The Pioneering Application of Virtual Reality Therapy for U.S. Veterans Experiencing PTSD

Ryan Kmonk

IMM456W: Studio V - Ethics and Access

December 13, 2024

Introduction

Background of Veteran PTSD

Every day, an average of seventeen U.S. veterans tragically take their own lives.[1] This alarming statistic underscores the urgent and pressing need for effective PTSD treatment for our veterans. The profound impact of veteran PTSD on soldiers returning home from action is evident, with nearly three million Americans serving 5.4 million deployments since the 9/11 attacks.[2] Post-traumatic stress disorder, or PTSD, is a diagnosed mental health condition that can develop after a person is exposed to a traumatic event.[3] This can stem from veterans' combat, training, or military sexual trauma. The National Institute of Mental Health states that there are four types of PTSD symptoms: re-experiencing (flashbacks, nightmares), avoidance (avoiding reminders of the trauma), arousal and reactivity (feeling jumpy, easily startled), and cognition and mood (negative thoughts and feelings, guilt, and depression).[4] After defining PTSD and its symptoms, its current treatment methods, specifically for military veterans, can be discussed. However, I must further clarify the intent of this paper. Virtual reality is a valuable mental health resource for U.S. veterans with PTSD because of its ability to improve exposure therapy by providing a controlled, safe, immersive environment that allows veterans to confront and process their trauma more effectively.

1 "Virtual Reality Therapy: PTSD Treatment for Veterans," SoldierStrong, June 12, 2024, https://www.soldierstrong.org/bravemind/.
2 "Virtual Reality Therapy: PTSD Treatment for Veterans."
3 "Wounded Warrior Project," n.d., https://www.woundedwarriorproject.org/programs/mental-wellness/veteran-ptsd-treatment-support-resources.
4 "Wounded Warrior Project."

Current Veteran Treatment Methods

In the present day, there are several treatment options for veteran PTSD. Two of the main ones are trauma-focused psychotherapy and medication. Trauma-focused psychotherapy is a therapy that focuses on the memory of the traumatic event or its meaning. There are usually three types of trauma-focused psychotherapy: CPT, PE, and EMDR. Cognitive Processing Therapy, or CPT, is a form of therapy that focuses on learning skills to understand how trauma changed your thoughts and feelings.[5] The result is that CPT changes how you think about the trauma and can change how you feel. Prolonged Exposure, or PE, is when you repeatedly talk about your trauma until the memories are no longer upsetting. This helps you gain more control over your thoughts and feelings about the trauma, go to places, or do things that are safe but that you have been staying away from because they remind you of the trauma.[6] Eye Movement Desensitization and reprocessing, or EMDR for short, is another form of therapy that focuses on sounds or hand movements while you talk about the trauma. The idea is to help your brain work through the traumatic memories.[7] Cognitive Behavioral Conjoint Therapy, or CBCT, is a therapy focused on assisting couples to understand the effects of PTSD on relationships to improve interpersonal communication.[8] Lastly, there are mainly four types of medicine prescribed to treat PTSD: sertraline (Zoloft), paroxetine (Paxil), fluoxetine (Prozac), and venlafaxine (Effexor). These four kinds of medication are SSRIs (selective serotonin reuptake inhibitors) or SNRIs (serotonin-norepinephrine reuptake inhibitors), which are types of antidepressant medicines believed to treat PTSD by putting brain chemicals back in balance but are not as effective as trauma-focused

5 "VA.gov | Veterans Affairs," n.d., https://www.ptsd.va.gov/understand/what/ptsd_basics.asp.
6 "VA.gov | Veterans Affairs," n.d., https://www.mentalhealth.va.gov/ptsd/treatment.asp.
7 "VA.Gov | Veterans Affairs," n.d.
8 "VA.Gov | Veterans Affairs," n.d.

psychotherapy.[9] Each of these medications has its benefits and potential side effects, and their effectiveness can vary from person to person. However, it is important to note that these treatments have limitations, such as possible side effects and the need for long-term use, which underscores the need for alternative therapy methods like VRET.

