

Virtual Reality and Mental Health Care

Rishikeshava Damarla¹

¹Washington High School

ABSTRACT

The current state of virtual reality is confined to the realm of video games, movies, and other entertainment forms. In recent years, however, VR has begun to make its way into the therapeutic realm. Virtual reality therapy is an emerging treatment for those with psychological disorders or social anxieties. This new form of therapy seeks to benefit from the immersive properties of virtual reality. VR treatment seeks to treat phobias by placing the patient in a virtual environment where they would come into contact with their anxiety-causing object or event. The aim is that, over time, patients would begin to show improvement in regard to their anxiety response when faced with real-world objects or events that invoke their fear. Further, VR treatment seeks to treat post-traumatic stress disorders by allowing patients to relive their trauma in a safe environment where they can watch themselves reenact the traumatic event. The goal is that patients would begin to build skills through practice that would be able to help them cope with actual situations of danger. The technology to create VR environments is already available, and the treatment methods are refined through clinical experiments with patients. VR has opened up a new avenue of understanding and treatment for those who suffer from psychological disorders, and it has the potential to be more effective than traditional therapeutic methods.

Introduction

The past decade has witnessed the development, application, and advent of virtual reality as a viable option for the analysis, assessment, and management of medical and psychiatric conditions. This growing interest in the use of virtual reality technology in mental healthcare has been driven partly by a desire to better understand and experience these disorders from the perspective of the patient and a belief that such a capability could facilitate the development of customized and efficient therapeutic approaches. Virtual reality (VR) technology has been developed as an extension of virtual environments, and its interactive elements are presented in a visual, physical, and/or semantic form, with the expectation that they will be experienced as real experiences by users. Moreover, these technologies are being used to create an environment that allows the stakeholders to develop a deeper appreciation and understanding of the challenges mental health patients face to function in the current conditions. It thus allows them to create tailor-made solutions that suit the specific requirements of patients, increasing the probability of positive patient outcomes and reducing readmission rates.

Historical Background

The term virtual reality was coined by Jaron Lanier in 1987 to refer to a group of computer technologies designed to create immersive, highly interactive 3D environments that simulate physical presence in places in the real or imagined world (Jerdan et al. 26). It involves manipulating information to give users the feeling that they are somewhere they are not. Historically, virtual reality has been applied in sports, military, entertainment, and simulation. Since the 1980s and 1990s, VR has made major technological strides toward widespread use. This application has had significant success in the various branches of the military. The U.S. Army's Land Warrior System is a good example, where VR technology has been used to increase the situational awareness and effectiveness of soldiers in combat training (Nasuto

& Thompson). Virtual reality also has been applied in graphic design, automobile design, data visualization, virtual prototyping, and in entertainment through applications such as film and games (Druin & Gombos). In psychiatry and clinical psychology, virtual reality has had a shorter history but an equally significant impact on the development of therapeutic approaches to address problems ranging from phobias to stress management.

Medical and psychological applications of VR therapy have been gaining popularity during the last decade. In the field of medicine, virtual reality technology is used to increase a patient's safety, accommodate a patient's specific needs and provide an efficient means to study reality without causing any harm to an individual involved in the experiment. In recent years, however, medical practitioners and other stakeholders have identified various ways this technology can be applied in mental health care. The use of virtual reality in mental healthcare aims to revolutionize the way mental health care is delivered by using immersive simulations that address different psychological conditions (Penn & Michael). These computer-generated scenarios are designed to simulate real-life scenarios of patients suffering from certain mental disorders. These simulations may help reduce anxiety by encouraging patients to face their fear or trauma through repeated exposure. More advanced applications of VR in healthcare are being explored to cross-dress mental disorders, and there is an increasing effort to understand its possible application in the diagnosis of mental disorders as well.

