

# The Use of Virtual Reality (VR) in the Treatment of Psychological Trauma

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## Abstract

This research reviews the role of Virtual Reality (VR) technology in the treatment of psychological trauma. This technology is considered one of the most advanced therapeutic methods that has proven effective in helping patients cope with Post-Traumatic Stress Disorder (PTSD) and anxiety. VR technology relies on creating realistic simulated environments that allow patients to confront their traumatic memories in a safe and controlled setting, enhancing their ability to cope with those memories and alleviate the psychological impact associated with them. The psychological and social benefits of using this technology are also discussed, including the enhancement of self-confidence and the improvement of social relationships post-treatment.

Additionally, the research addresses several challenges in applying this technology, such as the high cost of some devices and the potential side effects, such as virtual reality-induced dizziness. However, it is expected that this field will see continuous development in the future through device improvements, integration of artificial intelligence, and the expansion of its applications to include a broader range of psychological disorders.

**Keywords:** Virtual Reality (VR), Psychological Trauma, Post-Traumatic Stress Disorder (PTSD), Anxiety Treatment, Exposure Therapy, Mental Health

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Technology, VR Therapy, Artificial Intelligence (AI) Integration, VR-Induced Side Effects.

## Introduction

Psychological trauma is considered one of the most complex issues in the field of mental health, as it can lead to long-lasting psychological and emotional effects, such as PTSD and chronic anxiety, which hinder individuals' lives and affect their daily well-being. With the rapid technological advancements in the past two decades, new techniques have become available to treat these problems more effectively and safely. Among these modern techniques is Virtual Reality (VR), which has gained widespread recognition as a therapeutic tool used in various medical and psychological fields (Real-Sciences, 2019).

Virtual Reality therapy involves creating simulated environments that enable patients to face their fears and deal with their traumatic experiences in a safe and controlled setting. This technology has the ability to reshape patients' memories and help them overcome the effects of trauma through gradual exposure to situations that trigger their anxiety. Recent studies have demonstrated the effectiveness of this technology in treating PTSD, with systematic reviews published in recent years concluding that VR-based exposure therapy for PTSD is at least as effective as current proven therapeutic methods, and even superior in terms of control (Real-Sciences, 2019).

Moreover, a new version of VR therapy known as (3MDR) has been developed, which combines movement and virtual reality experience. In this method, the patient walks on a treadmill while wearing VR glasses, moving toward the triggering stimulus rather than avoiding it. Although this method is still under study, preliminary studies suggest it may yield additional progress beyond traditional therapy (Real-Sciences, 2019).

In recent years, numerous clinical studies have explored the effectiveness of VR as a therapeutic tool for psychological trauma. For instance, a therapeutic VR experience called "game Change" was developed in 2022, aimed at helping individuals with psychosis. It takes patients on virtual visits to everyday environments under the guidance of a virtual coach, allowing them to engage in scenarios such as buying coffee or waiting at a bus stop. Clinical trials have shown this technology to be beneficial even for patients suffering from severe psychosis, leading to significant reductions in avoiding daily situations and the psychological distress associated with them (Al-Quds, 2022).

As VR technology continues to evolve, significant improvements are expected in the future. The technology could be used to develop more complex and realistic therapeutic experiences, as well as to make it more affordable for patients. Additionally, the use of this technology is expected to expand to include a broader range of psychological disorders such as anxiety and depression. However, challenges still exist regarding cost and device availability, as well as the need to train therapists on how to manage these technologies and ensure a safe and effective experience for patients (Hourly Facts, 2025).

Studies indicate that VR technology represents an effective and promising tool in treating psychological trauma, as it provides safe and realistic simulated environments that help patients confront their traumatic memories gradually and safely. Despite challenges related to cost and some side effects, ongoing advancements in this field are enhancing its future applications, making it an exciting option for psychological treatment. Clinical studies also confirm the effectiveness of this approach compared to traditional methods, reinforcing the need for its broader adoption in therapeutic practices (Real-Sciences, 2019; Al-Quds, 2022; Hourly Facts, 2025).

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In this research, I will extensively discuss the role of Virtual Reality in treating psychological trauma, by reviewing the concept of psychological trauma, the key VR techniques used in treatment, and clinical studies evaluating the effectiveness of this technology, with a focus on the challenges and future prospects.

