

A Case Study on the Use of Hypnosis Combined with Virtual Reality in Psychological Partner Violence

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Abstract—This case study investigated the application of hypnosis and Virtual Reality (VR) using the Meta Quest headset, aimed at alleviating psychological partner violence mental health consequences. The subject of the study was a 56-year-old woman, originally from Mauritius, who has been residing in Italy for the past 33 years. The study employed a series of hypnosis and VR sessions, with the subject demonstrating a high susceptibility to hypnotic induction and a positive response to VR. Despite occasional distractions, she maintained a state of relaxation throughout the sessions. The VR applications used were “Nature Trecks”, “Liminal”, and “Cosmic Flow”. The use of the Meta Quest headset provided an immersive and realistic experience for the patient, showcasing the potential of health informatics in therapeutic contexts. However, the study found that the subject’s condition did not significantly improve. She continues to grapple with anxiety, disappointment, and sleep disorders, and her family situation remains challenging. Despite these hurdles, the subject consistently expressed a strong desire to use VR, which provided her with moments of tranquility. This suggests that hypnosis and VR could offer some degree of emotional stress relief, even if they cannot resolve the underlying issues. In conclusion, this case study offers valuable insights into the potential of hypnosis and VR as therapeutic tools for domestic discomfort and mental health issues. It underscores the need for further research to fully explore the long-term potential of these approaches.

Keywords—hypnosis, virtual reality, domestic discomfort, trauma therapy, oculus quest

I. INTRODUCTION

The employment of hypnosis specifically for post-traumatic stress disorders (PTSDs) has a long history: it was seen that it can help patients with this condition by providing controlled access to dissociated traumatic memories and promoting positive restructuring of those memories, reducing intrusive recollections [1]. Recent meta-analytic evidence supports the efficacy of clinical hypnosis in treating a range of mental and somatic health issues [2]. Hypnosis has been particularly effective in patients undergoing medical procedures and in patients with pain [2]. The vast majority of outcomes demonstrated positive effects, with over half exhibiting at least a medium effect size [2]. Also, self-hypnosis was seen to be a rapid, cost-effective, nonaddictive, and safe alternative to medication for

treating anxiety-related conditions, with promising results for state anxiety and anxiety-related disorders [3]. This suggests that hypnosis can positively impact various mental and somatic treatment outcomes, providing a valuable tool for stress management and mental health treatment [2].

Virtual Reality (VR) is another innovative intervention that has been increasingly used in mental health treatment. VR environments create immersive simulations of real-world environments, allowing patients to safely experience and overcome situations they would normally find challenging [4]. This technology has been used to tackle psychological conditions such as social anxiety and a variety of phobias [5]. Furthermore, VR relaxation has been identified as a potential low-intensity intervention to promote relaxation and reduce stress for adults with mental health conditions, especially anxiety and stress-related problems [6].

A. Combination of Hypnosis and Virtual Reality

Virtual reality brain-rewiring techniques have been shown to effectively improve metacognitive skills for individuals with various disorders, including learning disabilities, cognitive impairments, autism, attention deficit hyperactivity disorder (ADHD), depression, and anxiety [7]. This highlights the potential of VR as a powerful tool in cognitive rehabilitation and mental health treatment. In the realm of pain management, Virtual Reality Hypnosis (VRH) has demonstrated significant efficacy. Studies have shown that VRH can significantly reduce pain intensity, unpleasantness, and anxiety [8]. For instance, VRH was effectively used to reduce pain and anxiety in a patient with a severe burn injury, thereby improving wound care [9]. Furthermore, VRH has been found to be a useful and accessible tool for pain management, reducing the time and effort required for hypnosis delivery and improving patient engagement [10]. The Virtual Magic Glove (VMG), which combines Ericksonian hypnosis and VR, exemplifies the innovative applications of VRH. The VMG creates co-creative, immersive, personalized, and effective therapeutic experiences, thereby enhancing the therapeutic alliance between the thera-

pist and the patient [11]. Despite these promising findings, the long-term effects of VRH remain unclear. For instance, while VRH effectively reduced chronic neuropathic pain intensity and unpleasantness in a patient, the long-term pain reduction remains to be determined [12].

The primary aim of this case study is to explore the potential benefits of using a combination of hypnosis and VR as a therapeutic intervention for individuals experiencing significant psychological partner violence and mental health issues, including anxiety and depressive tendencies. Specifically, the study seeks to investigate the efficacy of hypnosis and VR, delivered via the Meta Quest headset, in promoting relaxation and tranquility in the subject. It also aims to assess the impact of this intervention on the subject's anxiety and depressive symptoms, as well as her overall mental well-being. The study also aims to explore the subject's perceptions and experiences of using VR as a form of therapy. Finally, the study seeks to understand the potential long-term effects of this intervention on the subject's mental health and domestic situation.

