

# The use of virtual reality in the work on the perception of one's own body

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## Abstract

**Thesis.** Eating disorders are an increasing contemporary problem, and therapy does not always bring desired effects, which is why it appears necessary to introduce new methods of therapy.

**Aim.** The aim of this paper is to present the benefits provided by virtual reality (VR) in the perception of one's own body, which can be used in therapy and prevention of eating disorders.

**Conclusions.** Virtual reality can be useful in the case of persons who wish to experience the image of their potential bodies when planning change (diet, exercise), as well as individuals who wish to actualise the image of their bodies after the change. VR can play a supportive role in the therapy of eating disorders, focusing on the reduction of adverse eating habits and a change in the perception of the body. The use of VR makes it possible to integrate the actions from both the areas in a safe and interesting environment. Accompanying the techniques which have been employed for years in the therapy of eating disorders, VR presents entirely new opportunities for patients to see and experience their bodies "in a new light" without delay, which allows them not only to understand themselves, but also to increase their motivation to persevere.

**Key words:** Virtual Reality (VR), perception of body, therapy, eating disorders

## Introduction

The perception of one's own body ranges from positive, through neutral, to negative (Brytek-Matera, 2008). The intensity of these assessments varies, and they are not always realistic. Dissatisfaction with one's body and the inadequacy of its assessment may lead to numerous disorders, including eating disorders, dysmorphobia, and depression.

Body image distortions are one of the components influencing the perceived quality of life, even in the case of the lack of clinically recognisable eating pathology. Numerous studies present the key role of body image distortions in the onset and persistence of eating disorders (Corno, Serino, Cipresso, Baños, & Riva, 2018; Serino, Dakanalis, Gaudio, Carrà, Cipresso, & Riva, 2015). They are one of the basic symptoms of anorexia nervosa (Ziser, Mölbert, Stuber, Giel, Zipfel, & Junne, 2018; Mölbert, Thaler, Mohler, Streuber, Romero, Black, Zipfel, Karnath, & Giel, 2018).

Contemporarily eating disorders have become a rising social problem, and therapy does not always produce desired effects, which is why it appears necessary to introduce new methods of therapy. Because disorders connected with altered diets can result in dramatic consequences, it is crucial to focus on the problem and develop effective tools of prevention and therapy.

Virtual reality provides a number of ways in which individuals can experience their bodies. The manner in which we physically experience the body as our own is a fundamental component of our self-awareness. Physical self-awareness can be measured with the use of physical illusions. A visual/tactile conflict is triggered in which individuals experience illusory ownership of a body or a body part (such as a rubber leg) (de Jong, Keizer, Engel, & Dijkerman, 2017). Such experiences can be beneficial in treatment of phantom pain, as well as in the therapy of body image distortions.

## Perception of the body and eating disorders

Excessive control over food intake (fasting, induced vomiting, excess use of laxatives) as well as compulsive binge eating may not only have negative influence on the health of an individual, but also be detrimental to their social life. Negative perception of one's body is perceived by researchers as one of the most frequent causes of unhealthy eating behaviour, those leading to dangerously low weight as well as obesity (Riva, 2011).

Eating disorders can occur at any age, however, adolescents are particularly vulnerable, because they experience biological puberty and changing bodies, a culmination of the maturing process, and they are prone to peer and media pressure.

Research suggests a connection between dissatisfaction with the image of one's body and unhealthy behaviour controlling weight and obesity in

teenagers, both male and female. Teenagers are so focused on negative representations of their bodies that they may have difficulties actualising the image of their bodies even after significant changes have taken place, e.g., after a diet (Riva, Gaggioli, & Dakanalis, 2013).

Problems with the actualisation of body image may occur even after major changes, such as, e.g., constant and significant weight loss achieved through laparoscopic stomach banding. Body image distortion can persist even 13 months following a surgery (Cárdenas-López, Torres-Villalobos, Martínez, Carreño, Duran, Dakanalis, Gaggioli, & Riva, 2014).

These findings confirm the allocentric block theory. The theory proposes that patients with eating disorders may be connected with (allocentric) representations of their bodies preserved in long-term memory. These representations are not actualised (modified) through perception in real time. Patients with eating disorders show deficits in their capability to relate to and actualise the long-term (allocational) representation with (egocentric) perceptive representation (Serino, Dakanalis, Gaudio, Carrà, Cipresso, Clerici, & Riva (2015).

### **Virtual reality in therapy**

Over the last decade virtual reality has become a technology which is especially useful in not only in the assessment of body image distortions, but also in changing them. In order to achieve this, a number of programming systems based in virtual environments has been developed (Ferrer-García, & Gutiérrez-Maldonado, 2012).

Virtual reality and other technologies relying on avatars are the potential methods of demonstrating and modelling behaviour connected with weight loss (Napolitano, Hayes, Russo, Muresu, Giordano, & Foster, 2013). We know that obesity has a multi-factor aetiology, including biological, environmental, and psychological causes. That is why treating obesity calls for a more integrated approach than the standard behavioural treatment based on diet and exercise. In order to test long-term effectiveness of the refined cognitive-behavioural therapy (CBT) of obesity, research aimed to unblock negative body memory and to modify its behavioural and emotional correlations was conducted with the inclusion of virtual reality (VR). The research results suggest that CBT supported by VR was effective in further weight loss, even following a year of observation. What is interesting is that the participants who received CBT treatment exclusively would on average regain most of the lost weight. The results support the hypothesis that VR can increase the long-term effectiveness of CBT (Manzoni, Cesa, Bacchetta, Castelnuovo, Conti, Gaggioli, Mantovani, Molinari, Cárdenas-López, & Riva, 2016).