Intro to VR Therapy

According to a National Library of Medicine journal: "virtual reality is a form of human–computer interaction creating synthetic virtual environments to immerse users into them."[10] Virtual Reality Exposure Therapy, or VRET, is an alternative form of PTSD treatment that has a user immersed in a virtual environment using, most predominantly, a head-mounted display and allows them to interact with stimuli while the clinician has free reign to modify the stimuli depending on the patient. At its core, VR therapy is paired with EBT or exposure-based therapy. This method involves exposing the patient to the feared object or context without any danger to overcome their anxiety and painful stress. VRET acts as an alternative form of therapy for veterans who are simply too shy from traditional talk therapies and who often unwillingly recall traumatic memories. The SoldierStrong Veterans organization uses a specific example of VRET called the BraveMind program.[11] This program curates fourteen different environments covering settings familiar to Iraq and Afghan war veterans. What is remarkable is that mental health professionals can customize the environment to closely match the veterans' traumatic memories as possible, down to the senses of smells, sounds, and even the time of the day. The veteran can

9 "VA.Gov | Veterans Affairs," n.d.
10 M G Volovik et al., "Use of Virtual Reality Techniques to Rehabilitate Military Veterans With Post-Traumatic Stress Disorder (Review)," *Sovremennye Tehnologii V Medicine* 15, no. 1 (February 28, 2023): 74, https://doi.org/10.17691/stm2023.15.1.08.
11 "Virtual Reality Therapy: PTSD Treatment for Veterans."

be placed in the driver's seat, where the therapist can generate explosions, helicopters, and other triggers to immerse the veteran as much as possible in their traumatic memories as they narrate their story in the present. Dr. Skip Rizzo, a clinical psychologist, summarized the basis of exposure therapy for VRET, "...hard medicine for a hard problem."[12] One veteran, former Marine Chris Merkle, who served three years in Iraq and close to four in Afghanistan, tried VRET and praised it, "You're completely immersed in the moment…"You can feel it in your body when you talk, you just feel so tense. You don't get that normally unless you're in a really, really deep therapy session…[The VR] hands you your experience."[13] The key to VRET is for the veteran to confront the traumatic memory directly repeatedly to reduce their brain's response to it to regain control of their memories and how they impact their lives. There are two primary VR environments for VRET: one focuses on specific and realistic situations, and the other uses a flexible approach using symbolism to represent the traumatic event.[14] Since VR emerged, many case studies have assessed VRET and its effects.

12 "Virtual Reality Therapy: PTSD Treatment for Veterans."
13 "Virtual Reality Therapy: PTSD Treatment for Veterans."
14 "How Virtual Reality Therapy Impacts Veterans With PTSD | Bradley University Online," n.d., https://onlinedegrees.bradley.edu/blog/how-virtual-reality-therapy-impacts-veterans-with-ptsd/.

Case Studies

Case studies involving Virtual Reality Exposure Therapy (VRET) for veterans have illustrated its groundbreaking potential in treating PTSD. The first case study uses a systematic electronic database review and a focus group of twenty-two Portuguese Armed Forces veterans.[15] The case study demonstrated that the systematic review group found VRET protocols to positively influence various symptoms, with all treatment improvements maintained at three-, six-, and twelve-month follow-ups of using VRET.[16] For the focus group, all participants agreed with the innovative potential of VR paired with technology and therapy despite never knowing about VR. All participants agreed that hearing, touch, and smell stimuli should be present in wartime environments and that smell is the sense they remember the most.[17] The case study revealed that VRET protocols effectively improved symptoms with lasting benefits, and participants recognized the potential of combining VR with therapy, emphasizing the importance of sensory stimuli in wartime experiences. The following case study focuses on a review evaluating the potential of virtual reality techniques as a tool to rehabilitate veterans with PTSD.[18] The final analysis examined seventy-five articles between 2017-2022. Based on this analysis, the inclusion of VRET in treating PTSD positively affected rehabilitation results due to