II. METHODOLOGY

A. Study Design

This case study employed a mixed-methods approach, combining qualitative and quantitative data collection and analysis techniques. The study design involved clinical interviews, psychological testing, hypnosis, and VR intervention sessions to assess the impact of hypnosis and VR on the patient's mental health. The study consisted of eight sessions, with the first two sessions dedicated to clinical interviews and baseline testing administration. Sessions three and four focused solely on testing hypnosis induction, while sessions five through seven employed both hypnosis and VR interventions. In session eight, diagnostic tests were re-administered to evaluate post-treatment symptomatology. The VR intervention sessions were conducted using a head-mounted display (HMD) and VR applications. The patient was guided through a series of VR environments to evaluate their impact on her psychological state. The sessions were designed to induce relaxation and provide a sense of immersion and distraction.



Fig. 1. An illustrative screenshot from the “Cosmic Flow” application.

B. Participant

The patient is a 56-year-old female originally from Mauritius, residing in Italy for the past 33 years. She has a 37-year-old daughter who lives in Mauritius and a 15-year-old son from her second husband, who lives with her in Italy. The patient's current family situation is characterized by ongoing conflicts and stagnation, causing her significant distress. She has been experiencing difficulties in her relationship with her husband, including infidelity and physical and psychological violence. Additionally, she reports a history of postpartum depression after the birth of her son, who was born prematurely and weighed only 1 kilogram. The patient has not had any sexual relations with her husband for the past four years. She voluntarily sought psychological treatment for symptoms of anxiety and depression. She provided informed consent and agreed to participate in the hypnosis and VR intervention sessions as part of her therapeutic process.

C. Virtual Reality Headset and Applications

The first edition of the Oculus Quest, also referred to as the Meta Quest headset, was utilized as a tool for delivering the VR interventions. This technology was chosen for its ability to provide an immersive and realistic VR experience, which is crucial for the effective application of hypnosis in a VR setting. The headset was used to display a series of VR applications, namely “Nature Treks”, “Liminal”, and “Cosmic Flow”, throughout the hypnosis sessions.

These applications were selected for their potential to facilitate relaxation and promote a positive response to the VR environment. “Nature Treks” offers serene and picturesque landscapes that help induce calmness and reduce stress. “Liminal” uses a combination of immersive visuals and soundscapes designed to evoke specific emotional responses, supporting deeper states of relaxation and receptiveness. “Cosmic Flow” provides soothing, meditative experiences with visual and auditory elements that guide users into a tranquil and introspective state. The carefully chosen VR applications enhance the therapeutic environment, making the hypnotic process more engaging and effective [13]. Screenshots of “Cosmic Flow” and “Nature Treks” apps can be seen in Figures 1 and 2.



Fig. 2. A visual capture from the “Nature Treks” application.

D. Hypnosis Induction

The patient was comfortably seated in an armchair to promote relaxation. The session began with autogenic training, focusing on various parts of the body in sync with the patient's breathing rhythm, which gradually became more regular and deep. This method encouraged sensations of warmth and heaviness in the limbs and progressive muscle relaxation. To deepen the state of consciousness, a countdown was employed, counting down from a higher number (e.g., 10 to 1) with each count enhancing the sense of relaxation. Visualizations and affirmations accompanied this process, guiding the patient into a deeper, more relaxed state. Once in this deeper state, the therapist communicated with the patient's subconscious to address psychological discomfort. Techniques such as direct suggestion, age regression, guided imagery, and symbolic interaction were used to explore and alleviate underlying issues. To conclude the session, another countdown, counting up from 1 to a higher number (e.g., 1 to 10), was conducted. Each count brought the patient closer to alertness and normalcy, ensuring they felt refreshed, awake, and fully present. The entire session was structured to last approximately 30 minutes, providing sufficient time for induction, therapeutic engagement, and re-orientation.

E. Psychometric Measures

The following psychological tests were administered before and after the VR interventions to assess the severity of the patient's symptoms. Standardized procedures were followed for test administration and scoring.

- *Beck Anxiety Inventory* (BAI) [14]: a self-assessment tool with 21 items, used to measure anxiety severity in individuals aged 17 and above.
- *Beck Depression Inventory II* (BDI-II) [14]: a self-assessment tool with 21 items, used to measure the severity of depressive disorder symptoms.
- *Somatic Symptom Scale-8* (SSS-8) [15]: a self-report questionnaire used to assess and potentially decrease somatization.
- *Peritraumatic Distress Inventory* (PDI) [16]: a self-report tool used to gauge distress during or after a traumatic event.

