

## **To What Extent is Virtual Reality Therapy Efficient as A Treatment of Social Anxiety Disorder?**

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**ABSTRACT:** *The effectiveness of virtual reality therapy as a therapeutic intervention for individuals with social anxiety disorder is investigated in this study. This research was created using a meta-analytical method and a review of several studies and conclusions by prior experts. It seeks to obtain a better knowledge of how virtual reality treatment impacts key symptoms and indications of social anxiety disorder, such as self-esteem and social interaction abilities. It also contributes to the current body of research and advances understanding of virtual reality therapy's potential as a cutting-edge, effective treatment for psychiatric issues. The study also incorporates culturally sensitive adaptations to VR therapies that take into consideration individuals' diverse cultural backgrounds. Additionally, the study looks at VR therapy's cost, flexibility, and economic factors. In conclusion, this research paper offers a thorough grasp of the possible uses and restrictions of virtual reality treatment.*

**KEYWORDS:** virtual reality, virtual reality therapy, social anxiety disorder, treatments of psychological disorders, anxiety disorder

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### **INTRODUCTION**

Identified as the most common anxiety disorder (Stein & Stein, 2008) 'social anxiety disorder' is characterized by overthinking and constant anxiety, worry and dread. The DSM-V states that a person must have a significant fear or anxiety for one or more social settings in which they may be the focus of others' attention for at least six months in order to be diagnosed with social anxiety disorders.

Virtual reality therapy has been proven to be an efficient tool for the treatment of anxiety disorders, exhibiting comparable effects to in-vivo exposure therapy (Kothgassner & Felnhofner, 2021). Furthermore, VR therapy creates a secure and regulated setting for patients to face their trauma triggers, and with the help of a therapist, they can develop an effective cognitive coping mechanism. (Son et al., 2022). Creating these situations in real life would be too expensive or

impossible, but with the help of this therapy, these situations can be created feasibly. On the one hand, virtual reality treatment can overcome these drawbacks by stimulating the triggering conditions in a controlled environment and clients can be exposed to the circumstances in a safe and regulated way through this technology. (Kahlon et al., 2019). However, in session exposure therapy as a treatment for anxiety disorders has significant drawbacks. It may not always be feasible to use real life scenarios in the exposure treatment.

### **Rationale**

Talking in general, the development of technology in healthcare has proven to be very accessible and efficient for a variety of illnesses and treatments. Since virtual reality therapy can create a specific stimulated environment, this therapy is now being preferred over traditional therapies. Numerous researches have validated the use of this technology in exposure treatment. Similarly, this treatment can also be used for other disorders like post-traumatic stress disorder, and obsessive compulsive disorder. (Hezel & Simpson, 2019).

### **Research Gap**

Despite the promising outcomes and advantages there is still need for more study in this field. For example, there is very little evidence for its effectiveness in social anxiety disorder. Self-referential processing is the mental process by which knowledge, frequently from the outside world, is connected to the self. This has a big impact on social anxiety disorder. It is important to find out how effective virtual reality therapy is in treating self-referential processing and if this treatment provides long lasting results. Additionally, prior studies have mostly concentrated on virtual reality settings that imitate extremely frightful real-world social encounters (Kampmann et al., 2018). The effectiveness of virtual reality therapy in creating a real life anxiety inducing situation or a particular stimulus such as interactions with people or scenarios that are difficult to create in real life or in traditional therapy treatment needs to be investigated further. Therefore, more research is required to determine the extent to which virtual reality therapies affect self-referential processing and its effects on related cognitive processes.

## **RESEARCH METHODOLOGY**

The research topic of this research paper aims to explore the effectiveness of virtual reality therapy specifically on social anxiety disorder. It seeks to investigate whether virtual reality therapy can improve social anxiety disorders in patients. By examining the efficacy of virtual reality therapy in this specific area, this research aims to add on to the existing knowledge about virtual reality therapy; specifically, to treat social anxiety disorder. As a high school student, I would not have been able to work with real patients with diagnosed social anxiety disorder because social anxiety disorder is a complex condition. Furthermore, since VR therapy is still very new, it would have been quite costly for me to get this equipment as a student. I had made the decision to employ

secondary resources to address my research topic while keeping all of these factors in mind, and this also works well because there is already a vast amount of existing literature on this topic.