15 Ana Vianez, António Marques, and Raquel Simões De Almeida, "Virtual Reality Exposure Therapy for Armed Forces Veterans With Post-Traumatic Stress Disorder: A Systematic Review and Focus Group," *International Journal of Environmental Research and Public Health* 19, no. 1 (January 1, 2022): 464, https://doi.org/10.3390/ijerph19010464.
16 Vianez, Marques, and De Almeida, "Virtual Reality Exposure Therapy for Armed Forces Veterans With Post-Traumatic Stress Disorder: A Systematic Review and Focus Group."
17 Vianez, Marques, and De Almeida, "Virtual Reality Exposure Therapy for Armed Forces Veterans With Post-Traumatic Stress Disorder: A Systematic Review and Focus Group."
18 Volovik et al., "Use of Virtual Reality Techniques to Rehabilitate Military Veterans With Post-Traumatic Stress Disorder (Review)."

the "...enhanced effect of presence and greater experience personalization."[19] With this case study, it can be concluded that VRET has the potential to be "...an effective, controlled, and cost-effective alternative for PTSD treatment in combatants."[20] The following case study concentrates on VRET effects on PTSD symptoms.[21] This study noted that "VRET presents immersive sensory cues in digital surroundings, and subjects can interact with stimuli using VR devices such as a head-mounted visual display."[22] While comparing its superiority to traditional therapy methods such as Prolonged Exposure (PE) was inconclusive, symptoms such as depression and anxiety were significantly reduced. [23] The last source is not a case study but rather a real case of a veteran using VR to cope with his PTSD. In this source, a veteran uses an Anakin Skywalker avatar to hide his identity while confessing his PTSD struggles to the creator dressed as Winnie the Pooh on the popular VR application VRChat. [24] While VRChat is not a therapy application, simply having the anonymity feature on an avatar to express yourself can do a lot to have people divulge their traumatic memories simply because no one knows their true identity. More so, it should not be understated that the power of a calming, virtual environment with someone who genuinely listens can help break down barriers preventing veterans from revealing their PTSD moments. All of these case studies have reported a reduction in PTSD symptoms and an

19 Volovik et al., "Use of Virtual Reality Techniques to Rehabilitate Military Veterans With Post-Traumatic Stress Disorder (Review)."
20 Volovik et al., "Use of Virtual Reality Techniques to Rehabilitate Military Veterans With Post-Traumatic Stress Disorder (Review)."
21 Seoyoon Heo and Jin-Hyuck Park, "Effects of Virtual Reality-Based Graded Exposure Therapy on PTSD Symptoms: A Systematic Review and Meta-Analysis," *International Journal of Environmental Research and Public Health* 19, no. 23 (November 29, 2022): 15911, https://doi.org/10.3390/ijerph192315911.
22 Heo and Park, "Effects of Virtual Reality-Based Graded Exposure Therapy on PTSD Symptoms: A Systematic Review and Meta-Analysis."
23 Heo and Park, "Effects of Virtual Reality-Based Graded Exposure Therapy on PTSD Symptoms: A Systematic Review and Meta-Analysis."
24 Syrmor, "Guy in Vr Talks About Their Worst Day as a Soldier," December 23, 2020, https://www.youtube.com/watch?v=MiXZECAe094.

improved quality of life for many veterans after VR therapy. However, continuous research is essential to fully understand this treatment method's long-term effects and potential drawbacks. The need for further investigation is crucial and calls for the active involvement of mental health professionals, researchers, policymakers, and veterans' advocacy groups to ensure the safety and effectiveness of VR therapy for veteran PTSD.

