

The Impact of Virtual Reality Technology on Public Speaking Anxiety

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Abstract

Individuals struggle with anxiety ranging from that of mild to severe anxiety disorders, which require much more in-depth treatment. These widespread feelings of anxiety demand a widespread and accessible treatment option. Some individuals have turned to virtual reality technology. This single participant design explored how effective the use of publicly available virtual reality (VR) technology, through an application called Virtual Speech, is in treating anxiety at a subclinical level. The study used a student in a speech class who has a fear of public speaking. This single participant filled out a questionnaire about their speech prior to ever giving the speech, after partaking in a required speech lab, and after the speech was given in class for a grade. This questionnaire sought to understand the thought processes of the participant, as well as the physical reactions to the speech. I hypothesized that would be a decrease in anxiety with each questionnaire, but actually resulted in a varied level of anxiety, with the highest anxiety score being after the VR app, followed by the post speech score, and finally the pre-speech lab being the lowest. The potential limitation to the data is the impact that rehearsal helped to reduce anxiety, as well as a need for one additional questionnaire to have been given after the speech lab. As the student gave the speech multiple times, there is a chance that the reduction in anxiety has to do more with being better prepared for the speech, thus reducing the public speaking anxiety, as opposed to the anxiety being caused simply by giving the speech for an audience.

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Introduction

The vast majority of individuals have been impacted by the technological advancements of the 21st century. These advancements have placed a TV in practically every room, and a smartphone in the hands of most children. This advancement in technology has pushed for improvements in a number of other fields to keep up with the ever-changing society. It has also pushed for more research into the impacts of technology, particularly for children. There are imaginative people thinking of new uses for this technology every day. Psychology and the treatment of mental health are no exception to this imagination. These advancements open new doors for treating mental illnesses that have never been considered before.

1 in 5 Adults in the United States experience mental illness (National Alliance on Mental Illness, 2019). There are few individuals who have not been touched by some form of mental illness, whether they have one themselves, or they know someone impacted. Every day there are new diagnoses of ADHD, anxiety, and depression, as well as less common illnesses, such as dissociative identity disorder or schizophrenia. Mental illness is all around us, and yet, there is still so much that needs to be done to treat it.

Despite the growing number of individuals impacted by mental illness, the more challenging statistic is that 60% of mental illnesses remain untreated (Medscape, 2015). This was the case in 2011, with the number of cases growing every day. This gross lack of treatment is caused by any number of problems, from lack of money to lack of time, to lack of awareness. Treatment options are out there, but individuals are not necessarily aware of them. Society is ever changing, so why shouldn't treatment keep up with it?

The need for more accessible and cheaper therapy is apparent in today's society. This need has led to creative therapists searching for the best possible solutions. The most recent solution has come down to virtual reality therapy (VRT). This virtual reality technology can present itself in many ways, from projections, to handheld devices, to apps on a phone, all of which can be used in various locations. By synthesizing psychology and technology, one is able to reimagine the use of virtual reality technology as a means of healing a large number of untreated mental illnesses. This treatment has the capability of becoming the most effective and primary treatment for those with mental health problems.

The impact of technology on an individual must be looked at in conjunction with the importance of therapist involvement in such treatment methods. All in all, VRT has great potential to be beneficial to many, given the right circumstances.

The demand for better access to treatment had resulted in the exploration of the use of technology, more specifically, virtual reality technology. In order to properly understand using VRT as a solution to untreated mental illness, one must consider the implications of such a thing. This exploration raises the questions, what is virtual reality technology, and where did it come from? How does the technology itself impact the individual, and will it replace a therapist in treatment? The virtual reality is potentially a game changer, but this reality does not come without question. With the advancements of technology come the complications of overexposure, the effects of the blue light emissions, as well as the question as to how technology impacts the development of children. Researchers from all over the world seek to understand exactly how much technology is too much, as well as the specifics as to what technology does to us as individuals.

Technology

While some effects of technology seem evident, there is new research discovered every day, in particular with how expansive technology has become. This expansion has so many benefits and possibilities, but also introduces a world of unknowns, especially to the specific impacts of technology. Several groups of individuals have done research to take a closer look as to how technology has begun to impact our everyday lives. Several studies have been done, discussing why children should have limited exposure and how the technology itself effects sleep and development. Outside of the pediatric realm, studies have sought to understand how screen time impacts our sleep. Some look into this with great detail, such as how blue light exposure impacts our development. These studies all indicate the harmful impacts that technology can have, but, for the most part, do not rule out its potential effectiveness as a tool.

According to the American Academy of Pediatrics and the Canadian Society of Pediatrics, infants aged 0-2 years should have no exposure to visual media, 3-5 years be restricted to one hour per day, and 6-18 years restricted to 2 hours per day. Cris Rowan is a pediatric occupational therapist, biologist, speaker, and author. She came up with 10 reasons as to why children under the age of 12 years old should have limited, if any access, to visual media. Her first reason is that brains are rapidly developing up until the child is 21 years old, at which time, the brain has almost tripled in size by the time the child is a toddler (Christakis, 2011, page 1). Early brain development in particular is affected by external stimuli in big ways. If these external stimuli include a gross overexposure to technology, it can lead to problems with attention, executive functioning, cognitive delays, impaired learning, increased impulsivity, and a decrease ability to self-regulation. Self-regulation is an extremely important and already difficult skill to achieve, and Rowan indicates that overexposure to technology leads to lack of the ability to regulate, and therefore ultimately more tantrums.