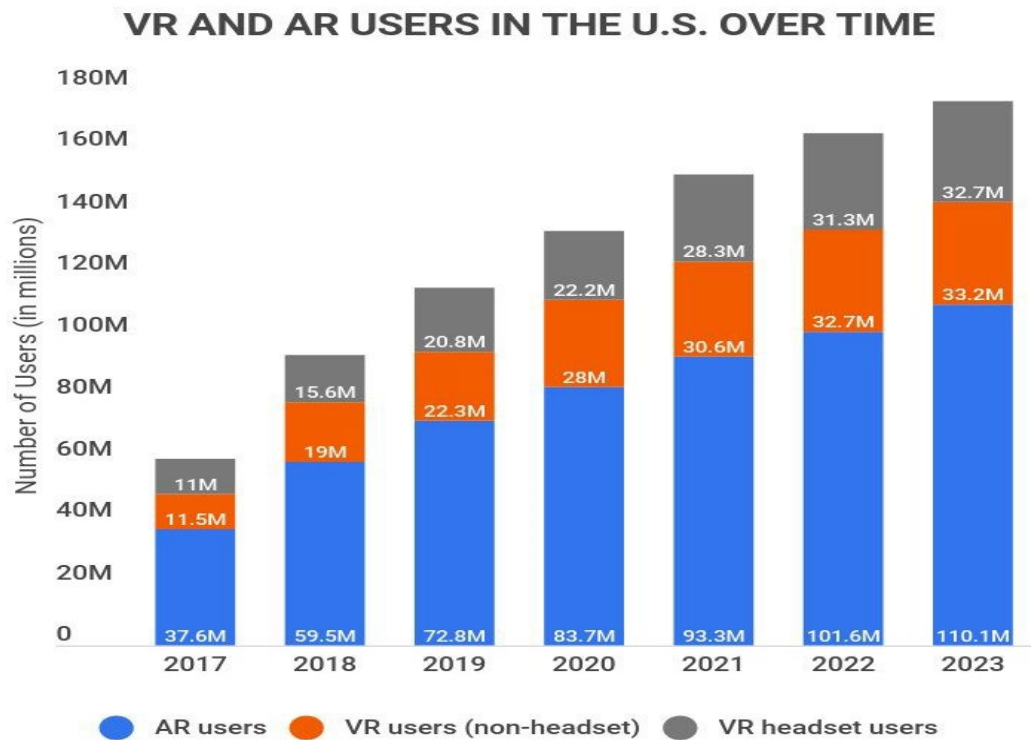


Figure 1: VR and AR users in the United States between 2017 to 20223 (adopted from Park et al.)

Method

A qualitative analysis of secondary data is employed to provide a detailed understanding of the use of VR in mental healthcare. This approach was used to explore several previously published articles on this topic, identify the potential impact and value added by using this technology, and understand the role of stakeholders in their implementation. It is envisaged that this study will provide a broader understanding of the use of VR in mental healthcare and help identify ways to develop more efficient strategies using this technology in mental health care. The findings of this

study will provide a better understanding of the potential challenges that may arise in using VR in mental healthcare and help mitigate these challenges before they occur. Moreover, the findings will inform the portrayal of the impact and value added by using technology in this field.

The articles were selected through a focused search conducted in the google scholar database and limited to full-text publications in peer-reviewed journals. The keywords used in the search included: VR, mental health, therapy, fear/anxiety, and therapeutic outcome. A total of 54 articles were found through this search; however, only eight of these articles were deemed relevant to the research question and selected for further analysis. These articles were published between 2018 and 2022. The qualitative study focused on the role of stakeholders in the use of VR in mental healthcare, how VR is being used, and its impact on mental health care. Another criterion used to arrive at the final number of articles was the focus of the study on VR techniques that are currently being used or could be used for mental healthcare. These techniques include VR exposure therapy, VR distraction techniques, and VR in diagnosis. Lastly, these articles needed to have been presented in English.