### **Thesis statement**

The main argument of this study is that virtual reality therapy has the potential to effectively target self-referential processing related to social anxiety disorder. By creating realistic and immersive virtual environments, individuals with social anxiety disorder can engage in exposure therapy and practice coping strategies in a controlled and safe setting. This will ultimately enhance treatment outcomes for individuals with social anxiety disorder and work as a therapeutic tool.

## **LITERATURE REVIEW**

### **Overview of anxiety disorder**

When a person experiences extreme dread or worry in one or more social situations—like social interactions, doing something while experiencing, witnessing, or performing in front of others—they are said to have social anxiety disorder. The symptoms are severe enough to cause substantial distress or considerable difficulties in social, familial, educational, occupational, and other critical domains of functioning, and they last for at least a few months. (*ICD-11 for Mortality and Morbidity Statistics*, n.d.) There are many different types of anxiety disorders, including social anxiety disorder, generalised anxiety disorder, PTSD, obsessive compulsive disorder (OCD), and generalised anxiety disorder (GAD). A few treatments for anxiety disorders are psychotherapy, medication or a combination of both. The most common therapy for anxiety disorder is cognitive behavioral therapy. This therapy is conducted with a therapist in which negative patterns of thought about yourself and the world are discussed with the therapist to treat disorders. Medication, such as serotonin and norepinephrine reuptake inhibitors (SNRIs) and selective serotonin reuptake inhibitors (SSRIs), are also used to manage the symptoms of anxiety disorders. However, these have side effects and do not treat the main cause. Medications just treat the overlying cause and not the main point of the problem. Some patients may not respond to traditional forms of therapy or medication. Furthermore, there are a lot of setbacks such as access to qualified therapists are not always feasible for everyone and the stigma associated with mental illnesses can also prevent individuals from reaching out for treatment. Such limitations can be overcome by innovative treatments such as virtual reality therapy.

### **Introduction to Virtual Reality Therapy**

Virtual reality therapy also known as virtual reality exposure therapy, uses technology to create computer generated environments which are realistic and interactive and are conducted in front of a therapist in a controlled situation. Using this, patients with social anxiety disorder can confront their fears and anxieties in a safe and controlled setting. During the VR therapy patients are supposed to wear a 3D headset over their eyes which generates a specific scenario decided by the

therapist. For example, a person with the fear of talking to others can be put in a computer generated environment where he has to confront another person asking them for directions. Meanwhile the therapist can see how they react to this situation, and come up with a suitable coping mechanism for the same. Furthermore, therapists also have the option of completely customizing the exposure process according to the patient's reaction to the situation. Due to these reasons VR therapy becomes a flexible tool for clients and patients especially with anxiety disorders and social anxiety disorders. This is also very useful in treating disorders because patient's can practice coping mechanisms in these controlled environments rather than in real life environments.

### **General Studies: Overview of studies that consider VR therapy's potential**

#### **Study 1: Spiegel et al. (2019)**

This study set out to determine how on-demand virtual reality (VR) compared to "health and wellness" television content affected hospitalised patients' discomfort. The researchers used hospitalised patients in a randomised comparative efficacy experiment to gauge this. Two groups, the VR group and the control group, included a total of 120 patients. Using a VR headset, patients in the VR group were given access to a database of 21 VR experiences. On the other side, the control group watched health and wellness-focused television. During their routine care session, patients used a number rating scale to describe their level of pain, which a member of the nursing staff documented. Following the first treatment, as well as after 48 and 72 hours, pre- and post-intervention pain levels were gathered and compared. The findings showed that VR considerably lessens hospitalised patients' suffering. Additionally, the researchers came to the conclusion that VR works best for really severe pain. A randomised control design was employed in the study to assist guarantee that participants are allocated at random and that there is no bias among them. Additionally, it guarantees that the number of confounding factors is minimal, enhancing the validity of the findings. Moreover, a comparison approach was employed by the researchers to evaluate VR's efficacy. To completely comprehend the potential advantages and restrictions of virtual reality, more study is necessary.