In addition to the VR interventions, the *Simulator Sickness Questionnaire* (SSQ) [17], [18] was employed to evaluate the severity of the patient's symptoms. The SSQ is a tool specifically designed to measure *cybersickness*, a condition akin to seasickness that can arise from extended exposure to a three-dimensional environment via a head-mounted HMD [19]. The SSQ comprises 16 items, each evaluated on a 4-point Likert scale, encapsulating symptoms such as "Nausea", "Blurred Vision", and "Vertigo". This instrument was administered following each VR session. The final score, derived from the sum of the item values, serves as an indicator of symptom severity: a score less than 5 is deemed insignificant, 5-10 is minimal, 10-15 is significant, 15-20 is concerning, and a score exceeding 20 is considered severe. This scoring system allows

for a nuanced understanding of the patient's experience and response to the VR interventions.

F. Virtual Reality Intervention Protocol

The VR intervention was integrated with 8 hypnosis sessions of 45 minutes each, divided into pre-VR (Sessions 1-4), VR intervention (Sessions 5-7), and post-VR (Session 8) phases. Pre-VR involved patient interview, baseline symptom assessment, and hypnosis without VR. During VR intervention, the patient underwent hypnosis while experiencing calming natural (Session 5), artificial relaxation (Session 6), and immersive cosmic (Session 7) VR environments using an HMD. The SSQ monitored VR tolerance post-session. Pre- and post-intervention, diagnostic tests (BAI, BDI-II, SSS-8, PDI) evaluated symptom changes. The protocol gradually introduced VR experiences during hypnosis, progressing from natural to artificial environments.

G. Data Collection

Data were collected through clinical interviews, psychological tests, and VR intervention sessions. The clinical interviews were conducted to gather demographic information, medical history, and current psychological symptoms.

H. Data Analysis

The data collected from the clinical interviews, psychological tests, and VR sessions were analyzed using both qualitative and quantitative methods. The qualitative analysis involved a detailed examination of the patient's responses, behaviors, and subjective experiences during the VR interventions. The quantitative analysis included scoring the psychological tests and comparing the pre- and post-intervention results to assess changes in the patient's symptom severity.

I. Ethical Considerations

Informed consent was obtained from the participant before data collection, hypnosis induction, and VR interventions. The study was conducted in accordance with ethical guidelines, ensuring confidentiality and anonymity of the participant's personal information. The potential risks and benefits of VR were explained, and the participant was closely monitored during the VR sessions to ensure comfort and safety.

III. RESULTS

A. Pre-Virtual Reality Intervention Sessions

The patient underwent a series of hypnosis sessions integrated with VR, totaling eight sessions, each lasting 45 minutes. During these sessions, the patient was guided into a hypnotic state and concurrently exposed to video content via a HMD.

- 1) First session: This initial session encompassed an interview process during which pertinent biographical information and medical history were gathered. The patient strongly expressed her desire for change, demonstrating high compliance from the outset.

- 2) Second session: Diagnostic tests were administered during this session. The results served as a baseline for comparing the patient's symptomatology before and after the treatment. Despite the evident tachylogia, the patient proved to be available and cooperative.

During the second clinical interview, the patient presented with marked anxiety, confusion, and physical health issues, including arthritis and elevated ocular pressure. She was taking anxiolytics and antidepressants to manage her symptoms. Psychological tests were administered to assess the severity of her condition:

- BAI: Total score of 31, indicating severe anxiety.
- BDI-II: Total score of 29, indicating clinically significant depression.
- SSS-8: Total score of 26, indicating a very high level of somatic symptoms.
- PDI: Total score of 24, indicating a significant level of distress.

Commencing from the third session through to the seventh, the core treatment phase was initiated, which entailed the amalgamation of hypnosis techniques with VR.

- 3) Third session: This session involved an initial hypnotic induction without the use of the HMD, aimed at evaluating the patient's responsiveness to hypnosis. The patient immediately focused and entered a relaxed state, closing her eyes of her own volition. During the session, her breathing underwent variations with accelerations and sighs. At the end, she reported feeling well and being able to let go of negative thoughts.
- 4) Fourth session: This session consisted of a second hypnotic induction, with an emphasis on deepening the hypnotic state. Once again, the patient responded positively to the induction, as evidenced by minor facial spasms, head movements, and changes in breathing. She again reported achieving a state of tranquility.

