Why You Really Eat?
Virtual Reality in the Treatment of Obese Emotional Eaters

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Abstract. The aim of this study is to assess the efficacy of a specific stress management protocol, based on immersive Virtual Reality (VR), to be used as part of a multidisciplinary inpatient program for the treatment of obesity. The stress management protocol included imagery, relaxation and different cognitive behavioral approaches – emotion focused coping, self-monitoring and record keeping. Forty (40) participants, all female, were recruited for the study at the San Giuseppe Hospital, Istituto Auxologico Italiano, Piancavallo (VB), Italy. Participants were chosen among the obese patients without a specific Binge Eating diagnosis but with high level of anxiety and a history of emotional eating. The sample was randomly distributed in three conditions as follows: (a) VR stress Management Protocol; (b) DVD based stress management protocol; (c) no treatment (control condition). Data show that the VR condition produced a significantly higher reduction in anxiety, as compared both to DVD and control groups. More, we found a significant correlation between changes in the emotional state and the level of presence: the more present the users felt, the higher the reduction in anxiety. This datum suggests the possible role of presence in mediating the effects of a stress management protocol.

Keywords: Virtual Reality, Obesity, Stress Management, Presence

1. Introduction

Obesity, defined as an excess of body fat with body mass index (BMI) greater than 30 kg/m^2, is currently considered a medical rather than a psychiatric disorder. Nonetheless, obesity is without question strongly influenced by behavior: many obese subjects use overeating in managing aversive internal states or external conditions as a response to a primary underlying problem [1].

As effectively summarized by Bray [2], in obesity “genes load the gun, the environment pulls the trigger.” On one side genes are currently thought to explain
25%-40% of the variance in BMI [3]. On the other side, the changes in the eating and activity habits are the triggers that activate the obesity process [4].

Specifically, Saper and colleagues [5] introduced the distinction between two different eating control systems: homeostatic and hedonic systems. The important role of the hedonic system in providing motivation for feeding, suggests the possibility that excess energy consumption may reflect a dysfunction in reward systems.

In this view, eating can be considered as an easy tool for regulating emotions, particularly negative affect. Recently, some authors have proposed more complex models for explaining the link between emotion, stress and overeating. For instance, the stress response model described by Gluck [6], suggests that abnormal stress responsivity contributes to obesity in vulnerable individuals via exaggerated cortisol release. Given the role potentially played by emotion and stress regulation in the etiology of obesity, our goal is to evaluate the integration of a stress management protocol in a multicomponent inpatient therapy of obesity.

2. Tools and Methods

Sample: Forty participants, all female, were recruited for the study at the San Giuseppe Hospital, Istituto Auxologico Italiano, Piancavallo (VB), Italy. Participants were chosen among the obese patients without a specific Binge Eating diagnosis but with a history of emotional eating and high level of anxiety: they scored higher than 0.5 in the SCL-90 (Symptom Check List) Anxiety Scale.

Protocol. A recent review by Ong and colleagues [7] categorized the most commonly used stress management techniques in three approaches.

The first one involves imagery, relaxation, and meditation. The second one involves cognitive–behavioral approaches, where strategies include emotion-focused or problem-focused coping, self-monitoring of stress intensity, thought recordkeeping and rewriting. The last category is represented by systemic approaches. They are focused on altering the external factors which contribute to create stress to the individual, such as social, environmental, or political factors.

For the current study we developed a specific stress management protocol including imagery, relaxation and different cognitive behavioral approaches – emotion focused coping, self-monitoring and record keeping. The protocol consisted of 2 sessions, in two different following days; each session lasted approximately 60 minutes and consisted of 4 phases based on relaxing exercises with in vivo or imaginary exposure. These characteristics were identical both for VR and DVD.

In condition 1 (VR) the medium used is a virtual island. This tropical island includes different zones in which the subjects can live different relaxing experiences. For example it is possible to watch the waves lapping gently on the shore from an atoll located in front of the barrier reef. Each experience included a therapeutic narrative that guides the subject in the different exercises of the protocol.

In condition 2 (DVD) the medium used is a DVD. This relaxing DVD includes different scenes in which the subjects can live different relaxing experiences under the water or at beach level. Also in this condition each experience included a therapeutic narrative that guides the subject during the exercises. Both subjects, in VR and in DVD conditions, listened to the same narrative, followed the same exercises and recorded during the day in a diary their emotional responses.
**Conditions:** The sample was randomly distributed in the three conditions as follows:

**Condition 1** - 15 subjects: VR stress management protocol (VR Condition)
**Condition 2** - 11 subjects; DVD stress management protocol (DVD condition);
**Condition 3** – 14 subjects: no treatment (CTRL condition).

All the subjects were submitted before and after the treatment to: (a) the *State Anxiety Inventory* to measure the level of state anxiety; (b) the *Visual Analogue Scale* to assess the emotional state; (c) the *Positive and Negative Affect Schedule* to measure the positive and negative affects; (d) the *ITC–Sense of Presence Inventory* – to assess the level of presence.

3. **Results and Conclusions.**

Data showed significant differences among the three groups (Chi-square=12.07; p< .005). Post-hoc analyses performed with Mann-Whitney test (2 independent samples) indicated that VR condition induced a significantly higher reduction in anxiety, as compared both to DVD and to CTRL groups. More, data showed a significant correlation between changes in anxiety and emotional state on the one hand, and several factors of presence on the other hand. Specifically, the more present the users felt, the higher the reduction in anxiety and increase in positive emotions. The correlation was independent both by the use of virtual reality and the type of measurement used to evaluate emotional change. This datum suggests the possible role of presence in mediating the effects of a stress management protocol.

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5. **References**