#### **Study 2: Nazlıgül et al. (2019b)**

The research paper by Nazlıgül et al. explores the use of interactive three dimensional virtual environment to alleviate public speaking amongst software engineers who were students with public speaking symptoms from a Turkish university. The ages of the participants ranged from 20 to 24. The study used software engineers who often faced challenges presenting their work or ideas in public settings. The researchers designed a virtual environment wherein participants could practice public speaking scenarios. To find a correlation they assessed anxiety levels before and after exposure to the virtual environment. The results of this study concluded that there was a statistically significant reduction in public speaking anxiety after participants used the virtual environment.

This paper addresses a practical and relevant issue, public speaking. This is a common challenge in many professions. So this study has good real world applications. It also specifically targets a specific population and examines the effectiveness of virtual reality therapy in reducing public speaking anxiety. By targeting this population, the study provides valuable information into the potential applications or virtual reality therapy. On the other hand, a weakness of this study is that the target population was only software engineers, which limits the generalisability of the findings to other populations. Another limitation is that the study did not include a comparison/control group which would be receiving traditional therapy or cognitive behavioural therapy. This makes it difficult to determine the specific effectiveness of virtual reality therapy compared to other forms of treatment.

In terms of age, the study used participants from the age of 20 to 24 years old with a majority of female participants. Since this study used a young participant it suggests that the findings are primarily applicable to young adults in their early twenties. This study does not employ a broader age demographic, making it less relevant as it does not consider how a virtual environment might affect software engineers from different age groups. This study was conducted in a Turkish university. This focus on a specific cultural context could be seen as both a strength and a limitation. On the positive side, by conducting this study in a Turkish academic environment, we get to see how the virtual environment may impact individuals within this particular cultural setting. The results can also be applied to countries with similar cultural norms such as Turkey. However, this also limits the papers generalizability to other countries or broader contexts. Different cultures may have diverse perceptions about virtual reality therapy and anxiety. This helps us understand that the findings might not be universally applicable.

### **Study 3: Hoffman et al. (2001)**

The purpose of this study was to investigate if prolonged usage of immersive virtual reality might maintain pain diversion. The study was conducted in a trauma centre. There were seven patients ranged in age from 9 to 32. On at least three different days, each of them underwent a range-of-motion exercise for their damaged extremity under the supervision of a therapist. The study discovered that the severity of the pain did not lessen with time and that patients' estimates of their pain were statistically lower while utilising virtual reality.

Despite having some serious flaws, Hoffman et al.'s work is quite trustworthy because it was founded on quantitative, in-depth study. For example, the patients were not followed up on in the long run, and confounding factors were not evaluated in the study. This presents a validity problem as we don't know if virtual reality therapy has a long-term effect on patients. Second, because the study only looked at burn patients at a trauma centre, a small fraction of patients, and one specific category, it cannot be generalised. Also, generalizability is further limited by the extremely tiny sample size.

The study used participants from the age of 9 to 32. This is a diverse age group ranging from children to young adults. This highlights the papers consideration of age related factors in pain control and virtual reality. The age consideration in this study was very important because pain perception and response to pain management techniques can vary significantly across different age groups

**Focused Studies: In-depth review of studies specifically using VR therapy for social anxiety disorder.**

**Study 4: Wallach et al. (2009)**

Wallach et al (2009 ) examined whether VRCBT can replace CBT. There were thirty individuals in the CBT group, twenty-eight in the VRCBT, and thirty in the wait list control group. Their research revealed that compared to those receiving virtual reality cognitive behavioural therapy (VRCBT), individuals receiving standard CBT (cognitive behavioural therapy) had a higher likelihood of discontinuing the treatment. Additionally, they discovered that, in comparison to CBT, VRCBT is a more efficient and quick treatment approach. The use of VR therapy for public speaking anxiety showed promising results in reducing self-reported anxiety and fear, as well as improving performance, compared to traditional cognitive behavioral therapy.

**Study 5: Geraets et al. (2019b)**

The purpose of this study was to evaluate the viability and impact of virtual reality (VR) based cognitive behavioural treatment on individuals suffering from generalised social anxiety disorder. Up to sixteen VR-CBT sessions were attended by fifteen individuals with social anxiety disorder diagnoses. Surveys and diary evaluations were used to provide a baseline on social activity, social anxiety, and paranoia. At the six-month checkup, post treatment was also completed. Depressive symptoms were shown to have decreased at the 6-month follow-up, whereas the impact on social anxiety had persisted. The findings suggested that VR-CBT could be useful in lowering sadness and anxiety.