B. Virtual Reality Intervention Sessions

- 5) Fifth session: During the third hypnosis induction session, the patient was introduced to VR via a HMD. She responded favorably to the VR experience, remaining relaxed despite some minor distractions. Notably, she reported a pleasant sense of abandonment, a feeling she was not accustomed to experiencing. This introduction to VR was facilitated through the Nature Treks app, specifically the Green Meadows environment, which presented a calming and serene natural setting. Following the session, the SSQ was administered to assess the patient's reaction to wearing the HMD, and she scored a 3, indicating a positive response.
- 6) Sixth session: In the fourth hypnosis induction session, the patient was immersed in a VR experience using the Liminal app, specifically the Soujourne environment from the "Calm" section. This VR scenario presented a highly immersive artificial environment, complete with tangible elements that further enhanced the sense of presence.

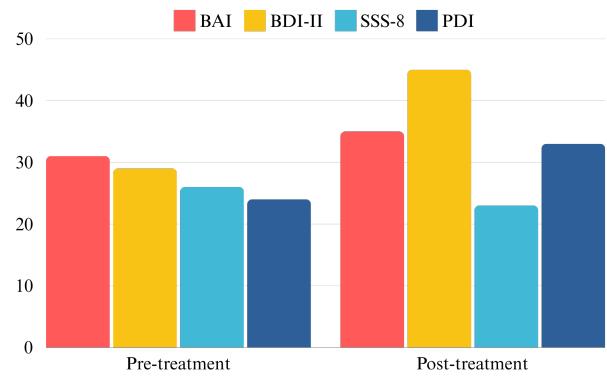


Fig. 3. Psychological Test Scores: Pre and Post-Treatment Comparison. This figure illustrates the changes in the patient's psychological test scores before and after the combined hypnosis and VR intervention. The scores are presented for the BAI, BDI-II, SSS-8, and PDI.

The patient thoroughly enjoyed the experience, reporting a thrilling sensation of being above the clouds, as if she were floating in an airplane. Notably, she began to use the first-person plural pronoun ("we"), indicating a strong sense of identification and connection with the virtual environment. Post-session, the patient's positive reaction to the HMD was confirmed with a SSQ score of 4.

- 7) Seventh session: The patient's response to the VR experience continued to evolve, demonstrating fewer distractions and a deeper sense of immersion. During the session, she was fully engaged with the Cosmic Flow app, to the point where she didn't even notice when the application was briefly interrupted. Moreover, she expressed a desire to fall asleep, a clear indication that she had reached a profound state of calm and relaxation. This relaxed state made her immediately receptive to hypnosis induction, allowing her to transition seamlessly into a hypnotic state. After the session, the patient's HMD use was assessed with a positive SSQ score of 3.

C. Post-Virtual Reality Intervention Sessions

- 8) Eighth session: Diagnostic tests were re-administered to evaluate post-treatment symptomatology.
- BAI: Total score of 35, indicating severe anxiety.
 - BDI-II: Total score of 45, indicating clinically significant depression.
 - SSS-8: Total score of 23, indicating a very high level of somatic symptoms.
 - PDI: Total score of 33, indicating a high level of peritraumatic distress.

As depicted in Figure 3, the combined hypnosis and virtual reality intervention resulted in significant changes in the patient's psychological test scores. The scores for the BAI, BDI-II, SSS-8, and PDI are all presented, allowing for a pre and post-treatment comparison.

IV. DISCUSSION AND CONTRIBUTION TO THE LITERATURE

The results of this case study suggest that the integration of hypnosis and virtual reality may be a promising approach for treating anxiety, depression, and somatic symptoms in patients with complex psychological and physical health issues. Despite the patient's initial presentation with severe anxiety, depression, and physical health problems, she demonstrated a strong willingness to change and cooperated fully with the treatment protocol. The patient's response to the hypnosis sessions was positive, with her entering a relaxed state and reporting feelings of tranquility and abandonment. The introduction of VR in the fifth session further enhanced her relaxation response, with her reporting a pleasant sense of abandonment and a strong sense of identification with the virtual environment.

However, the post-treatment diagnostic test results revealed a mixed outcome. While the patient's BAI, BDI-II, and PDI scores increased, indicating a possible exacerbation of anxiety, depressive and distress symptoms, the SSS-8 scores showed a slight improvement. The increase in anxiety, depression and distress scores could be attributed to several factors. Firstly, it is possible that the VR interventions triggered or exacerbated underlying emotional issues that had not been fully addressed during the treatment. Secondly, the patient's complex family situation and history of postpartum depression could have contributed to the persistence or intensification of these symptoms. Additionally, the short duration of the treatment and the limited number of sessions may have been insufficient to bring about significant and sustained improvements in anxiety and depression.