Comparison with Traditional Therapy

While we have seen the effectiveness of VR therapy, how does it compare with other traditional therapy methods? When comparing VRET with traditional therapy methods, I will be focusing specifically on cognitive-behavioral therapy (CBT) and Prolonged Exposure (PE). In comparison with these methods, VRET offers unique, distinct advantages. Compared to CBT, VRET is set in an immersive environment where veterans can interact with simulated environments that evoke real-life scenarios relevant to their traumatic memories. With this controlled setting, it can be easier for veterans to confront their fears gradually. While PE requires veterans to confront their fears and anxieties in real-world circumstances head-on, VRET allows the potential of repeated exposure in a safe, controlled setting. Moreover, VRET's interactive nature increases veterans' engagement, which can make it easier for them to invest in their therapy and come out with reduced PTSD symptoms. However, traditional therapy methods such as CBT and PE still hold immense significance. They have face-to-face interactions compared to VRET, where therapists can easily read veterans' non-verbal cues and movements, allowing for deeper emotional connections and empathetic understanding to address the veteran's needs. Furthermore, VRET might exhibit motion sickness and discomfort for veterans

using head-mounted displays, which can hinder its effectiveness. Based on these considerations, VRET should be considered as an up-and-coming PTSD treatment method for veterans compared to traditional therapy methods, but with caution.

Practical Considerations

Accessibility for Veterans

For VRET to be effective, it must account for veterans with both mental and physical limitations as well as financial ones. For instance, veterans often face unique mental health difficulties such as anxiety, stress, and depression in conjunction with PTSD. Physical injuries and disabilities are also unfortunately at play as they can exacerbate mental health challenges. To address these problems, sufficient VRET needs to design authentic, engaging, immersive environments that allow veterans to process their traumatic moments, develop coping mechanisms for PTSD, and gradually get exposed to their fears and phobias in a safe, controlled setting. For physical limitations, VRET equipment must meet the standards of addressing adaptability with varying degrees of mobility and sensory capabilities to be successful. As for financial considerations, veterans may not have the means to afford VR setups and equipment to access VRET sessions. VRET needs to be cost-effective, and that could mean donations in community centers or therapy offices through access to veteran organizations and healthcare systems. VRET has the potential to revolutionize PTSD care for veterans, but for it to do so, it must completely address and compensate for mental, physical, and financial issues.

Ethical/Safety concerns

VRET raises ethical and safety concerns that must be carefully considered and addressed. In any VRET session, informed consent is necessary to inform veterans about what to expect and the possible emotional/psychological effects. Since VRET focuses on exposure to intense, real-life scenarios, there is a psychological risk of overwhelming stress and anxiety that can lead to worsening of PTSD symptoms. A prolonged, repeated exposure to virtual stimuli could lead to a concern regarding desensitization, which can impact the VRET session. With this, therapists conducting VRET sessions must accurately assess each veteran's readiness with gradual exposure to traumatic stimuli. Furthermore, veterans must have control over their VRET sessions with the ability to pause or even terminate the exposure at any time if it becomes too much for them. It is also crucial to address veterans lacking technological expertise and educate them about VRET and other immersive technologies to ensure proper comprehension. Moreover, virtual environments must consider distinct cultural contexts and individual differences in veterans' preferences to ensure cultural sensitivity needs. Specifically for data privacy, VRET sessions will often collect sensitive data information about veterans' psychological states and traumatic experiences. To prevent misuse of this sensitive information, VRET systems must enforce robust data protection and privacy protocols. However, it is crucial to note that VR therapy is always conducted under the supervision of trained professionals, with safety measures in place to prevent re-traumatization. These measures include gradual exposure to traumatic stimuli, the ability to pause or stop the session at any time, and post-session debriefing to process any distressing emotions. The virtual environment can also be adjusted to ensure the veteran's experience is not overwhelming. These safety measures are designed to reassure both the

veterans and the professionals that VR therapy is a safe and effective treatment method for veteran PTSD.

Potential Innovative Integration

The most common integration of VR therapy with existing forms of therapy is EBT. However, there are other cases in which VRET is paired with other existing forms of therapy that can work depending on the treatment and the individual veteran. One example is pairing VR therapy with electric brain stimulation. One case study assessed the effectiveness of electric brain stimulation with a low electrical current during sessions of VRET, which resulted in a significant reduction in PTSD symptom severity.[25] During this study, veteran participants "...were randomly assigned to receive transcranial direct current stimulation or a sham experience that provided some sensation but not a significant amount or duration of electrical current."[26] Moreover, the veteran patients who received the transcranial direct current stimulation received a "...a low (2 milliamp) amount of electricity was targeted to the ventromedial prefrontal cortex during six 25-minute sessions of standardized warzone virtual reality exposure, delivered over two to three weeks." [27] The participants in the active electric brain stimulation group reported significantly accelerated psychological and physiological adjustment to the VR events and a superior reduction in self-reported PTSD symptom severity at