**Study 6: Quintana et al. (2023)**

The purpose of this research is to determine whether or not individuals with generalised social anxiety disorder (SAD) experience anxiety more in virtual environments during difficult social encounters than do those without SAD. Two nations' worth of participants were investigated. Researchers utilised 17 Canadian subjects without SAD and 15 Canadian participants with SAD. Also, 16 Spanish individuals with SAD and 21 Spanish individuals without SAD were used. Additionally, each participant was fully submerged in a monitored virtual world. The findings showed that individuals with social anxiety disorder experienced elevated levels of anxiety when placed in a virtual setting. There were no discernible variations in the anxiety reactions of participants from Spain and Canada. However, the group with social anxiety disorder experienced more adverse side effects as a result of being immersed in anxiety-inducing scenarios. This

demonstrates that while virtual reality treatment is a very effective and practical treatment, if the patient is not well monitored while they are in the simulated world, there may be adverse consequences.

Since this study was conducted in both Canada and Spain, it inherently introduces cultural differences into the study. In Spain, social norms may place a greater emphasis on family and community. Similarly, Canada might have its own social norms. These differing cultural norms could affect how participants from each country perceive and respond to social interactions in a virtual environment. Also the level of stigma associated with mental health issues can vary between both countries. In some cultures, such as, Spain there may be a greater stigma towards disorders and therapy. To summarize, recognising and addressing the cultural distinctions between Spain and Canada is essential to understanding the impact of exposure based therapy for social anxiety disorder.

### **Comparative Studies: Research that compares VR therapy to traditional treatment methods for social anxiety disorder.**

#### **Study 7: Bouchard et al. (2017)**

In contrast to in vivo exposure therapy, the study by Bouchard et al. examined the efficacy of virtual reality exposure treatment in cognitive behavioural therapy for social anxiety disorder. The VR exposure group, the in vivo exposure group, and the waiting list group were randomly allocated to the participants. Twenty people were on the waiting list, seventeen were in the VR exposure group, and twenty were in the vivo exposure group. Every participant received 14 weekly CBT sessions. Using the Liebowitz social anxiety scale, the study discovered that VR exposure was superior than in vivo exposure therapy in terms of effectiveness in the post-treatment stage. It was found that VR exposure therapy was far more effective to vivo exposure therapy for both therapists and patients at the six-month follow-up. This study found that, in comparison to traditional CBT exposure therapies, employing VR exposure therapy can be advantageous.

#### **Study 8: Anderson et al. (2013)**

This study compared vivo exposure to virtual reality exposure therapy as a method of treating social anxiety disorder. 97 community members who were primarily female made up the sample's participants. These people named their worst fear as public speaking. They had 8 sessions of VR exposure therapy and vivo exposure therapy after being randomly divided into 3 groups. Before the therapy, after the treatment, and at the 12-month follow-up, self-reports were gathered. The outcome and conclusion of this study was that exposure treatment using virtual reality is just as successful as exposure therapy using a group of people. However, more research with a bigger sample size is required to fully understand the statistical differences between the two treatments.

This study was remarkable for a number of reasons. First, it adopted a random controlled design for its participants, which reduces bias and confounding variables and produces results that are far more accurate and trustworthy. The research also contained a control group, which served as a baseline for the other two groups. A varied sample of 97 participants was also included in the study, which broadens its applicability. Additionally, the study contrasted real-world exposure treatment with virtual reality exposure therapy. Therefore this study provided significant insight into the validity of VRET when directly compared to the best possible alternative namely real-world exposure as a component of exposure therapies.

It would be difficult to totally depend on this study alone, however, due to some of its shortcomings. First, the sample size was too little given that this was a quantitative research, where a larger sample size may have been appropriate. Additionally, as women made up the majority of the study's participants, it cannot be applied to males as a whole. The study may have been improved by adding a second control group that received either CBT or social anxiety medication. Because of this, it is challenging to trust the study's conclusions and outcomes.