On the other hand, the slight improvement in somatic symptoms suggests that the hypnosis and VR interventions may have had a mitigating effect on the patient's physical symptoms. The VR environments, designed to promote relaxation and distraction, could have helped alleviate somatic manifestations of anxiety associated with traumatic events. However, further research with larger sample sizes is needed to substantiate this finding.

A. Artificial Intelligence in Virtual Reality Therapy

From a computer science perspective, the VR technology employed in this study, particularly the Meta Quest headset and VR applications such as "Nature Treks," "Liminal," and "Cosmic Flow" showcased the potential of health informatics in therapeutic contexts. The immersive and realistic experience delivered by the VR headset can be attributed to the advanced computer graphics and user interface design of the VR applications. Furthermore, Artificial Intelligence (AI) has the potential to revolutionize the VR experience by personalizing it for each patient [20], [21]. The data collected during the VR sessions could be analyzed using machine learning algorithms to predict the therapy's effectiveness and provide positive reinforcement [22]. For instance, reinforcement learning could be employed [23]: in the case of a positive response from the patient, the algorithm can learn and subsequently

display similar environments that evoke positive emotions. Conversely, if there is a negative response, the algorithm can adapt and change the environment. Additionally, AI can be used to enhance the quality of patient feedback acquired through internal and external sensors on the headset, although it is not necessary for this specific task. Natural language processing is another powerful tool that can be utilized to transcribe and analyze the patient's verbal responses during the sessions, providing valuable insights into their experience. Post-acquisition, machine learning can also be leveraged for advanced data analysis and decision-making during the trial [24]. AI-driven VR, where the environment is dynamically changed in response to patient feedback, could be another exciting application [25]. This can be achieved by modeling temporal sequences of patient feedback over time, with the primary goal of maintaining the patient's state of calm. This showcases the potential for AI to play a pivotal role in enhancing the therapeutic impact of VR.

B. Results Applicability

The results of this study have broad applicability in using VR as a therapeutic tool in mental health. The patient's positive response suggests VR can provide a safe and calming environment, opening possibilities for its use across various mental health conditions. From a computer science perspective, it highlights the potential of integrating informatics, machine learning, and AI in therapeutic interventions. However, the results are preliminary, and further research is needed to confirm findings and understand long-term effects. The lack of significant overall improvement indicates while VR can provide temporary relief, it may not lead to sustained mental health improvements. VR should be used as a complementary approach within a comprehensive treatment plan addressing underlying psychological and emotional issues. The study's methodology and reliance on psychometric tests as primary outcome measures limit the interpretation of results. While promising, the applicability of these results should be considered within the context of a holistic treatment approach combining VR with other evidence-based therapeutic interventions.

C. Limitations of the Study

This case study offers insights into combining hypnosis and VR as a therapeutic approach, but has several limitations. Firstly, the small sample size of one patient limits generalizability. Secondly, the absence of a control group prevents attributing outcomes solely to the combined modality. A longer treatment duration with more sessions could potentially lead to more pronounced benefits. Additionally, the lack of follow-up assessments prevents determining the long-term effects. The psychometric tests used may not fully capture the patient's emotional and physiological responses, warranting more comprehensive evaluations.

Despite these limitations, the positive response to hypnosis and the sense of immersion experienced during VR interventions suggest potential for treating anxiety, depression, and

trauma-related symptoms. However, further research, including randomized controlled trials with larger sample sizes, is necessary to establish the efficacy and generalizability of this innovative treatment approach.

This case study contributes to the literature on integrating hypnosis and VR in mental health treatment, highlighting potential benefits and challenges. Future research should aim to replicate and extend these findings, refining the therapeutic application of this combined modality to optimize its effectiveness in addressing various psychological disorders.

V. CONCLUSION

This case study highlights the potential benefits and limitations of using Virtual Reality as an adjunctive tool in psychotherapy, providing temporary relief for a patient under distress. While VR provided a sense of relaxation and immersion for the patient, it did not lead to a sustained improvement in her psychological condition. However, the positive responses during the VR sessions suggest that VR can offer a valuable distraction and a sense of calm for individuals experiencing anxiety and depression. From a computer science perspective, the future integration of Artificial Intelligence in VR therapy could lead to more personalized and effective interventions. The study provides preliminary insights into the benefits and challenges of VR therapy and the role of health informatics in therapeutic interventions. Further research is needed to explore the long-term effects of VR and its combination with other therapeutic techniques to enhance its effectiveness in treating mental health disorders.

VI. ACKNOWLEDGMENT

We would like to thank our fellow Ph.D. students for their valuable suggestions, through which we were able to improve this paper.

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