She goes on to discuss the brain development of a child further, indicating that movement plays a key role in a child's development. When a child is engaged in so much screen time, they are moving much less, and therefore their brain development is delayed. Part of this critical time in a child's life is their attachment that they form with their parents. More and more parents are on their phones in recent years, therefore leaving the child open to attach to something else. This something else, as scary as it sounds, is often technology. This can lead to an addiction to the technology itself, which is a problem on its own, but is even worse when you consider that a child is growing up and developing, while being addicted to visual technology.

Beside the developmental effects that come with the early use of technology, there are a number of long terms effects that the use of technology plays a part in as well. According to the study, children who have a device in their bedrooms have a thirty percent increase in obesity (Feng, 2011, page 1). These risks are scary enough alone, but childhood obesity specifically can lead to a number of other health concerns, including an increased risk for stroke and heart attack. Additionally, the technology in a child's room often causes sleep deprivation, at a very critical time in their development. Not only do children need sleep to develop properly, but sleep deprivation can lead a detrimental drop in grades. Besides the more immediate effects of the impact technology has on children, there are also a number of long-term problems that imply that technology is a factor in their development. These can include childhood depression, anxiety, attachment disorder, attention deficit disorder, autism, bipolar disorder, psychosis, and problematic child behavior. Beside the diagnosable side effects, media, violent or otherwise, can lead to aggressive behavior and short attention spans. In order for a child to really engage in learning, they must be able to pay attention.

Dr. Feng would be the first to agree that sleep is incredibly important in the lives of everyone, but children in particular. Much of a child's development occurs through sleep, which is time and time again proven to be a vital part of development. It's no wonder that children take so many naps. It is for this exact reason that a group of researchers, through Penn State University, conducted a study assessing the bedtime use of technology, and potential sleep problems that go along with it. No doubt that these individuals, like Dr. Feng, agree that technology can have a negative impact on children, but they wanted to look specifically at sleep habits in regard to technology. This study consisted of surveys given to parents of 234 children, ranging from age 8 to 17. These surveys identified the hours in which their children used technology (including computer, video games, cell phones, and television), as well as hours of sleep, and inattentive behaviors. Their studies found that college aged adolescents experienced decreased sleep quality, increased inattention, and an increase body mass index (Fuller, Lehman, Hicks, & Novick, 2017, page 1). In adolescents they found a lack of productivity, depression, lack of energy, and poor performance in school. They found that sleep is often put off by the use of electronics, as there is typically not set start or end time to their use. Additionally, if a child is viewing media, it often times arouses one's physiological, emotional, or mental state, which makes sleep much more difficult. Lastly, the light emission from screen may be affecting sleep. The three variables in which the researchers focused on included BMI, sleep quantity and quality, and inattentive behaviors.

Researchers hypothesized that increased screen time would be negatively correlated with sleep quality and child attention and could contribute to overweight and obese children. They found that children who watched television or used their phones at bedtime were more likely to be overweight than those who did not. Additionally, those who watched television, on

average, got 30 minutes less of sleep than those who did not, and those who used their phones got approximately 1 hour less of sleep than those who didn't. Those who played video games were more likely to have trouble staying asleep than those who did not. Researchers found that there was an inverse relationship between sleep quality and amount of electronic use (Fuller, Lehman, Hicks, & Novick, 2017, page 2). Overall, those who used electronics before bed were more likely to be tired in the morning than those who didn't. "Along with all of the benefits of technology, however come repercussions. It is important to be aware of how this new age of technology may influence the coming generations so that we may be prepared to offer recommendations as to prevent the harmful effects of overexposure, (Fuller, Lehman, Hicks, & Novick, 2017, page 7)."

Technology hold potential to have very negative impacts on the development of a child. While these impacts seem big a scary, as with many other things in life, moderation is key. If technology were implemented into therapy, it would be used solely as a tool. If there was that great of a concern with developmental delays, with therapy to blame, other steps can be taken to prevent some of these problems from occurring. Setting limits and guidelines, in particular for children, as to when and how to use technology can go a long way in the prevention of these in-depth extreme overuse situations. That being said, technology also has potential negative side effects for everyone else, not just children. Both Dr. Feng and the doctors from Penn State would encourage cutting of the use of technology for children for the sake of their sleep and their development. That being said, there are other hazards that impact more than just children, such as the newest blue light exposure phenomenon that seems to be a hot button concern for technology users.