#### **Study 9: Horigome et al. (2020)**

This meta analysis research was carried out to assess the effectiveness of VR exposure therapy as a social anxiety disorder treatment. The research had to target people with social anxiety disorder or similar phobias in order to be included, VRET had to be used for at least three sessions, and there had to be at least 10 participants in each study. This meta analysis examined 22 papers in total. The findings showed that the VRET was effective in treating social anxiety disorder and that these outcomes persisted for a prolonged length of time after the study. At the post-intervention, VRET and vivo exposure therapy were comparable, but at subsequent follow-up intervals, vivo exposure therapy was shown to be more beneficial. The study's findings suggest that VRET is a viable and successful treatment for those who suffer from social anxiety disorder, and it has long-lasting efficacy. However, it is probable that over the course of long-term follow-up, VRET's efficacy may decline in comparison to vivo exposure.

For the study, a meta-analysis and systematic review were conducted. The researchers' use of many studies on virtual reality exposure therapy for social anxiety disorder enhanced the study's validity. The inclusion of more papers in the study may have improved the validity of its conclusions. It is nevertheless important to acknowledge the paucity of comprehensive studies on virtual reality exposure therapy for social anxiety disorder.

#### **Study 10: Anderson et al. (2016b)**

In the study by Anderson et al., 28 individuals had received a clinical diagnosis of social anxiety disorders and had undergone eight sessions of exposure group treatment or virtual reality exposure therapy before. The study's researchers employed a behavioural task, an interview, a rating scale, and self-report measures to collect data. Following therapy, they conducted four and six-year



follow-ups. In the follow-ups, participants demonstrated statistically significant improvements on all self-report measures. Following the follow-ups, the individuals reported a 68% improvement in themselves, and the researchers found that 54% of them no longer fit the diagnostic criteria for social anxiety disorder.

Anderson et al.'s study was longitudinal in nature. The researchers were able to monitor the long-term effects of virtual reality exposure therapy for social anxiety disorder because they included a lengthy follow-up period of four to six years. In a group treatment session, the researchers also employed virtual reality exposure. This demonstrates that VRET can also be applied to a wider talent or utilised in a group environment. The study could, however, have several shortcomings, such as failing to take individual variations in VR therapy response into account. The possible effects of comorbidity are also not taken into account in this investigation. When it comes to their response to VRET, patients who have co-occurring mental health illnesses may react significantly differently than those who merely have one diagnosis. Consequently, more research is required to overcome these constraints and offer a more thorough comprehension of VRET's efficacy for social anxiety disorder.

## **DISCUSSION**

### **Long Term Effects**

Avoidance of the anxiety provoking situation has often acted as a negative reinforcer which maintains the avoidant behavior and therefore the anxiety towards the situation or event. VR allows patients to confront their anxiety provoking situation and to navigate under supervised conditions around the anxious situation which can be one of the key factors that ensures long term effectiveness of VR based treatments. In their meta analysis Horigome et al (2020) found evidence for the long term effectiveness of VRET which when compared with the findings of Lorimer et al. (2021) who found that around 29% of patients undergoing only CBT treatment for SAD have shown to have relapsed. Thus validating the effectiveness of VRET as a long term solution of SAD as compared to a traditionally well established therapy. Similarly in the studies conducted by Anderson et al., they also found evidence for long term effectiveness. They stated that at the 12 month follow up, participants showed significant improvement. In the second research, they found that at the six year follow-up 54% of the participants no longer met the diagnostic criteria for social anxiety disorder as an effect of the VRET treatment. The use of VR treatment has also got validation from real world practitioners. Practitioners such as Lucy Dunning, a licesend professional counselor in Georgia, and Dr. Donna Davis, director of the Oregon reality lab in Portland, Oregon; in a Forbes Health magazine article provided their support for using VRET as a treatment for people with PTSD, anxiety and chronic pain. VR therapy can help someone feel safe when conventional methods fail (Laurence, 2023). Another conclusion that could be found out from the above literature review was that, in terms of long term effectiveness, VRET was found to be more effective compare to in vivo exposure therapy. (Bouchard et al., 2017b)

There are multiple people who think that VRET is very efficient because it benefits people and provides them immediate relief. But this is not the case. Social anxiety disorder takes a long time to cure, no matter what the treatment technique. However, when people with social anxiety disorder face their fears in a controlled environment in front of a therapist, it is more likely that they would be able to develop a coping mechanism which could be used in real life. Furthermore, since the stimulated environments relate closely to real life environment, it is more likely that patients would get more comfortable when facing anxiety induced situations in their real life. Nonetheless, there is also significant evidence that has found that people treated with VRET have found difficulty when dealing with real life situations. There is limited research done about the long-term effectiveness of VRET so further research needs to be done to make sure VRET is a long lasting solution for people with social anxiety disorder.