Key Findings

The studies reviewed in this analysis showed that VR is being used in several psychiatric conditions, including post-traumatic stress disorder, anxiety disorders, and eating disorders, among others. It has also been used to simulate situations that may evoke fear reactions, and it has been applied as an assessment tool to understand patients' reactions to such situations (Birkhead et al., 2019). The findings of this study showed that virtual reality technologies were being used to bridge the gap between the person's view of the real world and their virtual one. This research also found that VR therapies were user-driven and presented opportunities for improving therapeutic outcomes. Further, it was observed that VR provides a unique therapeutic approach as it allows patients to be exposed to the same scenario repeatedly without getting bored. These findings illustrate how VR could potentially serve as a beneficial means to improve the quality of life of people suffering from psychological disorders (Birkhead et al. 119). It was also observed that virtual reality is a great tool for gaining a deeper understanding of the challenges patients are facing in reality and for creating customized solutions for them.

VR allows patients to participate in a simulated environment that could never be experienced otherwise. This limits the risk involved as no actual physical harm comes to the patient. The use of VR also allows patients to face their fears and phobias in a controlled environment, which increases a sense of safety and thus reduces anxiety (Penn & Michael). In addition, VR is used to study real-life situations of patients suffering from different mental disorders based on their perceptions of the situation. This helps improve professional knowledge about these issues and understand their impact on patient outcomes (Donker 682-690). The use of high-quality graphics through this technology enhances the therapeutic impact by allowing users more control over what they see. Available literature points to the use of VR in mental health care as a therapeutic tool that helps people suffering from certain psychological issues relieve their fear and anxiety by repeatedly exposing them to the source of their fear. It also helps in understanding the reactions and perceptions of patients through its application in mental health care (Norr 523-529). This helps create customized solutions for patients based on the information gathered from such simulations. Implementing such technology will improve the quality of life of patients suffering from mental disorders by helping them live normal life.

Discussion

Clinical virtual reality is a branch of the overall VR field that has been developed to assist in the diagnosis and treatment of psychiatric conditions such as anxiety disorders, phobias, post-traumatic stress disorder (PTSD), obsessive-compulsive disorder (OCD), eating disorders, and neurotic depression. Cognitive behavioral therapy plays a key role in the application of clinical VR as it is an effective means for treating mental health disorders through addressing current and past issues related to these conditions (Riva et al. 82-96). VR is being used to develop a better

understanding of the context of these disorders, such as the family relationship, stressful life events, and physical environments that may have contributed to a patient developing these disorders by allowing the user to become immersed in relevant scenarios, where they may choose to explore the causes and consequences of these stressful events along with other associated emotional responses (Riva et al. 82-96). This method is also used to allow patients to revisit their past experiences in a virtual environment, thus allowing them to identify the possible solutions they could have applied if they had encountered similar situations at that time.

Coupled with CBT, patients are guided through these experiences and are provided with feedback regarding their responses. This form of treatment is known as augmented reality, and it can allow patients to access alternative scenarios that may prevent them from experiencing similar scenarios in the future or may even allow them to see how they could have dealt with their current circumstances. In addition, clinicians are able to better assess underlying issues that may have contributed to certain mental health conditions, as well as identify potential solutions for more successful treatment of these conditions. These virtual environments allow the psychiatrists to collect real-time data, especially when the patient is "reliving" the experience which goes into developing an evidence-based approach to treating mental health disorders. A notable advantage of using clinical VR is that it allows clinicians to put their patients into an alternative reality, where they can review the details surrounding their disorders and provide coping strategies that can help them manage any consequences associated with their condition.