A group of researchers' from Oregon State University were particularly interested in the overexposure to technology, and the blue light emissions that coincide with excessive screen time. While pop culture tells you that being exposed to blue light from being on a screen all day is bad, they don't really tell you why. Society wants to tell you that getting blue light glasses will solve all your problems, but professors from Oregon State wanted to know what actually was going on. They decided to take these questions to the lab, and research the effects in *Drosophila*, a specific genus of flies.

The particular interest of this experiment was the impact of blue light on sleep cycles. According to their research "Humans are exposed to increased amounts of light in the blue spectrum produced by light emitting diodes (LED's)," (Nash, Chow, & Law, 2019, page 8). They indicate how the long-term effects are not yet understood, as this concept is relatively new, and therefore there is significantly less research to support it.

Their research consisted of comparing the lifespan of white adult flies, kept in alternated light and dark environments, compared to those kept solely in a dark environment. They assessed specifically the aging effects on the flies, which is measured largely in their abilities to move in a vertical motion. All in all, they found that the blue light causes a more dramatic reduction in the media lifespan of flies, as well as a correlation between blue light exposure and a reduced lifespan. They concluded that blue wavelengths were mainly responsible for the shortened lifespan. In addition to the lifespan impacts, researchers found that vacuoles or vacuole like structures were formed in the brains of the flies exposed to blue light. Brain neurodegeneration went hand in hand with accelerated aging, ultimately determining that blue light exposure can impact even the anatomy of the brain.

Researchers also looked into the impact of light on the fly's circadian clocks. It was hypothesized that having a well-functioning circadian clock could create some sort of resistance to the effects of blue light exposure, as it allows for resistance for a variety of other stressors. They ultimately determined that it provided no protective measures against the blue light exposure.

This study is solid proof that exposure to blue light emissions from screen time can have quite a negative impact on an individual. But this data was taken with extreme measures. Fifty percent of the time the flies were exposed to blue light, in which caused a detrimental effect. While blue light exposure should be taken into consideration in regard to the use of technology, it should only be taken with a grain of salt. In most cases, an individual is not exposed to blue light for fifty percent of their lives, and if that is the case, there are preventative steps, such as glasses and screen coverings that can help reduce, if not even diminish, the effects of the blue light.

All in all, there are quite a few negative impacts that technology can have on an individual. Dr. Feng reminds us of the developmental delays, while researchers from Penn State and Oregon State caution in regard to sleep and blue light exposure. While these are concern, there are also quite a few concerns that can come from playing sports, or working out, or even taking classes. Even too much of a good thing is a bad thing, which is exactly why the idea of using technology for therapy is still a reasonable one. If used in the appropriate light, being seen as a tool, not a reward, technology has the potential to enhance the therapeutic process in unimaginable ways.

Virtual Reality Therapy

This impact technology comes in the form of virtual reality therapy. Using the virtual or augmented reality technology and devices would enhance, not replace, the therapeutic process. These ideas have been researched and implemented for years. They have been seen on television shows, received media and textbook attention, as well as had led to the development of more than a few new methods and organizations dedicated to the advancement of the craft, with the ultimate goal of helping people get better.

One of these methods comes in the form of Audio-Visual Assisted Therapy Aid for Refractory auditory hallucinations, or AVATAR therapy. This is a relatively new method of treatment, with the potential to treat many individuals who have not found success with other treatment methods. The idea is to “create a direct dialogue between a voice-hearer and a computerized representation of their persecutory voice (the avatar) through which the person may be supported to gain a sense of greater power and control,” (Craig, Russo, & War, 2015, page 1). In other words, the participant is intended to create a visual representation of the voices in their head, specifically in the form of an avatar. The idea is that the therapist would communicate as the avatar, with a modified voice to best match that of the participant’s voice. The initial objective was to reduce the occurrence and intensity of the hallucinations. By giving the participant the power and control to confront their voices in a more visual sense, the goal is to ultimately reduce how often these voices occur. In addition, the study sought to “explore explanatory mechanisms of action and potential moderators, to carry out a qualitative evaluation of participants’ experience and conduct an economic evaluation,” (Craig, Russo, & War, 2015, page 7). The study consisted of 142 participants, all of which with schizophrenia or other psychological disorders in which they experience auditory hallucination for more than 12 months. In addition, these participants have received other treatment but has been either

ineffective or had very limited impact on the patient. These participants went through 7 sessions of AVATAR therapy. Throughout these treatment sessions, the participants are assessed at 0 weeks, 12 weeks, and 24 weeks, all of which took place in a community based mental health center.

In terms of the science behind the technology, the theory is that participants experience voices because they are “misattributing an internal experience to an external source,” (Craig, Russo, & War, 2015, page 2). The researchers then decided to take this internal experience and put it in an external form, via the creation of the avatar. The voice of the therapist is modified to sound closest to the voice that the participant hears. Then a conversation is had between the therapist, as the avatar, and the participant. The design is set up in two separate rooms, with linked computers, in which the therapist has the ability to see the participants monitor and responses, as well as the ability to adjust the therapeutic interventions. The participants feel as if they have control over the simulation and the confrontation of their voices, while all in all, the therapist is really in charge. The therapist has the ability to adjust the settings, as well as predict distress from the patient, adjusting the simulation to better fit their needs. All in all, the participant can end the simulation at any time, therefore giving them the control. This control is something that patients are often seeking, and therefore plays large role in the effectiveness of the treatment. Ultimately, after the treatment sessions, analysis will include a qualitative evaluation. This will consist specifically of an interview between the researchers and the patient, discussing how the treatment has impacted their auditory hallucinations.