## Chapter 1: The Concept of Psychological Trauma

### 1.1 Definition of Psychological Trauma:

Psychological trauma refers to unusual psychological and emotional responses that occur as a result of exposure to painful experiences or situations that exceed an individual's ability to cope and deal with them. These incidents or experiences can be deeply traumatic and profoundly affect an individual's mental health. Psychological trauma includes a range of experiences such as wars, natural disasters, sexual or physical assaults, serious car accidents, or any other event that poses a severe threat to an individual's life or safety (American Psychiatric Association, 2013).

The modern definition of psychological trauma includes the idea that trauma is not just a transient experience but an event that leaves a long-lasting impact on the body and mind. A person suffering from psychological trauma reacts to the incident in a way that makes it difficult for them to return to their normal psychological state. This experience interferes with the individual's psychological mechanisms, leading to the destruction of their ability to cope with daily situations. Research suggests that psychological trauma can lead to the development of chronic mental disorders such as Post-Traumatic Stress Disorder (PTSD), anxiety, depression, and sleep disorders, limiting the person's ability to lead a healthy and normal life (Brewin, 2011; Van der Kolk, 2014).

Studies show that psychological trauma has a long-term impact on individuals' health. For example, (Dunmore et al., 2013) demonstrated that individuals suffering

from PTSD often experience chronic anxiety, which can significantly affect their daily lives.

### Common Symptoms of Psychological Trauma:

- **Re-experiencing traumatic events (Flashbacks):** People suffering from PTSD can relive the traumatic experience. This type of emotional disturbance involves re-experiencing the traumatic events in a distorted way, which may create a feeling that the person is reliving the event in reality. According to (Brewin, 2011), these moments can be extremely painful and lead to emotional breakdowns.
- **Nightmares and sleep disturbances:** Many researchers note that nightmares and anxiety during sleep are among the key psychological signs of trauma. In (Van der Kolk, 2014), it was found that people exposed to complex trauma often suffer from severe sleep disturbances, exacerbating their psychological problems.
- **Avoidance of places or people related to the trauma:** People with psychological trauma often develop tendencies to avoid triggers that remind them of the event, whether they are specific places or people associated with that experience. This is known as preventive behavior, which is an adaptive strategy to avoid situations that may evoke painful memories.
- **Persistent anxiety and tension:** Chronic anxiety is one of the prominent symptoms of psychological trauma. Individuals with trauma experience constant tension and anxiety due to the fear of reliving the traumatic event. (Dunmore et al., 2013) showed that these individuals have difficulty relaxing, leading to long-term effects on their mental and physical health.
- **Exaggerated emotional responses:** Individuals may show intense emotional reactions that are disproportionate to daily situations. For example, a person



suffering from trauma may exhibit strong reactions to simple events, such as intense anger or feelings of hopelessness.

## 1.2 Types of Psychological Trauma:

According to (Van der Kolk, 2014), psychological trauma can be classified into various types based on the nature of the event and its frequency of occurrence, each of which can leave long-lasting psychological effects on the individual. Based on this classification, we will present the types of psychological trauma in detail, incorporating recent research.

### 1. Individual Trauma:

Individual trauma occurs when a person faces a traumatic incident or experience that happens individually, such as sexual or physical assault, serious car accidents, or a life-threatening diagnosis. (Ozer et al., 2003) indicated that individual trauma, especially those occurring suddenly, may lead to PTSD. In such cases, the person struggles to eliminate painful memories, and their daily life becomes distorted due to these memories. Moreover, (Lahav, 2016) explained that individuals suffering from individual trauma are more prone to depression and severe anxiety, with these emotions arising as a physiological response to sudden incidents.

### 2. Collective Trauma:

Collective trauma occurs when a community or a group of people experiences a traumatic event affecting many people at the same time. Such traumas include wars, terrorist attacks, natural disasters, or major humanitarian crises. Collective trauma affects individuals on a social and psychological level, where people face collective psychological crises, such as losing hope or feeling helpless. (Murray et al., 2017) showed that collective trauma leads to

significant changes in the mental health of affected communities. In (Wang et al., 2020), research focused on the impact of natural disasters such as earthquakes and floods on the mental health of local communities, finding that affected individuals suffer from elevated levels of PTSD, along with anxiety and depression due to the loss of social and economic security.

