VIRTUAL REALITY (VR) ASSISTED OBESITY TREATMENT

AN INNOVATIVE APPROACH

Obesity has become a global epidemic that affects millions of people around the world. According to the World Health Organization, the prevalence of obesity has almost tripled since 1975, and more than 650 million adults were classified as obese in 2016 [1]. This alarming trend has led to increased efforts to develop effective strategies for the prevention and management of obesity. While traditional approaches such as dietary interventions and physical activity continue to be the cornerstone of obesity treatment, innovative technologies such as virtual reality (VR) are emerging as promising tools in the fight against obesity.

This article provides a comprehensive guide for those who want to explore the role of VR technology in the treatment of obesity and how it can be integrated into personalized, sustainable weight management strategies.

In the context of obesity behavior therapy, VR provides a unique opportunity to create immersive experiences that can facilitate behavior change and support weight loss efforts. VR-based interventions can help individuals develop healthier eating habits and overcome the difficulties associated with traditional behavioral therapy methods by taking advantage of the principles of exposure therapy, realistic visualization, and gamification (2). A study conducted showed that the risk of developing depression in obese individuals is higher than in normal weight individuals, and the risk of developing obesity in depressed individuals is higher than in individuals without depression.(3)

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Obesity is associated with depression, but it is also associated with self-esteem and body perception. Because obesity has an effect on increasing the risk of depression, as well as increasing body dissatisfaction and reducing self-esteem. Self-esteem is a person's self-knowledge, realistic assessment, and acceptance and acceptance of himself as he is. It expresses the feelings of love, respect and trust towards the person himself. On the other hand, it is observed that low body esteem and negative body perception coexist in obese individuals (4) Dec.

The success rates of diet programs are very controversial. According to one study, 27% of individuals who maintained their body weight for ≤1 year after the diet quit the diet due to lack of motivation, while individuals who maintained their weight for >1 year quit the diet program by 12%, but needed support for motivation at a high rate in order to maintain the weight they lost for more than 1 year.(5)

THE ROLE OF DIET IN OBESITY

Diet plays a very important role in the management of obesity, it is the oldest known and most common method. Effective dietary interventions aim to create a calorie deficit by reducing energy intake while ensuring adequate nutrition. Various dietary approaches, such as low-fat, low-carbohydrate and Mediterranean diets, have been shown to promote weight loss (6). However, the long-term sustainability of these diets remains a challenge, as individuals often struggle to adhere to strict dietary regimes. Behavioral strategies that focus on portion control, mindful eating, and healthy food choices can help individuals maintain a calorie deficit and achieve sustainable weight loss.

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BEHAVIORAL THERAPIES IN OBESITY

Behavioral therapy is an important component of comprehensive obesity treatment, as it aims to identify and change the thoughts, emotions, and behaviors that contribute to weight gain (7). The principles of behavioral therapy for obesity include self-monitoring, goal setting, stimulus control, Decoupling from high-calorie foods and reinforcement. By tracking their food intake and physical activity, setting realistic weight loss goals, and changing their environment to promote healthy choices, individuals can develop the skills and strategies needed to achieve and maintain a healthy weight.

However, behavioral therapy for obesity also has its challenges. Many people struggle with adhering to behavioral interventions, as it can be difficult to change deeply ingrained habits and cope with environmental triggers. Traditional behavioral therapy approaches are often based on face-to-face sessions with a therapist, which can be time consuming, costly and inaccessible for some people (8) Virtual reality-based interventions offer a promising solution to these challenges by providing an immersive, engaging and accessible platform for providing behavioral therapy for obesity.In addition, traditional psychological support interviews for young people do not attract much interest.

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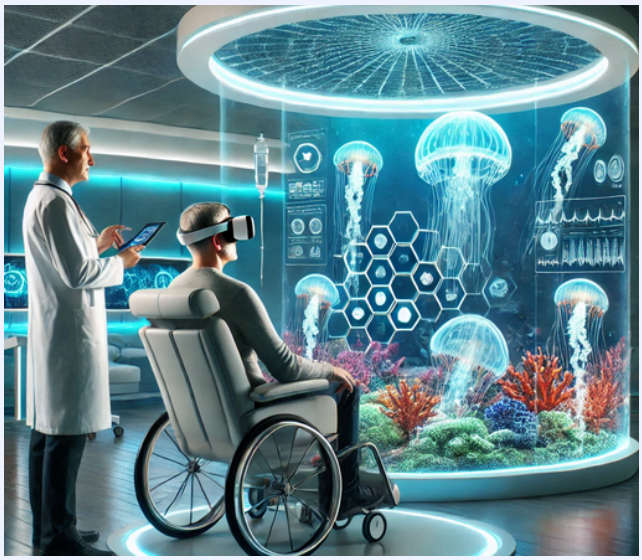
CURRENT MEDICAL APPLICATIONS OF VR THERAPIES

