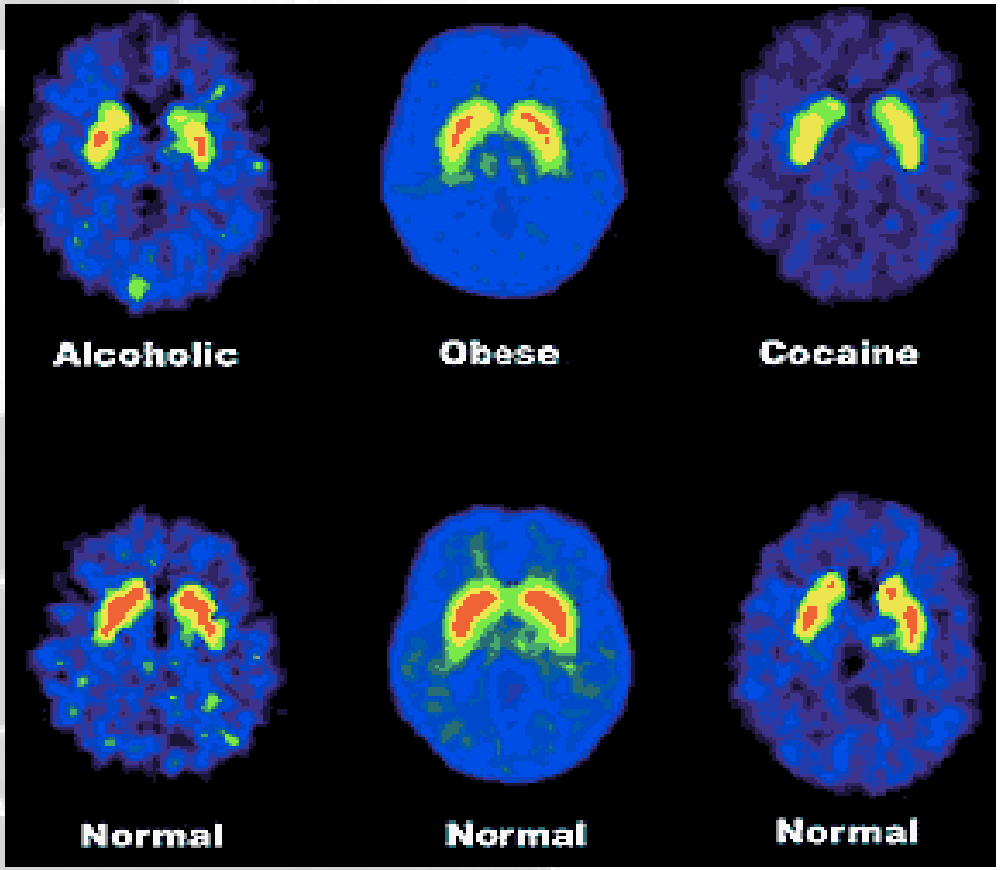
- obese subjects have less **dopamine receptors**
- the lack of these receptors is directly correlated to their body mass index (B.M.I.): **the more the weight, the less the receptors**



Future Plans (4)

Different researchers (Hoffman et al., 2004; Optale et al, 2002) using PET showed that **VR is able to modify the metabolism of the brain**.

How VR changes may impact the brain of obese and ED patients? **We want to discover it**.



For more info…

- Different books and papers can be accessed and freely downloaded from: http://www.cybertherapy.info (English)
- http://www.obesita.info (Italian)
- Different VEs can be accessed and freely downloaded from: http://www.vrtherapy.net
- e-mail:auxo.psylab@auxologico.it

Integrated Experiential Therapy for the treatment of Obesity and Binge Eating Disorders: Two Clinical Trials

Prof. G. Riva, Ph.D.
Istituto Auxologico Italiano

E-mail: auxo.psylab@auxologico.it

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Summary

This presentation will focus on:

- The Integrated Experiential Therapy
  - Structure, sessions and role of Virtual Reality
- Two controlled clinical trials
  - 71 female binge eating disordered patients
  - 221 female obese patients
- Comparison treatments
  - Waiting list
  - Nutritional/physical treatment
  - As above plus Cognitive-Behavioral Therapy
  - As above plus Virtual Reality session
- Main outcomes
  - Psychological treatment always better than Nutrition only
  - VR better than CBT in the long term

The Integrated Experiential Therapy (1)

- *Main features of the* **Integrated Experiential Therapy** *(IET):*
  - *integrates 10 virtual reality sessions;*
  - *is a relatively short-term, integrated, patient oriented approach that focuses on individual discovery;*
  - *the treatment lasts 8/12 weeks;*
  - *it is administered by therapists having a cognitive-behavioral orientation.*

The Integrated Experiential Therapy(2)

IET is based on both *individual* and *group* sessions.

The **individual work** regards:

- assessment by *psychometric tests*,
- weekly supportive *psychological talks*,
- sessions for assessment and therapy carried out using Virtual Reality (VR),
- psycho-pharmacological assessment and control.

The Integrated Experiential Therapy (3)

- The **group work** aims
  - at training for development and acquisition of assertive skills,
  - and at training for assessment and consolidation of motivation.

Moreover, patients participate to bi-weekly psycho-nutritional groups held by nutritionists.