Moreover, virtual reality technology allows psychiatrists to test the efficacy and effectiveness of the proposed coping mechanisms. This technology provides an environment where they can test different strategies and techniques to help their patients cope better with their disorders (Freeman et al. 625-632). This form of CBT is known as "manipulative therapy," and it usually involves designing a virtual environment that allows the patient to explore various scenarios where they may apply different strategies to ensure a more beneficial outcome. In this way, patients and doctors are able to identify the most suitable treatment approach and adopt the most effective coping mechanisms for the treatment of their psychological conditions (Freeman et al. 625-632). Ultimately, using immersive software that simulates an altered environment can be used by researchers to study how humans process cognitive and emotional stimuli and how they respond under similar circumstances.

Virtual reality technology also provides a learning environment where medical practitioners can train and hone their skills in patient care without exposing themselves or their patients to undue risk. These virtual environments allow for trial and error in real-time scenarios that could save a patient's life. More importantly, however, medical practitioners can immerse themselves in these environments and get a first-hand experience of the factors affecting their patients and how they feel when experiencing these issues (Gao et al.). Ideally, it allows the medical practitioner to experience what the patient is experiencing and therefore build rapport and trust with the patient. This is especially crucial in patient treatment because it allows the caregiver to empathize with the patient and develop a common understanding of the underlying factors. Through this understanding, doctors will be able to provide more personalized treatment plans that are tailored to suit their patient's emotional and psychological needs.

Virtual reality has been noted to improve access to modern psychological treatment options. Freeman et al. (2017) notes that the usage of VR for the treatment of mental health disorders can be attributed to its ability "to reduce healthcare disparities and lower treatment costs, increase access and reach, enhance clinical outcomes, increase patient engagement and satisfaction and provide continuity of care." The broad availability of internet access has allowed for greater exposure and ease of access to mental health resources. Additionally, there is increased consumer awareness about mental health conditions and the treatments that are available. Virtual reality software allows patients with remote areas limited access to clinicians who have actual expertise in dealing with these problems. Torous et al. (2021) argue that VR increases symptom assessment and identification. This is especially crucial when the behavioral health symptoms are subtle and cannot be detected by direct observation. Additionally, virtual reality alleviates geographical constraints that prevent individuals from seeking treatment or participating in treatment programs. Virtual reality therapy can also be used as a form of pre-treatment preparation. Pre-treatment refers to the period before undertaking any form of psychological treatment or therapy. Freeman et al. (2017) note that VR can be used to refine coping strategies, identify potential triggers for stress and reduce anxiety before face-to-face meetings with clinicians.

Traditional mental health treatment inevitably relied on clinician interviews and validated questionnaires which are susceptible to individual biases. Virtual reality is able to mirror the clinician’s surroundings while the patient is reliving their traumatic experiences in the virtual environment. This allows clinicians to observe the patient’s expression and body language, which can be sensitive information that cannot be observed during a traditional interview. Additionally, VR offers patients a more interactive experience that allows them to test out different rates of response, such as posture and facial expressions, without being detained by actual clinical questions (Boeldt et al. 773). The potential for clinicians to observe these responses and adapt treatment strategies accordingly will enhance patient compliance and cognitive processing of the treatment strategies with greater accuracy. This is especially helpful for patients who have a history of dropping out of conventional therapies, as well as individuals with chronic mental health issues who are less motivated to participate in clinical interventions or attend regular appointments with their clinical therapists.