### 3. **Complex Trauma:**

Complex trauma refers to trauma resulting from continuous exposure to painful situations, such as domestic violence, repeated sexual assaults, or ongoing psychological abuse in childhood. Complex trauma is characterized by long-term effects that lead to deep changes in the individual's personality, including loss of trust in others, feelings of helplessness, and destruction of the ability to form healthy emotional relationships. According to (Ford & Courtois, 2013), complex trauma can lead to the development of multiple mental disorders, such as personality disorders, chronic anxiety, and depression. (Herman, 2015) found that individuals suffering from complex trauma often develop a sense of emotional disconnection from the world, limiting their ability to interact socially and form sustainable emotional relationships.

### **Neurobiological Effects of Psychological Trauma:**

Psychological trauma not only affects an individual's mental and emotional health but also extends its effects to profound neurobiological changes in the brain. These neurobiological changes help explain why individuals who have been exposed to trauma continue to suffer from issues like anxiety, stress, and depression. Many recent neurobiological studies have shown that exposure to trauma can lead to structural and functional changes in the brain, impacting how individuals process daily situations and respond to emotional and social events.

One of the pioneering studies in this field is (Teicher et al., 2016), which highlighted the neurobiological changes that occur in the brain due to continuous exposure to trauma, especially during childhood. This study indicated that repeated exposure to abuse, such as domestic violence or sexual assault, can result in structural changes in brain regions linked to memory and emotional interactions, such as the amygdala and prefrontal cortex.

- The **Amygdala** is a key brain area involved in processing emotions and responding to emotional situations. When individuals are exposed to psychological trauma, the amygdala becomes significantly more active. This change in neural activity may contribute to increased levels of anxiety and stress and can lead to exaggerated responses to daily events, reflecting difficulty in adapting to social situations. For individuals who experienced abuse during childhood, the effect on the amygdala is more pronounced, making this area more sensitive to emotional triggers, which contributes to a cycle of excessive responses to potential threats (Teicher et al., 2016).
- The **Prefrontal Cortex**, which plays a vital role in functions such as decision-making, emotional regulation, and planning, has shown to be impaired in individuals exposed to psychological trauma. (Gold et al., 2016) found that the prefrontal cortex in individuals exposed to trauma shows reduced activity, making it difficult for them to regulate their emotions and control their behavior effectively. This indicates that individuals with a history of trauma may struggle to control their reactions, such as anger or anxiety, in everyday situations.

In addition to structural changes, psychological trauma can affect the neural connections between different brain regions. (Lanius et al., 2010) showed that individuals who experienced severe trauma may suffer from a “disconnect” between the amygdala and the prefrontal cortex, meaning that their emotional responses may



be unbalanced with their ability to think rationally and control their emotions. This neurobiological change could explain why individuals suffering from trauma have difficulty making rational decisions or controlling their emotions in life situations.

The ongoing neurobiological effects of psychological trauma may also contribute to the activation of the body's stress system, which releases hormones like adrenaline and cortisol in response to threats. Continuous exposure to stress due to trauma leads to a sustained increase in these hormones, contributing to heightened feelings of anxiety and constant fear. According to (McEwen, 2013), this ongoing interaction may result in changes in the amounts of neurotransmitters produced in the brain, such as serotonin and dopamine, which affect overall mood and behavior.

## **Chapter Two: Virtual Reality Technology**

### **2.1 The Concept of Virtual Reality:**

Virtual Reality (VR) is a modern technology that uses computers to create three-dimensional simulated environments, allowing the user to interact with them in a way that feels as if they are part of it. These virtual environments are accessed through VR headsets and other devices, such as haptic gloves, which enable the user to interact with the digital environment more realistically (Slater, 2018).

The goal of virtual reality is to provide an "immersive" experience, where the user feels as if they are in a completely different environment. This helps to create isolated environments that offer new opportunities for interacting with the surrounding world or experiencing things that might be impossible in real life. This technology has gained importance in therapeutic applications, particularly in psychotherapy, where it is widely used to treat disorders like Post-Traumatic Stress Disorder (PTSD) by exposing patients to simulated versions of the traumas they experienced (Rothbaum et al., 2001; Freeman et al., 2017).