Virtual Reality protocol

SESSION 1	**TEST** *ASSESSMENT*: Room with balance (Area 1a) Drawing room, kitchen (Area 1b)
SESSION 2-3	*EATING CONTROL:* Dining room, bathroom, bedroom
SESSION 4	*BIVRS - Body Image Evaluation*
SESSION 5-6	*SOCIAL ENVIRONMENTS 1 (eating control)*: Office, pub
SESSION 7-8	*SOCIAL ENVIRONMENTS 2* (*body image*): Swimming-pool, beach
SESSION 9	*SOCIAL ENVIRONMENTS 3* (*eating control*): Supermarket
SESSION 10	*BODY IMAGE*: Models, clothes **RETEST**

Description of the VR system

- A Pentium IV based machine (3Ghz, 512 mega RAM, graphic engine: ATI Radeon X800 256MB VRam)
- The Sony Glasstron head mounted display (38° H - 41° V FOV; 720 x 250 pixel; two active matrix color LCDs). An InterTrax 2 3D Mouse provided head tracking.
- an infrared two-button joystick-type input device: the direction of the movement is given by the rotation of operator's head.

The general clinical approach (1)

Anxiety control and empowerment:

This is done both by **integrating different cognitive-behavioral methods**:

Countering, Alternative Interpretation, Label Shifting, Deactivating the Illness Belief and Temptation Exposure with Response Prevention; and **by working on these three empowering dimensions**:

Perceived Control, *Perceived Competence* and *Goal Internalization*.

The general clinical approach (2)

Body Image treatment and Socratic style:

We integrated the **visuo-motorial** methods used by Butter & Cash and Wooley & Wooley. In particular we used the **virtual environment in the same way as guided imagery** is used in the cognitive and visual/motorial approach.

- In all the sessions the therapists follow the **Socratic style**: they use a series of questions, related to the contents of the virtual environment, to help clients synthesize information and reach conclusions on their own.

Body Image Sessions (1)

- In the first session the subject is exposed to a series of panels textured with pictures of models.
- 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.

Body Image Sessions (2)

- In the second sessions the user find a large mirror. The subject can look at her real body, previously digitised using a 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.

Two controlled clinical studies

To check the efficacy of IET we decided to set up ***two RANDOMIZED controlled clinical trial*** *involving*:

- ***211*** *Obese female patients;*
- ***71*** *Binge Eating disordered female patients.*

Each sample was randomly divided into four groups:

- the **waiting list** group;
- the **nutritional group**, that experienced a low-calorie diet (1,200 kcal/day), physical training, and nutritional groups (three times a week) focused on methods for improving stress management, and problem-solving.
- the **cognitive behavioral** group
- and the **experimental group**, that experienced IET;

Conclusions (1)

In the OBESITY trial, IET produced a similar weight loss to CBT after a 6-month follow-up but IET was better at 12-month. Both were better than nutritional

IET was also able to **significantly improve** both the level of body image satisfaction and the motivation for change.

This change produced a reduction in the number of avoidance behaviors as well as an improvement in the number of adaptive behaviors.

Conclusions (2)

In the BINGE trial IET was able to significantly **reduce** both binge frequency and weight better than CBT and nutritional groups after a 6/12-month follow-up.

Moreover, IET was more effective than CBT in **improving the overall psychological state** of the patients and in improving body satisfaction and the level of emotional control.

As for the first trial, this change produced a reduction in the number of avoidance behaviors as well as an improvement in the number of adaptive behaviors.

Conclusions (3)

IET was effective in dealing with two key features of these disturbances not always adequately addressed by cognitive-behavioral therapy: body experience disturbances and self-efficacy.

Further multicentric clinical trials are required to confirm these data. Moreover, the cost of the VR system used in the study is about $6,000.

This price, even if affordable for departments or hospitals, is still high for a single therapist.

For more info

- Different books and papers can be accessed and freely downloaded from: http://www.cybertherapy.info
- Different VR can be accessed and freely downloaded from: http://www.vrtherapy.net
- Giuseppe Riva, Ph.D., can be contacted at this address: ATN-P Lab., Istituto Auxologico Italiano, Via Pelizza da Volpedo 41, 20149, Milan, Italy
- e-mail: auxo.psylab@auxologico.it

Therapeutical Methods integrated in the VE (1)

Cognitive:

- Cognitive Countering: Once a list of distorted perceptions and cognitions is developed, the patient is taught to recognise the error in thinking, and substitute more appropriate perceptions and interpretations
- Deactivating the Illness Belief: The patient is taught a cognitive/behavioural approach to interpreting maladaptive behaviour and shows how bingeing, purging, and dieting can be understood from this framework

Therapeutical Methods integrated in the VE (2)

Cognitive:

- Alternative Interpretation: The patient learns to stop her/his judgment and to consider other interpretations of a situation.
- Label Shifting: The patient first tries to identify the kinds of negative words she uses to interpret key situations in her life (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.

Therapeutical Methods integrated in the VE (3)

Behavioral:

- Temptation Exposure with Response Prevention: the subject is exposed to the environmental, cognitive, physiological, and affective stimuli that elicit abnormal behaviours and taught to prevent them from occurring. The TERP protocol is usually divided in: (1) assessment of eliciting stimuli, (2) temptation exposure extinction sessions, and (3) temptation exposure sessions with training in alternative responses.

Therapeutical Methods integrated in the VE (4)

Visuo-motorial:

- Awareness of the distortion: The patients are instructed to develop an awareness of the distortion using their mirrored image.
- Modification of the body image: The patients are instructed to imagine themselves as different on several dimensions (size, race, etc.). They also are asked to imagine themselves as younger, older, what they look and feel like before and after eating.