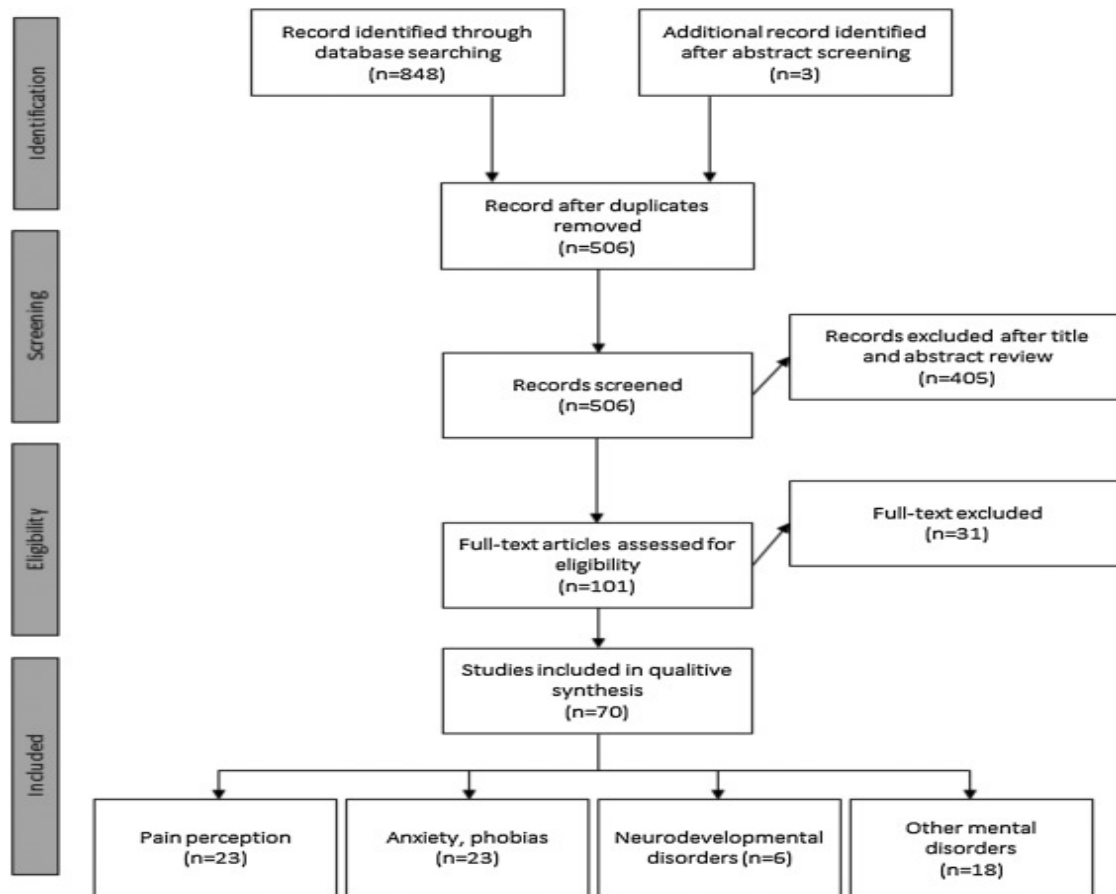


Figure 2: Virtual reality in psychiatric disorders (Adopted from Donker et al.)

Limitations of Virtual Reality in Treatment of Mental Disorders

While VR technology can accrue significant advantages in the treatment of mental disorders, there are several limitations that should be considered. For example, the use of VR to treat mental health conditions may result in some patients who have serious mental conditions being exposed to a virtual environment which can worsen their symptoms. This is especially apparent in conditions such as personality disorder, where VR technology could induce severe

emotional distress in the patient (Park 505). This is due to the fact that VR is a sensory-rich environment that stimulates five senses at once, rather than relatively limited interaction in real-life interactions.

Virtual reality environments are often designed with a specific outcome as their primary objective rather than user-defined objectives. This specific objective may be beyond the user's psychological capabilities, which can result in aversive feelings toward the user of the VR environment generated (Park 505). An example of this is when users are exposed to a virtual reality environment where they are being chased or attacked by an attacker. While this may be considered a desired outcome from the clinical perspective, from the user's perspective, it may induce fear and distress that could negatively affect the treatment process. Further, VR environments are designed for a specific purpose and also use an interface that is user-friendly and intuitive. This can restrict the amount of interaction between patients, and with clinicians, in a treatment program, in the end, impair or negatively affect the extent to which the clinician can suggest coping mechanisms.