### **Cost**

As seen above VRET is a great way to help patience with social anxiety disorder. However, there is another factor that is very concerning. VRET can be quite expensive since it is a new technology, this means that it cannot be accessed by everyone. To do a VRET treatment, special equipment and software are needed. Not only this but other miscellaneous expenses also need to be considered to perform the treatment; for example, an internet connection. According to statistics from IDC, in 2022, shipments of VR and AR headset came to a global average of 9.7 million dollars. According to Bloomberg's reports, Apple's head mounted computer display would cost around \$3000 (Gurman, 2023). According to the US bureau of labour statistics, a psychologist median pay is \$41 hourly (*Psychologists : Occupational Outlook Handbook: : U.S. Bureau of Labor Statistics*, 2023). So it is difficult to tell how many therapist and mental health can afford to offer we are services. Despite this, practitioners are trying to get their hands on VR services. Xavier Palomer, founder of Amelia Virtual care, states that their software has been used to treat more than 20,000 patients and it is being used by more than 2000 mental health professionals around the world(Eadicicco, 2023b). This suggests that although VR therapy may be effective, it could not be within the reach of the majority of practitioners worldwide. But if VR therapy gains popularity, it might also become more affordable, enabling more practitioners worldwide to include it into their practises.

### **Summary**

Virtual reality therapy has emerged as a useful therapeutic modality in recent times, particularly for the treatment of anxiety disorders. Virtual reality exposure therapy has been proven to have a substantial effect size in meta-analyses pertaining to social anxiety disorder, indicating its validity and efficacy as a treatment for the condition (Carl E et al., 2019). According to earlier studies, computer-generated settings can be used to treat social anxiety disorder patients in an effective manner (Kampmann et al., 2018). Virtual reality therapy has proven to be a promising therapeutic option for those with social anxiety disorder, according to the studies mentioned above.

Regardless, to lessen any potential harmful side effects, it was also shown that appropriate monitoring and supervision during VR treatment is vital. For instance, Quintana P et al.'s study, which investigated the possibility of VR exposure therapy for patients with social anxiety disorder, discovered that participants in computer-simulated environments could successfully elicit anxiety, which could have unfavourable side effects. In summary, prior studies indicate that virtual reality therapy is a useful therapeutic modality for social anxiety disorder but monitoring and supervision is needed.

## **CONCLUSION**

Conducting this literature review helped me understand multidimensional effects of using VR as a therapeutic tool. Though not being able to conduct a primary research in this area was seen as a drawback, in retrospect a primary research conducted by a high school student would not be able to share as much light as was possible by conducting this literature review study. Overall, the positives of VR evidenced by its culture fareness, far outweighs its negatives of which the prominent one seems to be cost. As technology builds further cost can be reduced as it becomes more common with masses.

## **Reflection**

My sphere of interest has considerably expanded as a result of writing this research paper. When I started writing this paper, I knew I wanted to write a research paper on psychology. I started researching themes and previously published research papers to have a better understanding of how a research paper is prepared. Initially, I was somewhat perplexed. Selecting a topic that was both manageable and personally relevant proved to be challenging for me. Ultimately, I focused on the topic "To what extent is virtual reality therapy efficient as a treatment of social anxiety disorder?" after narrowing down my list of concepts and inquiries. I learned a lot of important facts and information from this investigation that I was previously unaware of. I knew a little bit about virtual reality and social anxiety disorder, but I had no idea that it might be utilised to treat conditions. My only assumption was that it could be utilised for entertainment. I now know that virtual reality is not only a viable therapy option for social anxiety disorder, but it can also be far more effective than traditional methods in some situations.

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