## 2.2 Types of Virtual Reality:

According to Milgram & Kishino (1994), virtual reality technologies can be classified into several main types based on the degree of interaction and user immersion in the virtual environment. The main types are:

- **Immersive Virtual Reality (Immersive VR):** In immersive virtual reality, the user is placed into a virtual environment where they feel as if they are entirely inside this digital world. This is achieved through devices like VR headsets that cover the eyes and display a three-dimensional environment. Additionally, motion-tracking devices or haptic gloves can allow the user to physically interact with digital objects. A study by Rothbaum et al. (2001) showed that this virtual environment can help treat patients suffering from PTSD by simulating traumatic events in a safe environment, allowing patients to gradually and safely confront their painful memories. Another study by Freeman et al. (2017) demonstrated that immersive VR has a positive impact on treating social anxiety by exposing patients to simulated social situations, which helps improve their ability to handle real-life social situations.

- **Augmented Reality (AR):** Augmented reality differs from virtual reality in that it does not fully immerse the user in a virtual environment but rather integrates digital elements into the real world. Using technologies such as cameras on smartphones or smart glasses, AR overlays virtual objects onto the real-world scene that the user sees.

In the medical field, AR is used to assist surgeons in complex procedures by displaying additional information about tissues or organs during surgery (Billinghurst et al., 2015).

- **Mixed Reality (MR):** Mixed reality combines elements of both virtual reality and augmented reality, where digital objects are interactively integrated into the physical world. In other words, users can interact with virtual environments in a manner similar to how they interact with the real world.

Mixed reality enables immersive experiences where virtual objects interact with real-world objects, providing more dynamic and interactive experiences. In education, for example, students can use mixed reality to explore scientific or historical concepts by interacting with virtual content embedded in the real world (Dunleavy et al., 2010).

## **Chapter Three: The Use of Virtual Reality in Treating Psychological Trauma**

### **3.1 Exposure Therapy and Its Role in Treating Trauma:**

Exposure therapy is a psychological treatment approach primarily used to treat Post-Traumatic Stress Disorder (PTSD). It involves gradually exposing the patient to stimuli or situations that cause anxiety or remind them of the traumatic events they have experienced. This treatment is conducted in a safe environment under the supervision of specialists, aiming to help the patient confront their traumatic memories and painful experiences in a controlled manner. Foa and Kozak (1986) pointed out that exposure therapy works by gradually reconditioning the patient's response to traumatic stimuli, which helps reduce the anxiety and tension caused by these triggers.

Exposure therapy is effective in enhancing the patient's ability to face situations that previously caused them trauma, thereby reducing fear and anxiety responses associated with these painful memories. It also helps reduce the need for avoidance, a common behavior among individuals with PTSD, which interferes with daily life and contributes to worsening psychological symptoms. Furthermore, a study by Rothbaum et al. (2001) indicated that exposure therapy enhances individuals' ability to interact with their environment normally, which improves their quality of life.

However, exposure therapy can be extremely challenging, especially when the triggers involve major or highly impactful incidents. In some cases, patients may

struggle to face these triggers gradually, which has prompted researchers in the medical and psychological fields to explore new, more interactive techniques to ease this process, such as the use of virtual reality. Virtual reality technologies provide safe simulated environments, making it easier for patients to face and manage traumatic memories without the fear of real danger. Rizzo et al. (2017) confirmed that using virtual reality in therapy helps patients undergo a realistic exposure experience within a controlled, safe environment, significantly reducing symptoms and leading to better outcomes in treating PTSD.

### **3.2 The Role of Virtual Reality in Exposure Therapy:**

Virtual reality is an innovative technological tool that can be used effectively in psychotherapy, particularly in treating PTSD. By simulating real environments or distressing scenes, virtual reality provides a safe space for patients to face the traumatic stimuli that cause their anxiety, while allowing specialists to maintain complete control over the level of exposure. This technology contributes to creating a realistic environment where patients can interact with events safely, providing them the opportunity to confront traumatic memories gradually and without experiencing real-world risks. In a virtual reality environment, the patient can undergo a realistic experience without the concern of the negative real-life effects of distressing situations (Fodor et al., 2018).