Our bodies are the most familiar objects which we encounter in our perceptive environment. Virtual reality provides a unique method which makes it possible to experience a body entirely different from our own, granting us the valuable opportunity to investigate the plasticity of body representation (Piryankova, Wong, Linkenauger, Stinson, Longo, Bühlhoff, & Mohler, 2014). It is particularly important in the work on patients' motivation. The idea in the treatment of obesity is to refrain from little pleasures in order to achieve long-term goals. That is why losing weight calls for patients to sacrifice instant culinary pleasures for the sake of future health benefits. The difficulty lies in the delayed gratification, because the individuals in therapy cannot imagine their future selves (Kuo, Lee, & Chiou, 2016). The results of the research conducted on persons willing to lose weight show that a computer-generated body image with reduced weight may facilitate the control of the impulses promoting instant gratification (eating an ice cream, drinking a sweetened carbonated beverage). The research presents a new approach to the control of impulsive behaviour, such as the regulation of diet and body mass control (Kuo, Lee, & Chiou, 2016).

In the case of persons who excessively control their weight one of the crucial difficulties is that they present general predispositions to overestimate their body size and experience higher dissatisfaction with body image (Gutiérrez-Maldonado, Ferrer-García, Caqueo-Urizar, & Moreno, 2010). First and foremost, such individuals have inadequate assessment of their current body image, and they experience dissatisfaction in connection with the discrepancy between their current and their desired look. Anorectic patients are convinced that their bodies look larger than they actually are ("too fat"), and patients with bigorexia are certain that their bodies are less muscular than in reality.

What is interesting is that some of the research with the use of virtual reality shows that eating disorders of persons with anorexia nervosa are connected not as much with a distorted image of their bodies as with imagining their desired weight. What can be concluded from this research is that when working with patients with anorexia nervosa, a therapy aimed to change the desired image of the body rather than with the perception of current weight can be more effective (Mölbart, Thaler, Mohler, Streuber, Romero, Black, Zipfel, Karnath, & Giel, 2018).

In order to treat body image distortions and dissatisfaction with body image, two main methods are used. The first of them is cognitive behavioural therapy which influences the patients' sense of satisfaction, and the second one is visual motor therapy, influencing the level of body awareness (Riva, & Melis, 1997). A high percentage of patients with eating disorders react

positively to cognitive behavioural therapy. However, in the case of some of the patients it is ineffective or patients suffer from relapse (Lozano, Alcañiz, Gil, Moserrat, Juan, Grau, & Varvaró, 2002). Both of the therapeutic approaches can be integrated in virtual environments (Riva, & Melis, 1997). Inclusion of new technologies may be beneficial in increasing the effectiveness of standard treatment methods. Virtual reality has been successfully used in treatment of body image distortions of patients with eating disorders (Ferrer-García, & Gutiérrez-Maldonado, 2012). In the case of patients with anorexia it has been assumed that the distorted image of body size is flexible and can be altered (Keizer, van Elburg, Helms, & Dijkerman, 2016). VR can constitute an effective tool in modifying permanent body memory (Serino, Pedroli, Keizer, Triberti, Dakanalis, Pallavicini, Chirico, & Riva, 2016). Nevertheless, to increase the chances of success, it is crucial to have patients completely immersed in virtual environments: visually, audially, and interactively (Lozano, Alcañiz, Gil, Moserrat, Juan, Grau, & Varvaró, 2002).

One of the benefits of therapy with the use of virtual reality is that it can be employed even in cases when exposure to situations resembling real life are required, some of which can be difficult to actually conduct in the real world (Ferrer-García, & Gutiérrez-Maldonado, 2012). At the same time, the awareness of the fact that one is immersed in VR, even though the situation seems real, boosts the patients' sense of security.

### Summary

Body image distortions are a significant factor influencing eating disorders. The existing methods of treating eating disorders can include VR, which makes possible intervention into the body image of patients. Research results show that patients who undergo therapy reinforced with VR achieve better results than those participating in therapies not reinforced by it. What is more, the results of therapy are long-lasting. Research results confirm that inclusion of VR in the general eating disorders treatment programme may increase the effectiveness of the therapy (Marco, Perpiñá, & Botella, 2013).

Some of the research employing VR-based environments connected with cognitive behavioural techniques has shown their potential effectiveness in increasing motivation to change, improving self-esteem, counteracting body image distortions, and decreasing binge eating and self-induced vomiting (de Carvalho, de Santana Dias, Duchesne, Nardi, & Appolinario, 2017).

VR allows patients to enter into scenarios simulating real-life settings and to experience eating signals which are known to cause eating behaviour disorders. VR makes it possible to present the patients' bodies and to help them build awareness of the distortion of their body image and, subsequently, to confront and correct the distortions, which results in a more realistic body

image and decreasing the dissatisfaction with body image (Wiederhold, Riva, & Gutiérrez-Maldonado, 2016). On the basis of research it can be stated that virtual reality is an acceptable and promising tool in therapy of eating disorders (Clus, Larsen, Lemey, & Berrouiguet, 2018).

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