The applications of VR in healthcare are diverse and expanding rapidly. In medical education, VR is being used to train surgeons, allow them to perform complex procedures and develop hand-eye coordination in a risk-free environment. VR is also used in patient rehabilitation, especially in the field of physical therapy, where immersive environments can encourage patients to exercise and improve their range of motion (9)

In the field of mental health, VR shows promise in the treatment of anxiety disorders, phobias and post-traumatic stress disorder (PTSD). Exposure therapy, a common treatment approach for these conditions, can be offered through VR, which allows patients to confront their fears and develop coping strategies in a controlled environment (10). Furthermore, VR is being investigated as a tool for pain management, with studies suggesting that immersive experiences can help distract patients from painful stimuli and reduce their perception of pain (11).



As the field of VR in healthcare continues to develop, it is expected that new applications will emerge that further improve the delivery of personalized, effective and accessible medical interventions.

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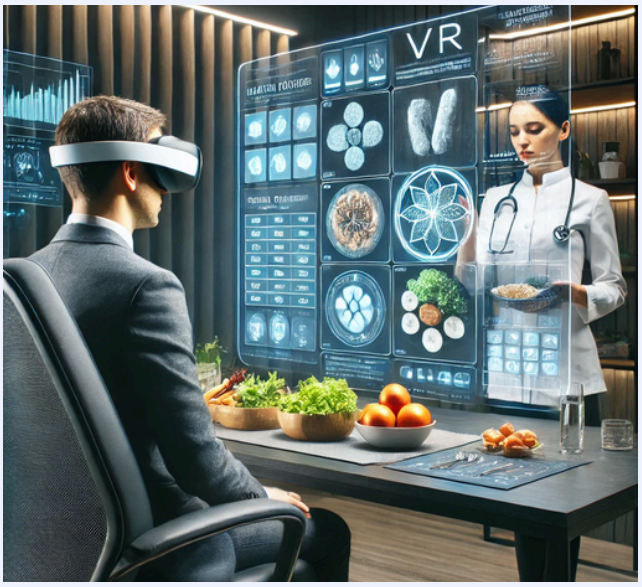

PLANNED DIET CONTROL USING VR

The concept of immersive diet control using virtual reality (VR) is an innovative approach to obesity behavior therapy. The visual shown to the person with VR is perceived as real by the brain at a very high rate. This approach creates an immersive and engaging effect in therapies performed with VR. The basic idea behind immersive diet control is to simulate real-life situations and challenges related to food choices, portion control, and eating behavior, and to allow users to practice and consolidate healthy habits in a safe, controlled environment (12).

- **POTENTIAL MECHANISMS OF ACTION EXPOSURE TO FOOD CRAVINGS**

A potential mechanism of action for VR in obesity behavior therapy is exposure therapy for food cravings. VR interventions can help reduce the intensity and frequency of food cravings by exposing individuals to virtual representations of their trigger food and teaching them coping strategies (13). This approach is similar to the use of exposure therapy in the treatment of anxiety disorders and phobias, in which patients are gradually exposed to feared stimuli in a controlled environment.

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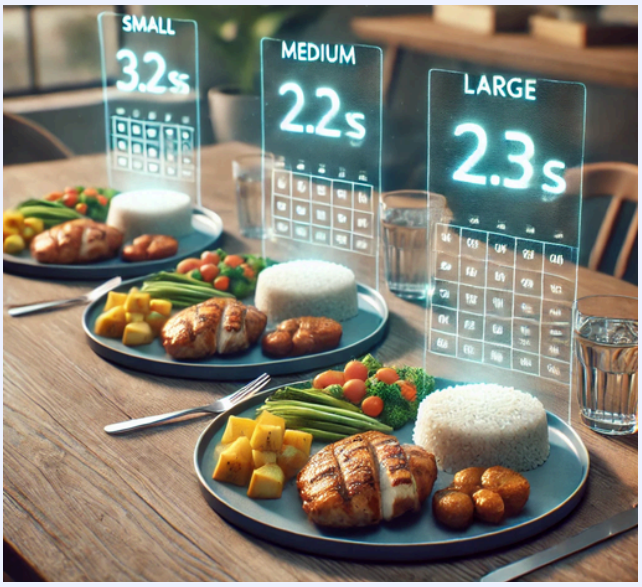

REALISTIC PORTION SIZE VISUALIZATION

Another potential mechanism is the use of VR to provide realistic visualizations of portion sizes. Many people have difficulty understanding and adhering to appropriate portion sizes, which can contribute to overeating and weight gain. VR can create interactive experiences that allow users to practice portion control and develop a better understanding of what constitutes a healthy portion size. By providing visual cues and instant feedback, VR can help individuals make more informed choices about their food intake.