All in all, AVATAR therapy is seeking to be aware of the harmful effects that technology can present. The methodology seeks to meet the patient where they are and provide a new method to those with little success elsewhere. Beside AVATAR therapy, other forms of virtual

reality therapy are being developed to solve other specific problems, such as anxiety filled situations. One example of this is DEEP: A Biofeedback Virtual Reality Game for Children At-risk for Anxiety.

Researchers from the Behavior Science Institute from Radboud University, in the Netherlands, are particularly interested in DEEP. Childhood anxiety can lead to many other problems, such as substance abuse, academic failure, risky sexual behaviors, and suicidal behavior (Rooij, Lobel, Harris, Smit, & Granic, page 1990). They discuss how, particularly in children, breathing and the regulation of breathing is key to calming down. Physiological reactivity is the body's response to a stressor and can include heart rate and breathing. In response to physiological reactivity is physiological regulation, which is the body's capacity to regulate or dampen arousal levels (Rooij, Lobel, Harris, Smit, & Granic, page 1990).

The game is designed as an underwater world in which the patient can move through the simulation in their own control. The game then allows for the tracking a variety of things, including diaphragm expansion. This is more or less how deeply someone is breathing and help set goals for someone who is experiencing anxiety (Rooij, Lobel, Harris, Smit, & Granic, page 1991). When an individual is feeling anxious, their breath is often shallow and does not fill the diaphragm, which is what calms an individual down. Through the game monitors, "players diaphragm expansions are recorded (using a variable resistor/stretch sensor) and directly feedback into the game. As the player inhales properly, her diaphragm expands and sensor resistance decreases," (Rooij, Lobel, Harris, Smit, & Granic, page 1991). The player is able to see their breathing through the expanding and constricting of a circle on the screen. In addition, the breath impacts the gameplay itself. If the lungs aren't filling to at least 50%, gravity is enforced, making game play more difficult. The direction of the player's breath determines the

direction and force that the player moves in. Slow and deep breathing allows players to move better, therefore encouraging diaphragmic breathing.

All in all, this is effective because it teaches anxiety coping skills in a fun and imaginative way that has a greater possibility to continue long term. The biofeedback and use of virtual reality give the player control over their own experience, and therefore can help retain new skills without even realizing it. As a whole, they found that the experience reduced self-reported state anxiety, as well as an increase in the transition to diaphragmic breathing, which is the ultimate goal (Rooij, Lobel, Harris, Smit, & Granic, page 1992).

This same kind of research has led to new programming, some of which allows a child to remain engaged with the therapeutic process. One specific treatment for Attention Deficit Hyperactivity Disorder (ADHD) is neurofeedback, or electroencephalography (EEG) biofeedback. This is essentially an individual's brain sending electrical signals, representing the "state of arousal of the brain," (Wang & Reid, 2011, p. 4). Those with ADHD have different signals than a traditional child, and this method of therapy encourages those children to regulate his or her own signals to more closely match those of a typical child in their age group. This is where the virtual reality comes in. While the virtual reality simulation may not be doing the treating itself, it is used as a reward. In this case, the reward is a dinosaur egg being hatched when the child is able to successfully regulate. Therapy involved reinforcement and reward so much that a therapist will ask their child what they are "working for" or earning. While nearly every child loves stickers and candy, the possibility of using something more exciting to entice the children could greatly reduce the number of reluctant kids when it comes to going to therapy. In addition, the EEG experience is somewhat uncomfortable, and can even be scary. By rethinking the use of VR, this once scary task becomes an enjoyable game.

AVATAR therapy, DEEP, and working with neurofeedback for ADHD are all focused on treating specific problems, in innovative and unique ways. These methods advanced right along with society and came up with alternative and new treatments because of it. In general, this is much of what VRT is seeking to do, with many more people doing research to advance it further.

Virtual Reality: Recent Advances in Virtual Rehabilitation System Design is a book discussing the use of VRT, its effectiveness, and the research that is currently being done in regard to it. The book begins with a brief introduction, and an overview of the findings in the use of virtual reality therapy. While the introduction indicates that the idea of using this technology as therapy is a good one, it emphasizes the need to ensure that it is done properly. The overall thesis is essentially stating that virtual reality therapy has great potential but needs to address some problems first. It mentions the need for standardization of the technology, and the considerations that must go into it. For example, a full body virtual reality machine may be useful in an office setting, with the funds to afford it, while at home, a much cheaper individual virtual reality device could be used for at home treatment. It is noted that technology does not always work, and various impairments, such as gaze detection, could impede the virtual reality process. While initially this seems to be poking all the flaws in this innovative method, it is simply setting up the reader in a position to rid them of the doubts they may have.