VR systems are often designed to be cost-effective. This could limit their ability to accommodate all the scenarios that can arise during psychotherapy sessions. For example, it is common in cognitive behavioral therapy to include a variety of paradigms that are meant to be reinforced and tested within the treatment session. In a virtual reality environment, this requires various devices that can be expensive to purchase and maintain. Additionally, the training time required for clinicians who wish to incorporate VR within their practices can be onerous, which could lead them to deviate from their regular practice (Zeng et al.42). VR technologies are also sometimes built for entertainment purposes, meaning that there is inadequate attention given to the user interface and its usability across various platforms.

Virtual reality environments are frequently set up with specific rules for users that do not always adhere to common clinical guidelines or ethical regulations. This, therefore, increases the risk of unethical behavior from clinicians or patients. This usually stems from clinicians wishing to maintain a proper ethical footing while treating patients with various mental disorders; however, currently, the lack of clear laws and guidelines regarding the ethical conduct of VR practice can inhibit clinicians from being able to treat their patients in a consistent and respectful manner (Zeng et al.42). With growing popularity comes an increased risk of misuse of the technology and potential harm caused to patients. For example, there is often the concern that clinicians may develop unrealistic expectations of the usefulness of VR technology in clinical practice and fail to assess patient reactions to the technology. A similar worry arises when clinicians prescribe VR equipment for patients without proper assessment of their individual needs. This can create a risk of inappropriate treatment where clinicians are prescribing inappropriate technological solutions to their patients' problems as opposed to using traditional methods such as counseling, psychotherapy, or medication. Clinicians are also concerned with issues surrounding the authenticity of a patient's expressions which may be replicated in VR environments.

While virtual reality can be successfully used in mental health treatment, it must be used in conjunction with other treatment methods, such as CBT. Ideally, VR as a treatment method is not sufficient in and of itself. More importantly, unlike traditional treatment methods, this method might not be applicable to all patients, given that they might experience negative side effects or mental health disorders that might require something more specific (Segawa et al., 1409). Thus, this subjective nature of the technology limits the number of potential users it might be applicable to, thus reducing the effectiveness of this approach.

Conclusion

VR has great potential in treating a range of mental disorders. This approach can be applied in the clinical setting to allow patients to manage their emotions and tackle problematic issues head-on. The use of VR to treat mental illness can be particularly beneficial for patients who are socially or physically isolated as it allows patients to participate in treatment without requiring a clinician or carer's direct supervision. This way, people who would otherwise find it difficult to remain engaged in therapy or social activities – such as the elderly or those with mobility challenges – can still benefit from safe, targeted treatment through virtual reality. In this way, VR and other forms of computerized

therapeutic intervention are providing an effective solution for the mass dissemination of therapy and early intervention programs for mental illness. Further, this technology is cost-effective and can be used across a range of platforms, meaning that its reach can extend to those in need, even in areas with difficult access. It allows medical stakeholders to experience the benefits of the technology while providing patients with a realistic opportunity to engage in therapeutic activity and support. Even though VR can be used to treat many mental illnesses, there are many inherent risks that need to be considered.

As the technology is still relatively new, there are many complications that need to be addressed before the mass adoption of VR therapy programs. There is still a lack of comprehensive studies on the use of VR therapy and its effects on mental health conditions, which makes it difficult to validate the claims being made by both researchers and clinicians. The technology still needs to evolve so that it does not cause significant distress or harm to patients. As with any therapeutic intervention, ethical guidelines need to be followed, and legal protections should be put in place to ensure that VR programs are not abused. Further work must also be done to develop more useful interventions for VR and create safer experiences for patients that enable a safe working environment. Further stakeholders need to take deliberate actions to address and minimize some risks associated with VR therapy and its implementation into clinical practices. Finally, as well as ensuring that the technology's use is ethical, it is also essential to monitor its development to ensure that the interests of patients are being taken into consideration.