A study by Rizzo et al. (2017) demonstrated that using virtual reality in therapy had a positive impact on patients with PTSD, with symptoms reduced by 40% after several treatment sessions. In this study, combat environments were simulated in virtual reality for veterans who had experienced psychological trauma due to their participation in wars. These simulations allowed the participants to experience environments similar to those they had encountered in real life, enabling them to face their traumas in a controlled environment. This helped reduce their negative

emotional responses to the events, allowing them to gradually re-engage with the memories in a safe and controlled manner (Rizzo et al., 2017).

Furthermore, virtual reality offers varied environments tailored to the specific needs of each patient, such as simulations of natural disasters or traffic accidents. These customized environments help make therapy more personalized, reflecting the real-life experiences of the patient. Consequently, virtual reality enables therapy to adapt more effectively to different trauma cases. Through this technique, patients can gradually and increasingly interact with distressing stimuli, helping retrain the brain to process these memories with less emotional impact. As patients face these triggers incrementally, they acquire tools and techniques to control their emotions, which enhances the psychological recovery process (Maples-Keller et al., 2017).

### 3.3 Virtual Reality Therapy Techniques:

Virtual reality is used in psychotherapy through a variety of therapeutic techniques specifically designed to treat PTSD. Some of these methods include:

- **Re-experiencing:** In this technique, patients gradually confront traumatic memories in a safe environment. They are presented with virtual situations that resemble the events they experienced in real life, allowing them to respond to these memories more calmly. Through this process, the patient learns how to manage their emotions toward painful memories, and their emotional reaction to these memories diminishes over time. This technique relies on the principle of gradually repeated exposure to the traumatic memories, so that the patient is exposed to them in stages. The treatment starts with less stressful situations compared to the original memories, and as therapy progresses, the intensity of the situations is gradually increased. Rothbaum et al. (2001) showed that this technique can improve patients' ability to cope with painful memories by reducing their negative emotional responses.



• **Gradual Exposure:** This is one of the fundamental methods used in exposure therapy, where the patient begins with lower levels of traumatic stimuli, which may be less explicit scenes or indirect reminders. As the therapy progresses, the stimuli are gradually increased, allowing the patient to interact progressively with the traumatic memories without becoming overwhelmed. This method provides individuals with severe trauma the opportunity to face the distressing memories without causing a sudden increase in their stress levels. Foa and Kozak (1986) emphasized that this technique helps patients reduce the anxiety caused by painful memories and is especially effective when dealing with severe trauma.

• **Relaxation Training:** In this technique, virtual environments that are calm and soothing are used to encourage patients to learn relaxation techniques, such as deep breathing and meditation, to help them manage their emotional reactions. These methods aim to reduce tension and anxiety while interacting with traumatic stimuli, enhancing the patient's ability to face painful events more safely. According to a study by Maples-Keller et al. (2017), combining relaxation with exposure therapy significantly improved treatment outcomes, as patients were better able to cope with painful memories and reduce the anxiety resulting from them. One of the benefits of relaxation training in virtual reality is the ability to create neutral virtual environments that patients can use at any time as a means of relaxation and stress relief, helping them improve their ability to interact with distressing stimuli gradually.

### 3.4 Future Applications of Virtual Reality in Treating Trauma:

Modern technologies, such as virtual reality, are among the most important tools that can be used for long-term psychological trauma treatment. With the continuous advancement in virtual reality technology, it is expected that these tools will become more interactive and realistic, contributing to making therapy more personalized to the needs of patients. According to a study by Slater et al. (2021), integrating

advanced virtual reality technologies will enable the creation of more interactive environments, allowing patients to undergo therapeutic experiences that are closer to real-life scenarios.

In the future, applications are expected to include Mixed Reality (MR), which combines real-world interaction with virtual elements. This technology will provide more interactive and realistic environments, accelerating the recovery process, especially in the gradual exposure of traumatic situations. Mixed reality allows for the provision of real-life-like experiences that support recovery, as real-world stimuli can be harmoniously integrated with virtual simulations (Bailenson et al., 2020).