There is an entire chapter dedicated solely to ensuring the best technologies for the best results are being used. This chapter supports the uses of virtual reality therapy, because it directly calls out the fact that if the technology is not used in the appropriate manner, it could be ineffective. Not only does it expose this potential for error, but it in turn provides guidelines for what device is best used for what location, in terms of accessibility and affordability.

One possible problem that is addressed by these series of essays, is the limitations of virtual reality technology that coincide using a mobile phone. Among the best points made discuss how the intention of virtual reality is to alter behavior, which can yield beneficial results, but can also lead to violent behavior. Researchers laid the problems out with the procedure and the findings of their study, indicating the discomfort with the speed of movement in the virtual reality, as well as the lack of planning ability. They are not shy to support the use of VRT but are transparent in that this is still a developing technology.

A later study within the book analyzed the use of a telepresence exposure therapy. In Lehman's terms, a simulation where the client is at home, and the therapist at a clinic (or whatever setting they practice in). The goal of this style of treatment is to assimilate the patient to face their fears, while allowing the therapist to "be there" in order to keep them grounded. This is effective for the treatment of phobias and PTSD. This particular argument supports the thesis incredibly well, as it is a huge advocate for Virtual Reality Exposure Therapy (VRET). The study addresses how many individuals will drop out of therapy due travel to the clinic, the heightening of symptoms when therapy begins, and lack of engagement. This argument is directly stating that VRET would fix all three. They even take it a step further, and advocate for telepresence, or a simulation experience, would further "fix" the presented problems. The headset goggles are beneficial and useful, but can block the non-verbal cues, and lack the security of having a therapist by your side. Not only does this present a clear argument for why tele-VRET is beneficial, but it presents a clear understanding of the problems that could go along with it. In addition, this study presents the system by which the therapy could be applied. The authors advocate for large projections, with the use of silhouettes to present the illusion of a reality. There are a number of prototypes already in play, they are clearly educated, with a game

plan to move forward. This study presented and described all aspects of the problem well, including the potential problems, as well as potential solutions, supporting and defending the use of virtual reality technology as therapy.

These therapeutic measures seek to aid everyone, both at a clinical and subclinical level. A study published in the Brazilian Journal of Psychiatry in 2018 analyzed the use of VRT to treat women who had anxieties about driving. Through the study they observed 13 women who were exposed to VRT 8 times. After the study was complete, there was a “decrease in the frequency of distorted thoughts and state anxiety scores, as well as a slight improvement in the quality of life” (Costa, Carvalho, Ribeiro, & Nardi, 2018, p. 192). The fear of driving is just one instance in which multiple people were helped, with the convenience and the safety of knowing they were in control. There are thousands upon thousands of phobias in existence, each of which has the potential to be cured with the assistance of virtual reality exposure therapy (VRET). These fears are so vast, that the treatment requires a creative, imaginative look, such as VRET.

VRT for Post-Traumatic Stress Disorder

Virtual Reality Therapy has been used to treat a number of specific mental illnesses. This technology is perhaps used most prominently for Post-Traumatic Stress Disorder or PTSD. There are a number of organizations dedicated to using this technology, many specifically focusing on veterans who are experiencing PTSD.

Many individuals who experience PTSD often find problems in describing what has happened to them, as they are difficult events. This leads to a huge importance in being able to listen with a huge amount of respect and empathy, and without judgement. How someone listens can greatly impact how the individual with PTSD feels and could in turn impact how they open up about what they experienced or are feeling. (McGrath, 2018, page 26). Keeping the important

of listening in mind, AMITA Health Family Foundation Residential Treatment Center has a treatment plan involving virtual reality therapy to treat veterans with PTSD. This plan uses “a Virtual Iraq/Afghanistan 3-D Combat Simulator, which is a graphic representation from the perspective of a soldier of what it is like to be in Iraq,” (McGrath, 2018, page 27). This simulator seeks to include multiple senses, with vibrating platforms, goggles, earphones, and a scent producing machine, all to emulate the war zone as close as possible. The use of this technology is a part of exposure and response prevention, in which patients are intentionally triggered to become more used to the triggers, while helping to respond without violence, anger, panic, sadness, or whatever emotion typically goes along with their post-trauma response (McGrath, 2018, page 27). McGrath continues to discuss how veterans with PTSD typically treat themselves by avoiding these thoughts and experiences. While this is beneficial for a time, ultimate healing comes from the ability to address their issues head on. The sessions seek to include more and more sensory aspects, from sound to smell to the physical movements.

Not only does this technology work for the traumatic event in itself, but also potential other side effects. For instance, an individual who experienced PTSD and coped with the use of alcohol can use the simulation to walk past a beer aisle in a store. They can include the smells of alcohol to further the effects (McGrath, 2018, page 29). The technology allows for an individual to face their fears in a way that they are still ultimately in control, without having the same impact of being in a war zone, or a place where they could easily grab a beer.