25 "Virtual Reality Exposure Plus Electric Brain Stimulation Offers a Promising Treatment for PTSD," Brown University, March 6, 2024, https://www.brown.edu/news/2024-03-06/ptsd-veterans#:~:text=Featured%20Events-,Virtual%20reality%20exposure%20plus%20electric%20brain%20stimulation%20offers%20a%20promising,stress%20disorder%20in%20military%20veterans.
26 "Virtual Reality Exposure Plus Electric Brain Stimulation Offers a Promising Treatment for PTSD."
27 "Virtual Reality Exposure Plus Electric Brain Stimulation Offers a Promising Treatment for PTSD."

one month in. In just two weeks of this study, the combination of electric stimulation and VRET accelerated a rehabilitation process that usually takes around twelve weeks to show effects during prolonged exposure therapy (PE). The study's author, Noah Philip, noted that the effects of the combined PTSD treatment continued to build over time, "What we found was that people continued to get better after they were done with the treatment, and we started seeing the biggest effects one month later."[28] While promising for the future of PTSD care, further research should be implemented to explore the long-term impacts of VRET paired with electric brain stimulation and understand its effects.

Challenges of VRET

Technical Challenges

Unfortunately, like all promising innovations, VR therapy has technical limitations and potential drawbacks. It is important to note that VR therapy has challenges similar to any treatment method. Still, technical challenges may hinder its effectiveness and widespread adoption in veteran care. The most pressing technical issue is hardware and software limitations, where the quality of VRET experiences significantly depends on the type of hardware and software used. High-quality headsets may be too expensive, but utilizing lower-quality ones would impede the VRET session's realism. Furthermore, with inadequate software development, these VR applications may not be expertly tailored for therapeutic needs, which may lead to disappointing outcomes. The lack of investment in adequate hardware and software for VRET may lead to suboptimal therapeutic results. These may include the possibility of the technology

28 "Virtual Reality Exposure Plus Electric Brain Stimulation Offers a Promising Treatment for PTSD."

malfunctioning during a session, disrupting the therapeutic process, or the risk of a patient becoming overly dependent on the virtual environment. Additionally, there are practical challenges, such as potential technical issues during therapy sessions, such as system crashes or malfunctions, and the need for training for therapists to use the technology effectively and guide patients through the virtual environments. More on this point, the lack of technical expertise could result in inadequate VRET implementation and an inability to properly fix potential technical issues and errors that can arise during VRET sessions. Conceivably, the most crucial problem to address is the user experience. The effectiveness of VRET depends on the veterans' comfort levels with technology, where some may find the concept of VR intimidating and thus feel reluctant to engage with it, reducing the potential benefits. As for logistics, VRET equipment can pose a challenge if implemented in various settings such as hospitals, rehabilitation clinics, and even homes to maintain equipment and provide technical support for those utilizing it. These limitations should be considered when implementing VR therapy, but they should not overshadow its potential benefits and the need for further research and support for its development.

Lack of long-term research

While there is a growing body of research on VR therapy for veterans, much of it has been published over the last five years. With previous case studies discussed, they primarily concentrate on immediate and short-term effects rather than also focusing on sustaining those benefits for the long term. Since the novel involvement of VR technology in veteran care, there is often a lack of long-term data to determine whether VRET is a temporary solution or facilitates lasting changes in coping mechanisms and behaviors in veterans with PTSD. In addition, individual responses, like any therapy method, may differ and vary greatly. In contrast,

more long-term studies can identify trends and circumstances and pursue potential factors that potentially influence the longevity of VRET therapeutic effects. Ongoing research is vital to ensure continuous improvement in veteran care and the fullest effectiveness of VRET to adapt and optimize it for different veteran needs. Long-term studies tracking the efficacy of VRET over time could provide valuable insights and help identify areas for improvement, engaging and committing the audience to the field of veteran care.