Future Research and Development in the Field of Virtual Reality Therapy

There is a significant gap in research regarding the use of virtual reality in mental healthcare, which is one of the reasons why current applications are limited. Very few studies have systematically evaluated the different methods of virtual reality delivery, their effect on long-term outcomes, and their effect on patient compliance. There is, therefore, an inherent need for further research. With an increased interest in VR in research and therapy fields, there may be opportunities for VR technology to become more widely applied in mental health treatment. However, there are several challenges in researching this technology. One of the important issues that must be addressed is the potential for adverse effects of virtual reality therapy. Adverse effects such as anxiety, cognitive impairment, and other anxiety disorders are common in people who use the internet for long periods. Furthermore, there is a need to conduct research on how possible adverse effects are related to the type of therapy used. For example, it might be beneficial to compare the impact of virtual reality therapy with other types of therapies to determine whether there are significant differences between VR and non-virtual reality therapies. Another issue that must be addressed is the safety of real-time feedback. The application of VR technology during clinical treatment may be stressful or cause anxiety in some patients. Thus, defeating the purpose, it was set out to achieve. Hence, research must be conducted to determine the best method of real-time feedback, as well as its impact on patients.

Works Cited

- Boeldt, Debra, et al. "Using virtual reality exposure therapy to enhance treatment of anxiety disorders: identifying areas of clinical adoption and potential obstacles." *Frontiers in psychiatry* 10 (2019): 773.
- Birckhead, Brandon, et al. "Recommendations for methodology of virtual reality clinical trials in health care by an international working group: iterative study." *JMIR mental health* 6.1 (2019): e11973.
- Donker, Tara, et al. "Effectiveness of self-guided app-based virtual reality cognitive behavior therapy for acrophobia: a randomized clinical trial." *JAMA psychiatry* 76.7 (2019): 682-690.

- Freeman, Daniel, et al. "Automated psychological therapy using immersive virtual reality for the treatment of fear of heights: a single-blind, parallel-group, randomized controlled trial." *The Lancet Psychiatry* 5.8 (2018): 625-632.
- Freeman, Daniel, et al. "Virtual reality in the assessment, understanding, and treatment of mental health disorders." *Psychological medicine* 47.14 (2017): 2393-2400.
- Gao, Zan, et al. "Virtual reality exercise as a coping strategy for health and wellness promotion in older adults during the COVID-19 pandemic." *Journal of clinical medicine* 9.6 (2020): 1986.
- Jerdan, Shaun W., et al. "Head-mounted virtual reality and mental health: critical review of current research." *JMIR serious games* 6.3 (2018): e9226.
- Norr, Aaron M., et al. "Virtual reality exposure versus prolonged exposure for PTSD: Which treatment for whom?" *Depression and Anxiety* 35.6 (2018): 523-529.
- Park, Mi Jin, et al. "A literature overview of virtual reality (VR) in treatment of psychiatric disorders: recent advances and limitations." *Frontiers in psychiatry* 10 (2019): 505.
- Penn, Rebecca A., and Michael C. Hout. "Making reality virtual: How VR "Tricks" your brain." *Frontiers for Young Minds* 6 (2018).
- Riva, Giuseppe, Brenda K. Wiederhold, and Fabrizia Mantovani. "Neuroscience of virtual reality: from virtual exposure to embodied medicine." *Cyberpsychology, Behavior, and Social Networking* 22.1 (2019): 82-96.
- Torous, John, et al. "The growing field of digital psychiatry: current evidence and the future of apps, social media, chatbots, and virtual reality." *World Psychiatry* 20.3 (2021): 318-335.
- Segawa, Tomoyuki, et al. "Virtual reality (VR) in assessment and treatment of addictive disorders: A systematic review." *Frontiers in Neuroscience* 13 (2020): 1409.
- Zeng, Nan, et al. "Virtual reality exercise for anxiety and depression: A preliminary review of current research in an emerging field." *Journal of clinical medicine* 7.3 (2018): 42.