GAMIFICATION OF EATING HABITS

VR also provides an opportunity to gamify healthy eating habits, making the process of adopting and maintaining a healthy diet more engaging and rewarding (14). Users can be motivated to make healthier food choices and stick to weight loss goals by incorporating game design elements such as points, rewards, and challenges into VR-based obesity interventions. Gamification can also further increase the effectiveness of the intervention by providing a sense of achievement and social support.Especially if the young population thinks that the obesity rates are increasing gradually, their participation in such gamified programs will be higher, and the results obtained will be very meaningful for the treatment of future generations.

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- **CREATING A DIGITAL TWIN**

Digital twins of the people participating in the program will be created.The goal here is that the digital twin who follows the necessary rules that adapt to the program will lose weight, look fitter and healthier, so that the person will be encouraged to participate by showing how he will change if he follows the treatment.

✅ Digital twin for general health monitoring
✅ Virtual avatar for personalized diet and fitness plans
✅ Health technologies and data analysis environment

ADVANTAGES OF TRADITIONAL BEHAVIOR THERAPY METHODS

Compared to traditional behavioral therapy methods, VR-based interventions for obesity offer several advantages. Firstly, VR offers a highly immersive and realistic experience that allows individuals to practice and develop healthy habits in an environment that is very similar to real-life situations. (15). Secondly, VR interventions can be accessed remotely, which offers a cost-effective alternative to face-to-face therapy sessions. This may increase the reach and accessibility of obesity behavioral therapy, especially for individuals who face barriers to traditional treatment options. Finally, VR-based interventions can be tailored to individual needs and preferences and offer a personalized approach to obesity management that can improve participation and compliance.

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SOME EXAMPLES WHERE VR TECHNOLOGY IS USED IN OBESITY MANAGEMENT

Several studies have explored the potential of virtual reality (VR) in obesity management and have shown promising results. Gutiérrez-Maldonado et al. (2016) examined the effectiveness of VR-based interventions for the assessment and treatment of eating disorders and obesity. The review found that VR interventions were effective in reducing body dissatisfaction, binge eating, and food cravings, as well as promoting healthier eating habits and weight loss (16).

According to Manzoni et al. (2016) compared the effectiveness of a VR-enhanced cognitive-behavioral therapy (CBT) program for weight loss in obese patients with traditional CBT. The results showed that both groups achieved significant weight loss, but the VR-enhanced CBT group reported greater improvements in body image and self-efficacy (17). These findings show that VR can be a valuable adjunct to traditional obesity treatments, improving their effectiveness and patient outcomes.

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INTEGRATION OF VR TECHNOLOGY INTO OTHER TREATMENT PROGRAMS

Another important aspect is the integration of VR interventions with existing obesity treatment programs. Although VR shows promise as an independent intervention, its effectiveness can be improved when combined with other evidence-based therapies, such as cognitive-behavioral therapy, nutrition education, and the promotion of physical activity (18). To facilitate the integration of VR into comprehensive obesity treatment programs, researchers and clinicians should develop standardized protocols and guidelines for the use of VR in obesity behavior therapy. This will require collaboration between VR developers, endocrine specialists, dietitians and psychologists to ensure that VR interventions are based on established obesity management theories and Deceptions.

Another technical issue that should be considered is the potential for cyber-disease, a type of motion sickness that can occur during VR experiences. Cyber sickness can cause symptoms such as nausea, dizziness and eye strain, which can limit the duration and frequency of VR sessions (19). Researchers and developers should work to minimize these negative effects by optimizing VR content and hardware design.

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As a result,
virtual reality (VR) offers a new and immersive approach to promoting healthy eating habits and weight management.. By leveraging the unique capabilities of VR, such as exposure therapy, realistic portion size visualization, and gamification, researchers and clinicians can create engaging and personalized interventions that address the complex challenges of obesity.

Current research and case studies have demonstrated the potential of VR to reduce food cravings, improve body image and promote weight loss. However, in order to fully realize the potential of VR in obesity behavior therapy, it is necessary to address several challenges, including technical limitations, cost and accessibility, integration with existing treatment programs, and the need for long-term efficacy studies.

As VR technology continues to advance and become more accessible, researchers, clinicians and developers need to collaborate to create innovative, evidence-based VR interventions that can be seamlessly integrated into comprehensive obesity treatment programs. By doing this, we can harness the power of VR to revolutionize obesity behavior therapy and provide individuals with the tools and support they need to achieve lasting weight loss and better health outcomes.

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