Potential Breakthrough

Ongoing Innovations

With the rapid advancement of technology, VRET is constantly evolving. As a whole, there is potential for VR, exposure therapy, and biometric sensors to work together to diagnose and treat PTSD and its symptoms. For instance, recall earlier clinical psychologist Skip Rizzo's VRET system. His system allows the veterans to talk about their experience as they walk through their trauma with customization options for therapists to add secondary elements such as clouds, missiles, small-arms fire, and helicopters to enhance the realism of the VRET session. [29] Another example is called Ellie, which is a virtual PTSD screening tool launched by USC's Institute for Creative Technologies that provides patients with an unrecorded, anonymous interview session to encourage veterans to be more open about their trauma and speak freely about it. Future advancements may allow Ellie to report the veteran's vulnerability to PTSD.[30] Lastly, Neuroflow is a technology process that monitors PTSD symptoms in real-time, such as heart rate levels and brain-based movements. While the veteran talks, the therapist can observe the readings of stress,

29 "How Virtual Reality Therapy Impacts Veterans With PTSD | Bradley University Online."
30 "How Virtual Reality Therapy Impacts Veterans With PTSD | Bradley University Online."

engagement levels, and relaxation to identify triggers.[31] With these continuous innovations for VRET, there is a possible breakthrough for veteran care through the improvement of technology and its ability to improve the effectiveness of VRET.

Expanded Use for Other Mental Health Conditions

The success of VR therapy in treating veteran PTSD raises an intriguing question: could it be a viable treatment for other mental health conditions? The potential of VR therapy to extend its benefits to conditions such as anxiety and depression is an area that warrants further exploration and research. For instance, VRET can help with anxiety disorders by utilizing virtual environments for patients to practice facing anxiety-inducing situations such as public speaking on a stage or crowded lines. Similarly, on this point, VRET can be adapted for phobias such as heights, snakes, spiders, and the dark in a safe, controlled virtual setting. For both cases, similarly, for treating PTSD, the idea is building resilience to fears while developing adequate coping mechanisms. Moreover, VRET can be adopted for depression, which can better help veterans deal with its symptoms. For example, patients could be placed in virtual environments that promote positive emotional experiences and social interactions to enhance their mood and social skills. Due to the success of VRET in treating veteran PTSD, it can be concluded that it has proven to be a highly adaptable and versatile tool in mental health care. Because of this, VRET can revolutionize therapy methods for conditions such as anxiety, phobias, and depression by harnessing the power of immersive technology.

31 "How Virtual Reality Therapy Impacts Veterans With PTSD | Bradley University Online."

Funding & Policy Support

With the potential breakthrough in mind, it is crucial to stress the urgent need for further research funding and policy support. To fully realize the potential of VRET, there must be significant investment in research initiatives to explore the long-term efficacy behind VRET's success. More funding will enable the exploration of innovative technologies for VRET to enhance therapy sessions and training for therapists to be equipped with the proper protocols to implement VRET effectively. Similarly, VRET research initiatives at established institutions such as universities and research institutions can bring crucial support to discover its potential fully. Additionally, public awareness of VRET can be broadened on websites, social media, and through advertising to communicate VRET's benefits to foster public support and engagement. With substantial funding and critical policy support, VRER implementation and growth are possible, which can transform veteran care forever.