It is also expected that technologies such as artificial intelligence will be integrated into virtual reality environment design. These technologies will allow for better customization of simulations according to each patient's needs, thereby improving treatment effectiveness. By analyzing the data collected during sessions, artificial intelligence can customize and adjust the therapeutic experience automatically based on the patient's progress (Yin et al., 2022). This personalization will provide a more accurate and patient-aligned therapeutic environment.

Additionally, advanced relaxation techniques such as guided meditation and therapeutic music may be integrated to provide comprehensive therapeutic environments. Combining these methods with virtual reality will help patients manage stress and anxiety resulting from traumatic memories more effectively. Maples-Keller et al. (2017) confirmed that combining relaxation techniques with exposure therapy could enhance treatment outcomes and reduce the symptoms resulting from psychological trauma.

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## Chapter 4: Clinical Studies on the Effectiveness of Using Virtual Reality

### 4.1 Research and Studies:

Research indicates that virtual reality therapy is an effective tool in reducing symptoms of psychological trauma, especially in the treatment of Post-Traumatic Stress Disorder (PTSD). One of the prominent studies conducted by Difede and Hoffman (2002) compared virtual reality therapy with traditional therapy for PTSD patients. The study showed that virtual reality was more effective in addressing trauma-related symptoms. Virtual environments were presented that simulated traumatic events patients had experienced in the past, allowing participants to interact with these memories gradually in a safe environment under the supervision of specialists. This led to a reduction in negative emotional responses associated with these memories. Subsequent studies supported these findings, showing that virtual reality can help reduce debilitating symptoms such as anxiety, depression, and nightmares associated with PTSD (Hertlein & Blanchard, 2019).

### 4.2 Clinical Study Results:

- **Significant improvement in symptoms:** Many studies have shown that patients who underwent virtual reality therapy experienced a significant reduction in anxiety and depression levels. Botella et al. (2015) demonstrated in their study that patients who were exposed to simulations of environments similar to their traumatic experiences showed significant improvements in anxiety and depression-related symptoms after several sessions of virtual reality therapy. Simulated environments were created to mimic wars, accidents, or natural disasters, allowing patients to gradually confront these traumatic memories. The results showed a decrease in negative emotional responses and an increase in psychological adjustment to these situations.

Additionally, a study by Maples-Keller et al. (2017) indicated that patients who underwent virtual reality therapy for PTSD exhibited a marked reduction in acute symptoms and improvement in their overall condition after several sessions.

- **Increased acceptance of therapy:** Research indicated that patients were more willing to engage in virtual reality therapy compared to traditional treatments, as confirmed by Rizzo et al. (2017). Their study showed that the virtual reality environment provided a safe space for patients to confront traumatic memories in a controlled manner, making them feel more comfortable compared to traditional methods such as exposure therapy. Freeman et al. (2017) added that this technique creates an emotionally non-threatening environment, which enhances patients' acceptance of therapy and increases their willingness to participate.
- **Long-term results:** Interestingly, the improvement resulting from virtual reality therapy persisted for extended periods after the therapy sessions concluded, according to a study by Botella et al. (2015). The results showed that patients who underwent virtual reality therapy maintained stable improvement in symptoms several months after completing their therapy sessions. This suggests that virtual reality may have a long-lasting positive impact on improving patients' mental health, continuing to provide benefits after the therapy ends, especially in reducing anxiety and ongoing psychological stress. Additionally, other studies have shown that virtual reality can help prevent psychological relapses by repeating therapeutic experiences in safe environments, allowing patients to gradually deal with their traumatic memories more effectively over time (Freeman et al., 2017).