According to Dr. Robert McLay, in an interview for the *Scientific American Mind* magazine (2013) the most effective treatments for PTSD are those that confront trauma. When people feel as if they are in the traumatic circumstance they can “learn how to confront painful reminders of trauma without facing any real danger,” (Sipple, L., 2013). A typical session works

to include a therapist coaching their client through the challenging they are facing, being careful to prevent the client from feeling overwhelmed. They do this through the use of physiological monitoring devices, as well as talk therapy during the simulation. The ultimate goal is to “desensitize patients to their trauma and train them not to panic, all in a controlled environment,” (Sipple, L., 2013). The results of this have been proved effective, with indication that the use of virtual reality therapy to treat PTSD has restored more normal functioning of certain patterns of brain activity (Sipple, L., 2013). This concept is also used by a number of other organizations.

One of these organizations is Bravemind, a virtual reality-based company. This organization has undergone significant changes over the years, in terms of both accessibility and affordability. In terms of the mechanism itself, the organization was able to go from a \$25,000 head mounted display that was incredibly heavy, to that of an \$800 lightweight headset (Waldrop, 2019, p. 2). This revolution has made this treatment available to many more individuals, with the benefits being just as impactful. One of the first uses of the old heavy VR machine involved a woman who witnessed and ran from the falling of the Twin Towers. This woman was deeply traumatized, but through the help of Bravemind, she was able to uncover and process a repressed memory, reliving the moment of the falling towers, with the comfort of knowing that ultimately, she is in control (Waldrop, 2019, p. 4). She had memories repressed deep in her brain and was able to face and recover them with the use of VRT.

Bravemind also introduced the idea that tricking the brain is the name of the game. “Presence” is a psychological phenomenon, mostly simply stated as an illusion. Essentially, it is the name for when someone feels like they are in an environment, when they are not. The technology itself provides position sensors that “shift the synthetic images in a way that the computer calculates from the 3D geometry of the scene,” (Waldrop, 2019, p. 3). The brain is

already expecting the images it is seeing to shift in a manner that responds to their physical moments, therefore causing the brain to interpret the scene as if it were real. While the technology itself is fascinating, what is even more shocking is the result. Through studies, Bravemind was able to prove that brain activity was improved through the use of this therapy. The hyperactivity typically seen in an individual with PTSD's amygdala and hippocampus were calmed, as well as a restoration of normal frontal-lobe activity, which is often inhibited, accounting for the "emotional numbing and social withdrawal" typically seen in patients. (Waldrop, 2019, p. 5). This technology has proved successful to patients for years, but Bravemind workers are striving to do more. They are looking to incorporate a virtual coach, who will help guide and personalize the treatment to allow for more effective methodology (Waldrop, 2019, p. 7). As wonderful as technology is, human interaction is still key.

All in all, VRT for PTSD has proven effective, and is still in the works to become even more effective. The many program that took the concept of VRT and used it to meet their needs and specifically solve problems. The goal of VRT is not to replace a therapist in a session, but to provide another tool to use. After all, the patient therapist relationship is key to a successful therapy experience.

Patient Therapist Relationship

As beneficial as Virtual Reality Therapy is, it lends itself to a scary age in which technology replaces people. This is not, and should not be the fact with therapy, as the therapist relationship with their patient plays a huge role in the healing of the patient. A number of individuals, through the Department of Psychiatry at the University of Oslo sought to analyze the patient-therapist relationship among individuals who were involved in dynamic psychotherapy. They sought to understand the "long-term effects of relationships work in the context of patients'

levels of personality pathology and therapists self-reported parental feelings,” (Dahl, Rossberg, Crits-Christoph, Gabbard, Hersoug, Perry, Ulberg, & Hglend, page 460). These researchers used a control group who received no relational interaction compared to those that did. They were specifically looking at the parental feelings that the therapist would experience and concluded that long-term relational work contributed to these feelings. Even in situations where there were low parental feelings, the relational work was regarded in a positive light. That being said, when the parental feelings were stronger, hand in hand with relational work, interventions by the therapist were more positive than those without (Dahl, Rossberg, Crits-Christoph, Gabbard, Hersoug, Perry, Ulberg, & Hglend, page 460). Essentially, having a relationship led to having a more positive experience with therapeutic interventions, indicating the importance of the relationship between the patient and the therapist.

Suzanne M. Peloquin is an occupational therapist, dedicated to the understanding of the profession. Much like those from the University of Oslo, she understood the impact that the relationship with a therapist has on the treatment. Through her experiences and research, she touches on how there is a difference between emphasizing competence in a therapist, while there is now a greater shift toward caring (Peloquin, 1990, page 14). This change in emphasis progressed the idea of having a personal relationship, or at the minimum, a relational aspect of therapy. Peloquin dives into the images that patients create in their mind of who their therapist is, what they are doing, and how they can help them. She describes the concept of therapy being “something that uses purposeful and meaningful activity to promote healing... predicted on some mutual understanding of personal meaning and interest,” (Peloquin, 1990, page 18). In the definition alone, the personal interest and meaning is highlight, neither of which can successfully be incorporated without a connection and a relationship between the therapist and the patient. On

page 17-19, Peloquin continues to note an occupational therapists' role as a parent, who provides order and nurture, their role as a covenanter, or friend, and as a technician who helps refine technical skills. Of these three traits, two of which are very personal and relational.