Conclusion

Virtual Reality Exposure Therapy (VRET) offers a groundbreaking, revolutionary approach to PTSD treatment for U.S. veterans. By engaging veterans in immersive virtual environments through a safe, realistic, controlled setting, VRET allows them to confront their trauma directly in a secure, sufficient manner. It also presents unique advantages compared to traditional therapy methods such as Cognitive Behavioral Therapy (CBT) and Prolonged Exposure (PE), ranging from improved engagement and customization of scenarios to realistic virtual environments that allow the veteran gradual exposure to their traumatic memories. Case studies assessing VRET and its effects prove promising in significantly reducing PTSD symptoms and improving veterans' quality of life, demonstrating its potential as an innovative

tool in veteran care. However, despite its immense promise, VRET still faces several challenges. These include technical limitations, financial accessibility, ethical considerations, safety concerns, and the further need for long-term research to comprehend its effects over time fully. To ensure the success and sustainability of VRET, additional research funding, policy support, and continuous innovative technologies must be used to guarantee its effectiveness. Public awareness among researchers, veteran organizations, universities, hospitals, and rehabilitation clinics is crucial to optimize VRET for widespread implementation. More so, VRET's adaptability indicates its potential for other mental health conditions such as anxiety, phobias, and depression due to its unique feature of immersive environments and exposure for patients to directly confront what they are dealing with and obtain a higher quality of life. All this said, with continual technological advancement and broad implementation of VRET in hospital and research settings, VRET can become a cornerstone in the treatment of PTSD for not just veterans but mental health treatment as a whole, offering a ray of hope to countless veterans and individuals globally.

Bibliography

Heo, Seoyoon, and Jin-Hyuck Park. “Effects of Virtual Reality-Based Graded Exposure Therapy on PTSD Symptoms: A Systematic Review and Meta-Analysis.” *International Journal of Environmental Research and Public Health 19, no. 23* (2022): 1-10. doi: 10.3390/ijerph192315911.

“How Virtual Reality Therapy Impacts Veterans with PTSD.” Bradley University Online. Accessed October 10, 2024. https://onlinedegrees.bradley.edu/blog/how-virtual-reality-therapy-impacts-veterans-with-ptsd/.

Pikul, Corrie. “Virtual Reality Exposure plus Electric Brain Stimulation Offers a Promising Treatment for PTSD.” Brown University, March 6, 2024. https://www.brown.edu/news/2024-03-06/ptsd-veterans#:~:text=Featured%20Events-,Virtual%20reality%20exposure%20plus%20electric%20brain%20stimulation%20offers%20a%20promising,stress%20disorder%20in%20military%20veterans.

Syrmor. “Guy in vr Talks about Their Worst Day as a Soldier.” YouTube. , December 23, 2020. https://www.youtube.com/watch?v=MiXZECAe094.

"Va.Gov: Veterans Affairs." Medications for PTSD, August 8, 2018. https://www.ptsd.va.gov/understand_tx/meds_for_ptsd.asp.

"Va.Gov: Veterans Affairs." PTSD Basics, August 7, 2018. https://www.ptsd.va.gov/understand/what/ptsd_basics.asp.

"Va.Gov: Veterans Affairs." PTSD Treatments & Therapies for Veterans, April 22, 2009. https://www.mentalhealth.va.gov/ptsd/treatment.asp.

"Veterans and PTSD: Understanding Causes, Signs, Symptoms and Treatment." Wounded Warrior Project. Accessed October 10, 2024. https://www.woundedwarriorproject.org/programs/mental-wellness/veteran-ptsd-treatment-support-resources.

Vianez, Ana, António Marques, and Raquel Simões de Almeida. "Virtual Reality Exposure Therapy for Armed Forces Veterans with Post-Traumatic Stress Disorder: A Systematic Review and Focus Group." *International Journal of Environmental Research and Public Health*, January 1, 2022. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8744859/.

"Virtual Reality Therapy: PTSD Treatment for Veterans." SoldierStrong, June 12, 2024. https://www.soldierstrong.org/bravemind/#:~:text=VR%20therapy%20allows%20veterans%20to,these%20memories%20impact%20their%20lives.

Volovik, M G, A N Belova, A N Kuznetsov, A V Polevaia, O V Vorobyova, and M E Khalak. "Use of Virtual Reality Techniques to Rehabilitate Military Veterans with Post-Traumatic Stress Disorder (Review)." Sovremennye tekhnologii v meditsine, January 28, 2023. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10306958/#:~:text=VRET%20contributed%20to%20a%20significant,met%20diagnostic%20criteria%20for%20PTSD.