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## Chapter 5: Challenges and Future Prospects

### 5.1 Challenges Associated with Using Virtual Reality:

Despite the substantial benefits offered by virtual reality technology in the treatment of PTSD, its use is not without some technical, psychological, and economic challenges that may limit the effectiveness of this technology in therapeutic settings. Some of the most prominent challenges include:

- **High costs:** Virtual reality devices, such as VR headsets and high-performance computers needed to run them, are still considered expensive technologies. This represents a significant barrier to the widespread application of this technology, especially in therapeutic institutions that may struggle to provide these tools regularly. The high costs of these devices may limit access to this advanced treatment for many patients. Furthermore, costs increase when including the specialized software required to create customized environmental simulations for patients, further increasing the financial burden (Parsons & Rizzo, 2008).
- **Side effects:** Despite the numerous benefits, side effects are considered one of the challenges that may hinder the effective use of virtual reality. Some patients experience motion sickness or nausea while using VR headsets, a condition known as "virtual reality sickness." This occurs due to a mismatch between visual expectations in the simulation and the sensory signals sent by the body, leading to confusion for patients. Parsons & Rizzo (2008) noted that this symptom could negatively impact some patients' ability to endure the therapy, limiting their ability to interact with the virtual environment.
- **Technical challenges:** Technical challenges include simulation accuracy and control over the experiences. Although virtual reality technologies are rapidly advancing, virtual environments sometimes lack the realism required to



provide an effective therapeutic experience. The simulation may not be able to accurately represent the real-life experiences patients have gone through, which limits their ability to face painful memories. Additionally, some simulations have limitations in diversity, making it difficult to treat various cases such as PTSD resulting from different traumatic experiences.

## 5.2 Future Developments:

Despite the challenges associated with using virtual reality in the treatment of psychological trauma disorders, significant developments are expected in the future of therapeutic technologies, enhancing the effectiveness of this technique. Some of the most notable developments include:

- **Artificial Intelligence (AI) in customizing therapy:** AI is expected to play a key role in improving the effectiveness of virtual reality therapy. By analyzing patient data and behaviors in the simulation, AI techniques can personalize therapy to suit each patient's specific needs. Gorini et al. (2010) noted that AI will enable real-time analysis of patients' emotional responses, allowing for the customization of therapeutic environments based on the patient's psychological reactions. This type of personalization helps increase the effectiveness of therapy and allows specialists to adjust the therapeutic experience based on each patient's progress.
- **Mixed Reality (MR):** The future is likely to see the emergence of mixed reality technologies that combine virtual reality with augmented reality. These technologies will blend virtual elements with the patient's real environment, offering more interactive and realistic environments. Such applications can enhance the real interaction with traumatic situations in an integrated environment, allowing patients to experience the realistic effects of events they have gone through without the need for real-life exposure to risks. Direct interaction with the real environment, enhanced with additional virtual

elements, will strengthen patients' ability to confront psychological trauma in a more interactive and realistic environment, accelerating the recovery process.

- **Improved devices and software:** Devices and software used in virtual reality therapy are expected to be developed and improved to become more accurate and realistic, with decreasing costs over time. Freeman et al. (2017) reported that improving VR devices will contribute to greater accessibility of this technology in therapeutic institutions and hospitals. Improving software will allow for better environmental simulations that are more compatible with different psychological conditions, making therapy more effective and achieving better results in dealing with PTSD.
- **Personalized training and digital follow-up:** Therapeutic digital applications are also expected to be integrated into virtual reality to allow patients to undergo therapy sessions in their homes or in comfortable and familiar environments. This type of technology enables patients to interact with advanced therapeutic environments without the need to visit therapy centers. Furthermore, these applications will assist in tracking the progress of therapy using digital data, enhancing the effectiveness of treatment and ensuring more accurate follow-up. Freeman et al. (2017) noted that these applications provide continuous support and enable patients to continue therapy throughout the day, which enhances the continuity of therapy and improves psychological outcomes.

## Chapter 6: Psychological and Social Effects of Virtual Reality Technology in Treating Psychological Trauma

### 6.1 Psychological Effects of Using Virtual Reality Technology:

Using virtual reality (VR) technology in treating psychological trauma is a recent and effective development that helps improve patients' psychological condition in various ways. The role of this technology lies in providing a safe simulated environment that helps patients confront traumatic memories in an organized and gradual manner. Among the key positive psychological effects of using virtual reality technology are:

- **Reducing anxiety and stress:** By gradually exposing patients to simulated situations resembling the experiences that caused them trauma in a controllable virtual environment, VR helps reduce anxiety and stress. According to a study by Maples-Keller et al. (2017), gradual exposure to frightening or anxiety-inducing situations in a virtual environment contributes to reducing the stress levels caused by recalling traumatic memories in a safer manner compared to traditional therapy.
- **Enhancing positive emotional responses:** Virtual reality enables patients to confront traumatic triggers gradually, enhancing their ability to interact with these triggers over time. Instead of avoiding these situations, patients learn how to control their emotional responses, leading to improved overall mood and reduced emotional stress associated with these memories. A study by Freeman et al. (2017) showed that patients who underwent virtual reality therapy demonstrated significant improvements in managing their emotional responses and adapting to painful memories.
- **Rebuilding self-confidence:** Virtual reality allows patients to deal with life-like situations in a safe environment, helping them restore their self-

confidence. This improvement in self-confidence enhances their ability to return to normal life and overcome the negative effects of trauma. A study by Rizzo et al. (2017) demonstrated that patients who underwent virtual reality therapy were able to regain much of their ability to face anxiety-inducing situations without experiencing severe fear or social withdrawal.

### 6.2 Social Effects of Using Virtual Reality Technology:

The effects of virtual reality technology also extend to the social aspect of patients. The psychological improvement experienced by individuals undergoing this therapy directly impacts their social relationships and how they interact with others. Some important social effects include:

- **Improving social relationships:** Patients who suffer from psychological trauma often tend to isolate themselves and avoid social situations. With the use of virtual reality technology, they can confront traumatic memories that previously hindered their social interactions, leading to improved relationships with others. A study by Botella et al. (2015) found that patients who underwent virtual reality therapy demonstrated increased ability to interact socially and improved their relationships with friends and family, with a reduction in feelings of isolation and withdrawal.
- **Social reintegration and re-adaptation to society:** After virtual reality therapy sessions, many patients are able to gradually return to their social lives. This improvement enhances their ability to participate in social activities they had avoided due to fear or anxiety. A study by Hertlein & Blanchard (2019) showed that patients who underwent trauma therapy using virtual reality were more capable of reintegrating into society and returning to their usual social activities, reflecting the positive impact of therapy on their interaction with the social environment.

### 6.3 Challenges in Social Adaptation After Virtual Reality Therapy:

Despite the improvements experienced by individuals undergoing virtual reality therapy, some patients may face challenges after the therapy when trying to adapt to real-life situations:

- **Adapting to real-life situations:** Some patients find it difficult to transition from the controlled virtual environment to the real world, which requires them to confront situations directly. Virtual simulations offer situations that can be controlled, but in real life, control is not always available. This transition can be challenging for some patients who may need more time to adjust to real-world variables.
- **Social and family support:** Patients need ongoing support from family and society after completing virtual reality therapy to ensure continued progress and improvement. Freeman et al. (2017) noted that social and family support plays a crucial role in enhancing adaptation after therapy, as emotional support and participation help patients overcome the social difficulties they may face.

**Challenges related to social expectations:** Patients who have undergone virtual reality therapy may experience social pressure resulting from unrealistic expectations from those around them. Once patients show psychological improvement, those close to them may expect a full return to their previous lives, not realizing that the process requires time and

### Conclusion

This research addressed the role of Virtual Reality (VR) technology as a modern and effective therapeutic tool for treating psychological trauma. By reviewing the psychological and social effects of using this technology and the clinical studies that confirmed its effectiveness, it becomes evident that virtual reality significantly contributes to improving the condition of patients suffering from Post-Traumatic



Stress Disorder (PTSD) and other trauma-related disorders. Research has shown that VR therapy can provide a safe environment that helps patients confront their traumatic memories gradually and in a controlled manner, reducing stress and anxiety levels while enhancing patients' self-confidence.

The challenges associated with the application of this technology were also discussed, including the high cost of certain devices and potential side effects such as virtual reality sickness. However, continuous technological advancements and the development of new tools, such as artificial intelligence and mixed reality, are expected to enhance the effectiveness of VR therapy and allow for its broader application in the future.

In conclusion, virtual reality is a promising tool for improving mental health, but further research is needed to develop and expand the use of this technology and ensure its accessibility to a larger patient population. Additionally, psychological and social support must be provided to patients after completing therapy to ensure full adaptation to daily life.

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