All in all, the role of the patient therapist relationship is key to the success of therapy. According to those from Oslo University, therapy is much more effective with it, while Dr. Peloquin says that it is right in the job description. The idea of using virtual reality technology is not to replace this relationship, as clearly it has a large part in therapy, but instead to provide yet another method to the existing relationship.

Conclusion

Most people will agree that VRT is more accessible and affordable treatment and therefore can lead to a decrease in the number of individuals with an untreated mental illness. That being said, many will argue that it is not the best method, due to potential ethical dilemmas and technological inconsistencies. The specific concerns addressed are those in regard to the standardization of the technology and ensuring that the individual chooses the right one for their needs (Powell, Rizzo, Sharkey, & Merrick, p. 10). The sheer variety and accessibility of technology open so many doors, thus, the technology is the key to providing more access.

While VR is the key, as with every other form of technology, it's only great when it works. There are of course limitations, including user error and response, that go along with new forms of technology. It is for that exact reason that there is also a push to train therapists to use this technology. This training would ensure that the therapist's imagination and treatment methods are applied in the best possible way, but also ensures that there is a smooth use of the technology. On the other hand, an individual may get motion sickness or begin to feel out of control due to the unknowns involved in simulation. While these are possibilities, there is almost

no form of therapy that works for everyone. Just because some people could have adverse reactions does not mean that the large majority of individuals will not benefit from this method.

In addition, the developmental and sleep problems that come with the use of technology, and the blue light exposure for people of all ages are concerns. In moderation, and with careful limits, these symptoms and delays can be greatly reduced. As a whole, the benefits to the technology with limitations and proper usage greatly outweigh the minimal consequences.

Beside the technological difficulties that could go along with VR therapy, there are also possible ethical dilemmas. Dr. Brenda K. Wiederhold, President of the Virtual Reality Medical Center, tells of Talkspace, an organization that provides online and anonymous counseling services. Initially, the organization provided absolute anonymity, until a therapist was unable to report dangerous information due to this policy (Wiederhold, 2017, p. 2). While the policies are now cleared up, it shows the potential for problems when doing things online. By using virtual reality technology, there are possible threats to personal privacy, as well as social risks due to the blurred lines between what is real and what is fake (Spiegel, 2018, p. 1538). This innovative methodology is not operating outside of these risks. Things like blurred lines and privacy are even greater reasons why there is such an emphasis on training of the therapists. In order for this technology to be accessible and affordable, and ultimately reduce the number of untreated mental illnesses, therapists will be trained so they can properly relay the information to their patients.

Over time, the number of individuals experiencing some sort of mental illness or other life altering problems such as processing disorders, visual impairments, or debilitating fears has increased dramatically. In this day and age, it seems that more often than not a person will struggle with a mental illness. This challenge has brought out the most imaginative and forward-thinking solutions for all parties involved. In an attempt to reduce this number, researchers and

psychologists across the world have taken the virtual reality technology and combined it with the therapy already at work. These methods of therapy have revolutionized the possibilities for generations to come. As mental illness grows, the field of medicine grows stronger, causing only better methods to arise. Daniel Freeman, a clinical psychologist at the University of Oxford, believes that “VR technology could provide the equivalent of the world’s best therapists in people’s living room,” (2019, p. 3). With these recent advancements, there is no telling what is to come. Imagine a world where the best, most revolutionary treatment would be at the touch of a button, in the convenience of every home.

This study is important because there are countless individuals who are experiencing mental illness who are going untreated. This can be accounted for by a number of reasons, including the lack of accessibility and affordability. Through the use of virtual reality technology, treatment can be more affordable and accessible. The vast number of virtual reality apps for a phone alone provide for at home treatment, even at a subclinical level. Not only is treatment right in the individual’s pocket, but is offered free with a download of an app. The number of individuals who experience some form of mental illness who are going untreated can be vastly reduced simply with the touch of a button. My study will aid in the real-life application of the use of VRT for a specific phobia and see how it impacts an individual on a personal level.

I want to understand just how easily a touch of a button can reduce anxiety and fears. The biggest question to be answered is how effective is the use of VR technology in treating anxiety at a sub clinical level? My hypothesis is that a student who experiences mild to moderate public speaking anxiety will be significantly reduced with the use of VR technology. I will seek to understand how an individual’s anxiety is impacted by the use of VR technology, and the complications and specifications that go along with it. To explore this hypothesis, I will perform

a single-case study on an individual who struggles with mild to moderate public speaking anxiety and evaluate the effectiveness of the use of a virtual reality therapy application.

Method

Participants

This was a single participant study, a male freshman at Milligan University, enrolled in a Speech Communications class. He volunteered to be a participant through the assistance of the professor of the speech class.

Procedure

This single participant filled out a questionnaire about their speech prior to ever giving the speech, or even working on the assigned speech. The day before he gave the speech for a grade, he used a virtual reality app called Virtual Speech and did a practice run of the speech. This virtual reality app experience showed an auditorium full of individual people, who ranged from paying very close to the speaker, to getting distracted and clearly not paying attention, as to best simulate the real-life experience. The participant then took the same questionnaire again. The next day, he gave his speech for the class and took the questionnaire final time.

Measure

A questionnaire was used to assess the attitude of the participant toward public speaking. This questionnaire sought to understand the thought processes of the participant, as well as the physical reactions to the speech. Examples of questions include whether thinking of speaking in front of people makes the participant sweat, as well indicating whether giving a speech seems like a generally pleasant experience. See the appendix for a full list of questions (Table 1). He

ranked his scores on a 5-point Likert-type scale of strongly disagree (1) to strongly agree (5), with a total of 35 questions.

Results

The score for the before the speech lab questions was 124. For after the virtual reality experience it was 150, and for after giving the speech for a grade it was 129. This indicates that the participants anxiety was the highest after the virtual reality experiences, followed by after the speech for a grade, and lastly before the speech lab.

Discussion

The original hypothesis was not supported, as the use of a virtual reality app resulted in higher anxiety, both after the use of the app, and the giving of the speech for a grade. All in all, this can be explained by the natural reactions of an individual when it comes to giving a speech for an assessment. When the first questionnaire was taken, the speech was far off, and therefore anxiety was low. When using the VR experience, it was the day before, and therefore anxiety was high because the grading period was near. After the speech was done, adrenaline was pumping and therefore it makes sense that anxiety was still high. While the data did not line up exactly with the original hypothesis, the use of virtual reality can and should still be researched to find out more information.

Future research could look on a broader scale, with a longer and more in depth study of the implication of the virtual reality. This would seek to consider confounding variables such as how the rehearsal of a speech reduced anxiety and how the topic and familiarity of the participant with the topic helped with their experiences. In addition, future research would avoid some of the flaws made by weaknesses in this study. For instance, it would have been beneficial for the participant to take the questionnaire again after giving their class required speech lab to see the

impact that the speech lab had. Additionally, future research would look to include more qualitative data, to have a description of the feelings of anxiety in addition to the quantitative scores. While this data was not imperfect, there is still possible for this application.

Due to the accessible nature of the app, it still holds the possibility to be beneficial for some individuals. These results should not be cast too broadly, as a single participant is in no way representative of an entire population. Virtual reality applications are just another potential tool that could work for some individuals, but not everyone, much like many other tools used in treatment. For instance, previous studies have found similar results. For instance, success has been found with the application Limelight, which is another public speaking virtual reality app (Levski, 2018). All in all, virtual reality may be a useful tool and future studies should include a larger number of participants to better examine its usefulness.

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Appendix

Table 1

1. While preparing for giving a speech, I feel tense and nervous	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
2. While preparing for giving a speech, I feel tense and nervous	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
3. I feel tense when I see the words <i>speech</i> and <i>public speaking</i> on a course outline when studying	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
4. My thoughts become confused and jumbled when I am giving a speech	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
5. Right after giving a speech, I feel that I have had a pleasant experience	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
6. I get anxious when I think about a speech coming up	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
7. I have no fear of giving a speech	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
8. Although I am nervous just before starting a speech, I soon settle down after starting and feel calm and comfortable.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
9. I look forward to giving a speech	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
10. When the instructor announces a speaking assignment in class, I can feel myself getting tense	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
11. My hands tremble when I am giving a speech	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
12. I feel relaxed while giving a speech	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
13. I enjoy preparing for a speech	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
14. I am in constant fear of forgetting what I prepared to say	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
15. I get anxious if someone asks me something about my topic that I do not know	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
16. I face the prospect of giving a speech with confidence	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
17. I feel that I am in complete possession of myself while giving a speech	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
18. My mind is clear when giving a speech	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
19. I do not dread giving a speech	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

20. I perspire just before starting a speech	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
21. My heart beats very fast just as I start a speech	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
22. I experience considerable anxiety while sitting in the room just before my speech starts	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
23. Certain parts of my body feel very tense and rigid while giving a speech	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
24. Realizing that only a little time remains in a speech makes me very tense and anxious	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
25. While giving a speech I know I can control my feelings of tension and stress	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
26. I breathe faster just before starting a speech	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
27. I feel comfortable and relaxed in the class before just before giving a speech	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
28. I do poorer on speeches because I am anxious	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
29. I feel anxious when the professor announces the date of a speaking assignment	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
30. When I make a mistake while giving a speech, I find it hard to concentrate on the parts that follow	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
31. During an important speech, I experience a feeling of helplessness building up inside me	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
32. I have trouble falling asleep the night before a speech	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
33. My heart beats very fast while I present a speech	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
34. I feel anxious while waiting to give my speech	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
35. While giving a speech, I get so nervous I forget facts I really know.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree