

# EMVR

Self-Empowered **Wellness**



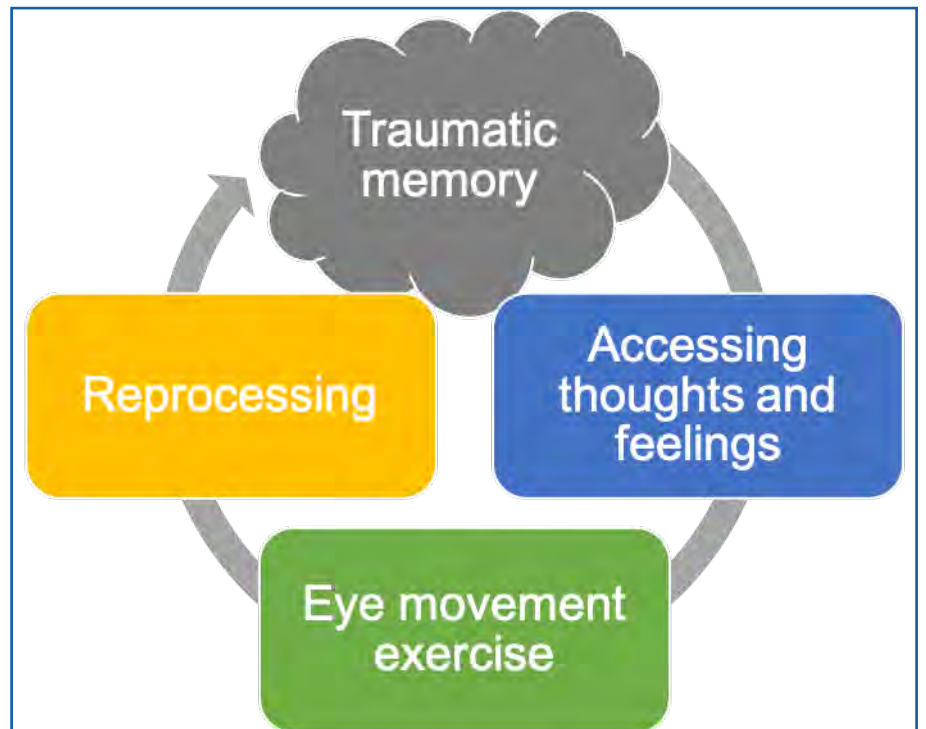


Eye  
Movement  
Desensitization &  
Reprocessing

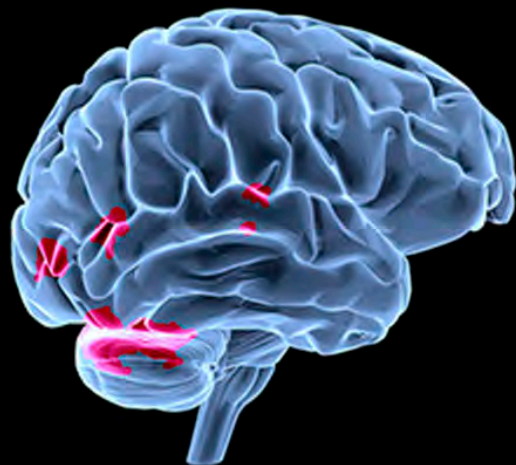


# WHAT IS EMDR?

**F**rancine Shapiro, Ph.D., an American psychologist, developed Eye Movement Desensitization and Reprocessing (EMDR) Therapy in the late 1980s as a breakthrough therapy with a special capacity to overcome the often devastating effects of psychological trauma. An ever-growing community of therapists soon directly saw its power to transform lives. At the same time, controlled research studies consistently demonstrated its effectiveness.



Brain overactivity is display in red.



The same brain after EMDR treatment.



# THE VISION:

## EMVR Simulator: EMVR Eye Movement Virtual Reality

An Integrated System for  
Immersive Therapy and  
Education.

*EMVR digital avatar therapist. Customizable to the clients needs (race, dialect, age, etc.)*



In the fall of 2004, FLOW-LAB's CEO, William Jamaal Fort, began developing what was to become The Flow Trainer System. Fort contended that an integrated system incorporating immersive environments, hypnotherapeutic modalities, psychodynamic narratives, and brain stimulation technologies could become the universal educational and therapeutic content delivery system of the future. He believed that the inefficient and costly systems that have been responsi-

ble for administering education and therapeutic management tools would eventually be replaced by cost-efficient technological alternatives.

The first iteration of Fort's concept, the NNIT (Neural Narrative Induction Trainer), and, later, The Flow Trainer ([see video](#)), was designed to be a versatile content delivery system that could be implemented in education, PTSD, and pain management, and additionally serve as an effective treatment option for a host of other psy-

chological and behavioral issues. The system's initial design and content were originally intended for clinical applications, taking into consideration the cost-prohibitive nature of the Virtual Reality technology of the time. Several companies were focused on developing streaming technologies that would allow the type of content required by the device to be streamed online, but those were still in their early development.



Fast forward to 2014 and the advent of low-cost Virtual Reality devices and streaming technologies that could accommodate digitally dense virtual content. That year, The Flow Trainer System experienced a radical redesign that now incorporated inexpensive off-the-shelf VR devices like the Oculus Rift and the HTC Vive. No longer was it necessary to develop all of the complex visual hardware for the system. Therefore, the focus of The Flow Trainer System shifted to content creation and distribution.

*Headsets from HTC, Sony, Oculus, and Samsung are just several companies in the VR marketplace.*

In 2016, Fort founded FLOWLAB along with partners Brian Donohue, Director of Business Continuity at the Johns Hopkins Applied Physics Lab, and James Fitzpatrick, Senior Navigation Ship Handling Instructor for the US Navy. FLOWLAB's mission was to create cost-effective therapeutic and educational content that could be delivered to users on-demand via the internet and mobile devices. The implementation of Virtual Reality technology into the therapeutic scenario allows for a completely immersive experience that can significantly enhance the psychological benefits for the end-user.

“ *No longer was it necessary to develop all of the complex visual hardware for the system.* ”



# THE FLOW TRAINER SYSTEM

The Flow Trainer System is the nexus of Flowlab's proprietary, patent pending process. The system's customizable delivery system enables it to be implemented in education, PTSD, pain management, and a host of other psychological and behavioral issues.

[CLICK HERE TO VIEW VIDEO](#)



“ *Flowlab's fully automated approach reduces the need for human operators in many therapeutic situations.* ”

FLOWLAB's fully automated approach significantly reduces the need for human operators in many therapeutic situations. In recent studies, the Defense Advanced Research Projects Agency (DARPA) conclusively proved the efficacy of non-human counseling facilitators and virtual environments for the treatment of a variety of psy-

chological disorders, including post-traumatic stress disorder. FLOWLAB has built on this research by developing a content model that will efficiently serve the future psychological needs of both the veteran and civilian communities.

EMVR( introduces Dr. Shapiro's therapeutic expression and brings it into the world of

immersive Virtual Reality experiences. This technological synthesis revolutionizes the process by creating an environment where a deeply therapeutic process can be achieved and delivered via the internet. This automation makes it accessible and affordable for those in need.





# EMVR

VIRTUAL THERAPY OFFICE

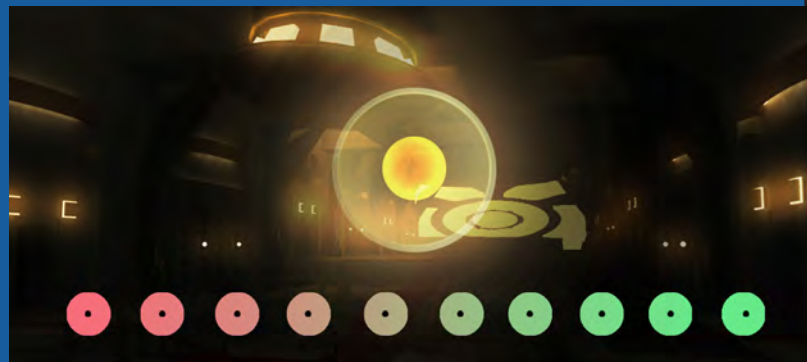
## CONCEPTUAL STORYBOARDS

WELCOME TO FLOWLAB



FLOWLAB

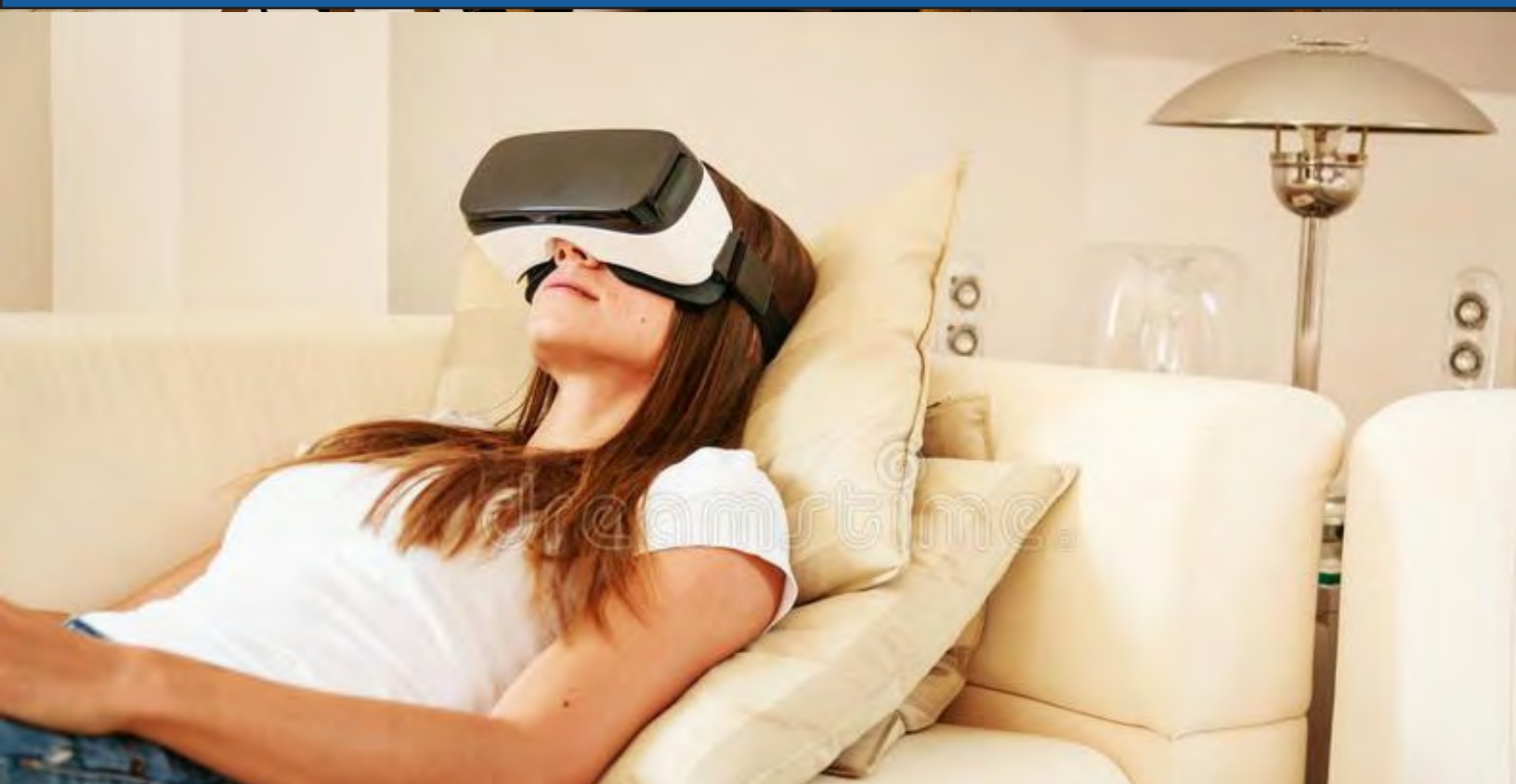
SELF EMPOWERED WELLNESS







A Conventional Therapy Session in 2019



2020: EMVR Therapy From The Comfort of Home





TRAUMA & PTSD



“*...symptoms can cause problems with trust, closeness, communication, and problem-solving, which may affect the way the survivor acts with others.*”



Post-traumatic stress disorder, or PTSD, is a serious, potentially debilitating condition that can occur in people who have experienced or witnessed a natural disaster, a serious accident, a terrorist incident, the sudden death of a loved one, war, a violent personal assault such as rape, or other life-threatening events.

Research has recently shown that, in some cases, PTSD among military personnel may be a physical brain injury. Trauma survivors who have PTSD may have trouble with their close family relationships or friend-

ships. Their symptoms can cause problems with trust, closeness, communication, and problem-solving, which may affect the way the survivor acts with others. In turn, the way a loved one responds to him or her affects the trauma survivor. A circular pattern may develop that could harm relationships.

The majority of persons who experience such events recover from them, but people with PTSD continue to be severely depressed and anxious for months or even years following the event.

## PTSD FACTS

- 7.7 million Americans age 18 or older have PTSD.
- 67% of people exposed to mass violence have been shown to develop PTSD. This rate is higher than among those exposed to natural disasters or other types of traumatic events.
- People who have experienced previous traumatic events run a higher risk of developing PTSD.
- PTSD can also affect children and members of the military.



## BEHAVIORAL HEALTH: **BY THE NUMBERS**

**Suicide** is the **10<sup>th</sup>** leading cause of death in the U.S.<sup>1</sup>

Between **25-45%**

of patients admitted to the hospital for medical care have **one or more BMH comorbidities**<sup>3</sup>



**1 of every 4 Americans** experience an illness or substance use disorder each year<sup>2</sup>

**\$5 billion**

State government cuts to mental health services from 2009 to 2012<sup>4</sup>



**4500**

Public psychiatric hospital beds **eliminated across the U.S.** in that same time period<sup>4</sup>

**1 in 8**

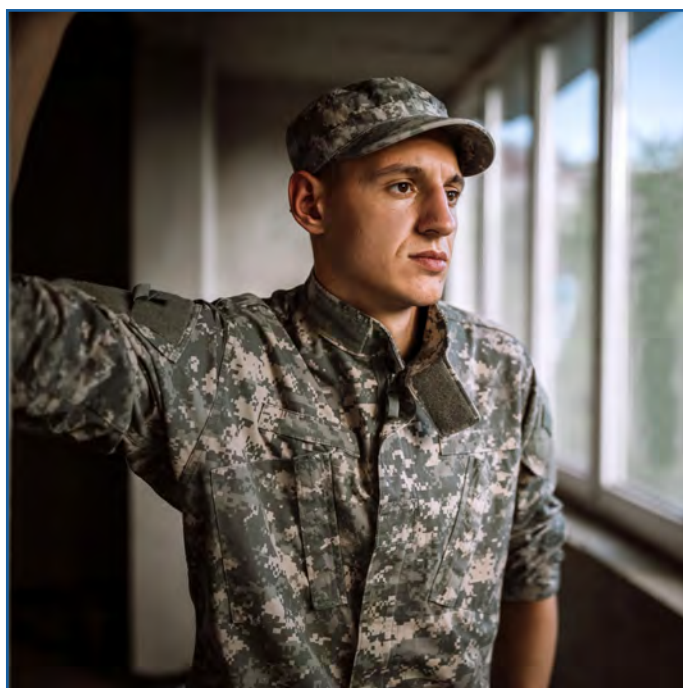
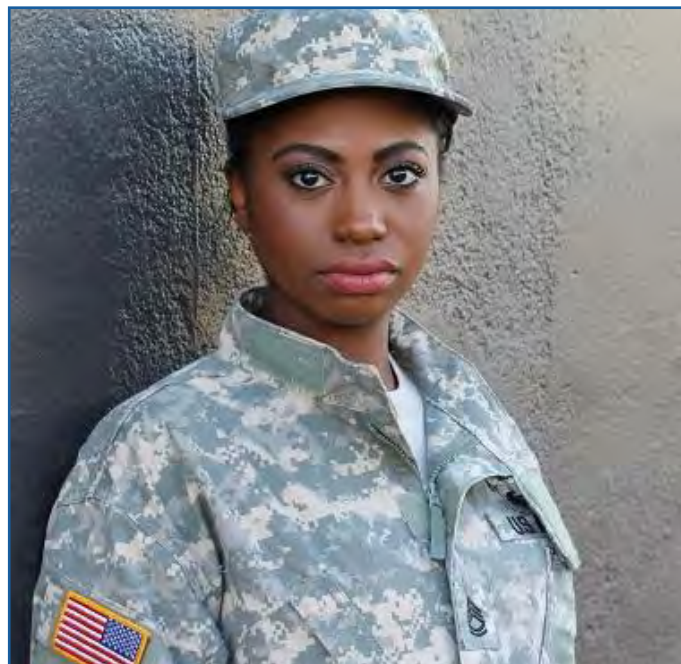
emergency department (ED) visits in the United States are for treatment of mental health or substance use disorders<sup>5</sup>



Sources: 1'Special Report: Suicide Prevention in Health Care Settings', 37 (11): The Joint Commission Perspectives 2017; 1-7, (May,2017). 2 (July,2018). Access to Behavioral Health. Behavioral Health. Retrieved July, 2018 from <https://www.aha.org/advocacy/access-and-health-coverage/access-behavioral-health>. 3 Design for Behavioral and Mental Health: More Than Just Safety, February 2018, Card, A, Taylor, E, Platkowski, M (2018). 4 Comment by Robert Glover, Executive Director of the National Association of State Mental Health Program Directors. USA Today "The Cost of Not Caring: Nowhere to Go" by Liz Szabo, May 12, 2014. 5 May Is National Mental Health Awareness Month. Mathematica Policy Research. Retrieved July, 2018 from <https://www.mathematica-mpr.com/news/may-is-national-mental-health-awareness-month>.

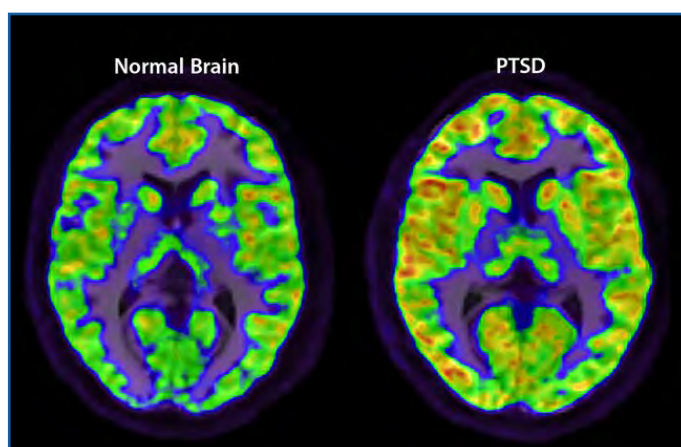


# RISK FACTORS FOR PTSD IN VETERANS



Several factors have been shown to increase the risk of PTSD in the veteran population, including (in some studies) younger age at the time of trauma, racial minority status, lower socioeconomic status, lower military rank, lower education, a higher number of deployments, longer deployments, prior psychological problems, and lack of social support from family, friends, and community. PTSD is also strongly associated with generalized physical and cognitive health symptoms attributed to mild traumatic brain injury.

“*Longer deployments, prior mental health issues and lack of support from family and community can increase the risk of PTSD.*”





C current treatment solutions for PTSD are varied: Cognitive Behavioral Therapy, Hypnotherapy, Exposure Therapy EMDR (Eye Movement Desensitization Reprocessing), and a host of pharmacological treatments are most commonly used. The personal, social, and economic burden of human suffering, treatment costs, disability compensation, and productivity losses related to PTSD are the major issues facing American society broadly. After decades of research, there is still no consensus on the causes, nature, or treatment of the psychological and psychosomatic consequences of trauma. Many therapies used in psychiatry reduce the severity of some PTSD symptoms. However, medications and psychotherapy have limited efficacy. In a review of 55 studies on empirically supported treatments of

# CURRENT TREATMENT SOLUTIONS

PTSD, high dropout rates or non-response rates (up to 50%) were common. The limitations of current mainstream treatment approaches invite open-minded consideration of the range of promising non-medication approaches aimed at preventing PTSD following exposure to trauma and treating chronic PTSD, including natural supplements, yoga, mind-body practices, EEG biofeedback, and Virtual Reality.



# VRT: VIRTUAL REALITY THERAPY

**V**irtual Reality Therapy (VRT), also known as Virtual Reality Immersion Therapy (VRIT), Simulation For Therapy (SFT), Virtual Reality Exposure Therapy (VRET), and Computerized CBT (CCBT), is the use of Virtual Reality technology in psychological or occupational therapy. Patients receiving Virtual Reality Therapy navigate digitally created

environments and complete specially designed tasks often tailored to treat a specific ailment. Technology can range from a simple PC and keyboard setup to a modern Virtual Reality headset. This therapy is widely used as an alternative form of exposure therapy, in which patients interact with harmless virtual representations of traumatic

stimuli to reduce fear responses. It has been proven to be especially effective at treating PTSD. Virtual Reality Therapy has also been used to help stroke patients regain muscle control, to treat other disorders such as body dysmorphia, and to improve social skills in those diagnosed with autism.







*“ VR Exposure, as compared to In-Vivo Exposure, has the advantage of providing the patient with a vivid experience, without the associated risks or costs.*

Unlike traditional Cognitive Behavioral Therapy, VR-based treatment may involve adjusting the virtual environment, such as adding controlled intensity smells or adding and adjusting vibrations, and allowing the clinician to determine the triggers and triggering levels for each patient's reaction. VR-based therapy systems may allow for the replaying of virtual scenes, with or without adjustment, to habituate the patient to such environments.

Therapists who apply Virtual Reality Exposure Therapy, just as those who apply In-Vivo Exposure Therapy, can take one of two approaches toward the intensity of exposure. The first approach is called flooding. It is the most intense approach, in which stimuli that produce the most anxiety are presented first.

For soldiers who have developed PTSD from combat, this could mean first being exposed to a Virtual Reality scene of their

fellow troops being shot or injured, followed by less stressful stimuli such as the sounds of war.

On the other hand, graded exposure takes a more relaxed approach, in which the least distressing stimuli are introduced first. VR Exposure, as compared to In-Vivo Exposure, has the advantage of providing the patient with a vivid experience, without the associated risks or costs.



Recently, there have been some advances in the field of Virtual Reality medicine. In Virtual Reality, the patient becomes completely immersed in a virtual world by putting on a headset with an LED screen in its lenses. This is different from the recent advancements in augmented reality. Augmented reality is different in the sense

that it enhances the non-synthetic environment by introducing synthetic elements to the user's perception of the world. This, in turn, "augments" the current reality and uses virtual elements to build upon the existing environment. Augmented reality offers additional benefits and has proven itself to be a medium through which

individuals suffering from a specific phobia can be "safely" exposed to the object(s) of their fear, without the costs associated with programming complete virtual environments. Thus, augmented reality can offer an efficacious alternative to some less advantageous exposure-based therapies.





VRT has great promise because, historically, it has produced a “cure” about 90% of the time—and at about half the cost of traditional Cognitive Behavioral Therapy. It is especially promising as a treatment for PTSD where there are simply not enough psychologists and psychiatrists to treat all the veterans with anxiety disorders diagnosed as related to their military service.



## Addendum: Articles

*Virtual Reality Therapy Treating The Global Mental Health Crisis*

*DARPA Created A Virtual Therapist and People Love Interacting With Her*

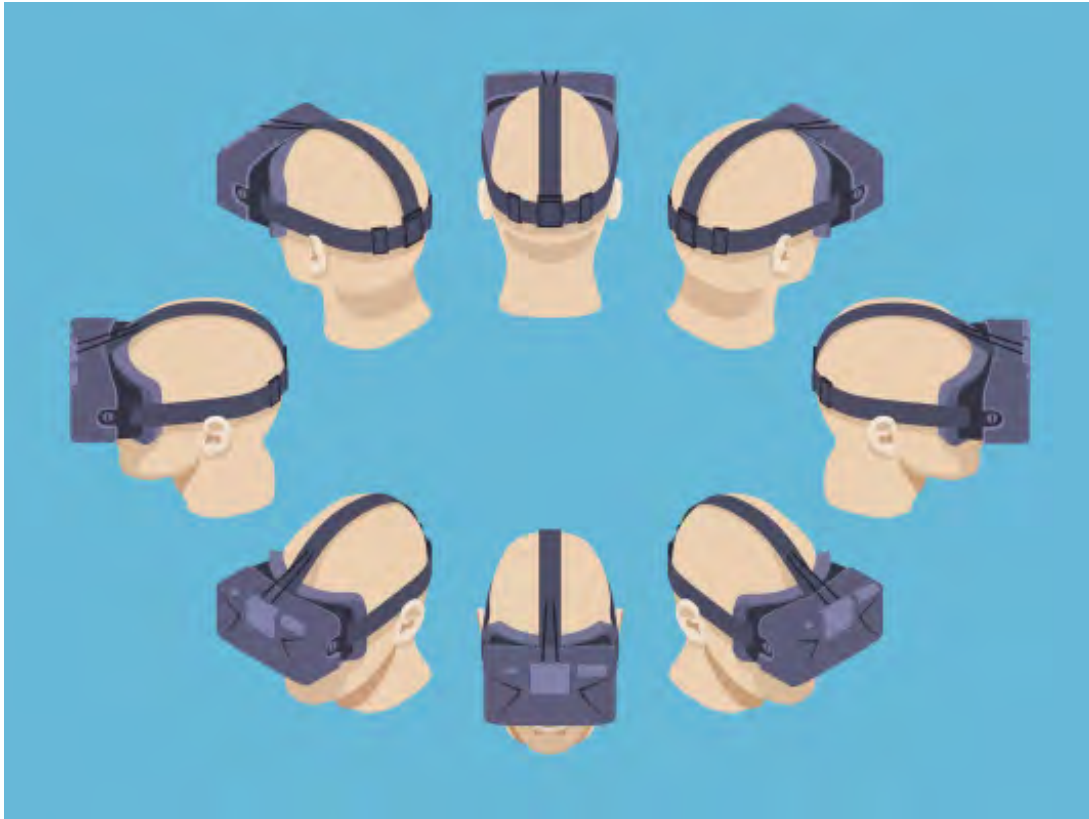
*VR May Change The Future of Therapy*



# Virtual Reality Therapy: Treating The Global Mental Health Crisis

[TC techcrunch.com/2016/01/06/virtual-reality-therapy-treating-the-global-mental-health-crisis/](http://techcrunch.com/2016/01/06/virtual-reality-therapy-treating-the-global-mental-health-crisis/)

Alex Senson 5 years



Alex Senson Contributor

Alex Senson is a biotech/pharmaceutical professional.

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[Virtual Reality In Healthcare: Where's The Innovation?](#)

Most of us experience some level of stress and anxiety in our lives. It can be relatively mild or extremely severe and debilitating — or anywhere along the spectrum. Some examples include general stress at work, relationship issues, fears and phobias, depression and other anxiety disorders, including post-traumatic stress disorder (PTSD).

An estimated one in five people in the U.S. have a diagnosable mental disorder. Even those who don't can still experience significant stress and anxiety. Psychological conditions and mental health disorders affect our daily lives, and cost an estimated \$467 billion in the U.S. in lost productivity and medical expenses (\$2.5 trillion globally).

For many disorders, there are highly effective treatments that don't require drugs. But many doctors still tend to over-prescribe medications that are either not effective, have disturbing side effects or are completely unnecessary.

Part of the problem is a lack of specific training of family physicians in mental health, combined with the difficulty to find and access qualified mental health practitioners. While severe disorders may still require pharmacological intervention, techniques such as cognitive behavioral therapy (CBT) and exposure therapy (ET) are highly effective in conditions such as anxiety disorder, panic disorder, phobias, PTSD and obsessive compulsive disorder (OCD) when administered by a qualified practitioner.

## **Can virtual reality become a global mental health treatment platform?**

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Virtual reality (VR) has been used for decades as a tool for therapists to administer virtual reality exposure therapy (VRET) in a safe and controlled manner. Due to cost and technology limitations, it has not been widely available, to date. With the advent of affordable mobile VR headsets, such as the Gear VR, there is a new opportunity to apply telemedicine to decentralize mental health treatment, reaching more patients and improving lives around the world.

A key challenge today is the lack of clinical evidence and data to support if and how VR can be used to administer effective treatment both in the clinic (expanded use) and remotely. Companies wishing to penetrate this market will need to conduct well-designed, randomized, controlled, properly powered clinical studies in order to change or influence treatment paradigms. There will undoubtedly be a flood of VR apps in the coming months and years attempting to solve these mental health issues.

| For many disorders, there are highly effective treatments that don't require drugs.

Some examples might include remote teletherapy by qualified practitioners who use VR as a supplementary tool, in-clinic VR therapy, virtual therapists created using artificial intelligence or patient-directed VR therapy in the absence of a professional therapist. It remains to be seen which options can deliver real, effective and sustaining treatment to mental health patients across the world, or even people with no diagnosable disorder who want to reduce generalized stress and anxiety in their lives.

## **Cognitive behavioral therapy and exposure therapy**

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Briefly, CBT is a psychotherapeutic treatment administered by a therapist trained in mental health disorders and specifically in CBT. Patients typically attend a limited number of sessions that focus on a specific problem, helping the patient identify, recognize and



change disturbing thought patterns and feelings that are leading to negative or destructive beliefs and behaviors. There often is an avoidance behavior that stems from the anxiety.

For example, if a person spends a lot of time thinking about plane crashes and accidents, they might avoid air travel. Or if they worry about how others perceive them in public, they may avoid social situations and become isolated, leading to depression and other issues.

CBT can be thought of as a set of tools one can use to overcome these limitations, providing a way to cope with their thoughts and feelings effectively. CBT goes hand in hand with ET, which gradually encourages patients to face the troubling thoughts and fears directly. Over time, this effectively lowers the peak anxiety the person experiences when they are exposed to whatever causes the anxiety.

Virtual reality is now convincing enough to simulate many of these anxiety-inducing stimuli, and is a safe, controllable and effective way to conduct various types of ET and CBT. Although ET is an obvious fit with VR, there are many other psychiatric conditions, such as childhood developmental disorders and autism, where VR may play a more dominant role in the future.

## **Treating PTSD using virtual reality**

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Virtual reality has been used fairly extensively to deliver prolonged exposure therapy (PET) for PTSD since the 1990s, mostly for the treatment of soldiers and war veterans. Dr. Albert “Skip” Rizzo, director of Medical Virtual Reality at the Institute for Creative Technology at the University of Southern California, is a leader in this field. His application, called Bravemind, was developed in partnership with Virtually Better, who sells the product to institutions around the world.

The Canadian government purchased two copies of this software in 2014 for \$17,000 each. The system consists of various components, such as the VR environment, which is controllable and customizable, a vibrotactile platform, which delivers sensations associated with explosions and firefights and even a scent machine, which can emit smells like diesel fuel, garbage and gunpowder at specific times during the simulation to increase immersion. There have been a number of clinical studies (completed and ongoing) that investigate the safety and effectiveness of Bravemind.

A recently published study found that the VR therapy alone was as good as a combination of drug therapy and VR therapy. In fact, one of the drugs studied led to a worse outcome for patients. There is another clinical trial ongoing that is investigating the use of Bravemind VR therapy in military sexual trauma.

Military funding has allowed rigorous studies to be conducted. However, smaller private companies developing VR therapy applications with limited budgets must still demonstrate clinical efficacy if they hope to penetrate this market. I have spoken with one such company operating in the Netherlands who is attempting to tackle PTSD in a different, but scientifically based, way.

| There are an estimated 7.7 million people in the U.S. with PTSD.

Beyond Care is working on a VR software solution for PTSD based on the principle of eye movement desensitization and reprocessing (EMDR). EMDR works by having a patient recall a traumatic memory, then having the patient follow a moving object with their eyes only at the same time. The dual task of memory recall plus eye movement taxes the working memory, causing the traumatic memory to become less clear and vivid.

Eventually, after repeating this process, the memory permanently loses its ability to trigger such intense emotional responses. After a successful pilot study, Beyond Care is now coordinating a patient trial in partnership with a Dutch University and a company specializing in delivering specialized psychological treatment over the Internet. The results of this study will determine if the new VR desensitization and reprocessing therapy, called Beyond Care PTSD, works and, more interestingly, whether it can be successfully delivered virtually, under the semi-supervision of a therapist.

Military PTSD is not the only type of PTSD: There are an estimated 7.7 million people in the U.S. with PTSD, many of whom suffer due to rape or sexual trauma in their past. It is highly likely that many of these cases go unreported and untreated, which is unfortunate because there are very effective treatments available. Beyond Care is initiating a study in this patient population, as well. Customizable applications such as Beyond Care PTSD will allow expanded access to therapy for all types of PTSD sufferers.

## **Treating phobias and anxiety disorders using virtual reality**

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Similar to PTSD, VR therapy has for many years been used in clinics for the treatment of phobias and other anxiety disorders. Anxiety disorders affect at least 40 million people in the U.S. and cost the country \$42 billion per year. Because of the vast number of patients afflicted by some form of anxiety disorder, decentralization of treatment through telemedicine or self-guided therapy could make a huge difference.

Specific phobias affect about 19 million individuals in the U.S. A recently published meta-analysis of 14 clinical trials showed that VRET was similarly effective in treating specific phobias as real-life exposure therapy. Some examples of companies using VR to treat anxiety disorders are presented below.



The Virtual Reality Medical Center has a system for treating those afraid of flying. It includes software and hardware, complete with airplane seats and a subwoofer system to mimic the sights, sounds and feeling of flying.

Virtually Better also has software to treat fears such as flying, heights, public speaking and storms. This company has partnered with leading academic institutions, research and treatment facilities to undertake new R&D projects concerning childhood anxiety and childhood social phobias.

| Anxiety disorders affect at least 40 million people in the U.S.

CleVR is a company in the Netherlands developing VR systems for fear of flying, heights and social phobias, also backed by scientific research. The company is undertaking a randomized controlled trial to study the use of VR as a therapist's tool to treat psychosis and social phobia. Through proprietary dynamic virtual emotion technology, the overall atmosphere of the simulated social situations can be controlled.

Psious is a company in Spain that offers a clinical toolkit for therapists to administer and control VRET to treat patients with phobias; it includes VR hardware, a customizable software platform and biofeedback devices.

VirtualRet is another tool for psychologists and therapists to help evaluate and treat phobias such as public speaking, flying, heights, blood and public places. They provide a range of virtual environments, hardware and parallel services.

A company from Sweden called Mimerse is developing gamified psychological treatment tools for VR for the mass market in partnership with the Swedish Government and Stockholm University. Their first game, "Itsy," is focused on treating arachnophobia without involvement from a real-world therapist. Coinciding with the game's release on the Gear VR app store, a randomized controlled study is being conducted comparing VRET using Itsy versus real-world exposure therapy. Because the majority of phobia sufferers don't receive professional treatment, mass market games like Itsy could offer immense value for individuals globally.

## **Virtual reality for stress relief and meditation**

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Whether or not a person suffers from a specific diagnosable mental health condition, most of us experience varying levels of stress and anxiety during our lives. Meditation is a great way for anyone to improve their mood and induce a state of relaxation. While meditation and relaxation may not be the sole treatment for any particular diagnosable condition, the general overall health benefits are thought to be positive for anyone, healthy or otherwise.

In addition to their work on phobias, Psious and VirtualRet also have solutions for generalized anxiety and relaxation. Another company developed DEEP, a unique

meditative VR game where the user explores a strange and beautiful underwater world. The unique part is that the game is completely controlled through breathing (biofeedback). Correct breathing techniques are central to meditation and relaxation, and with the custom DEEP controller the user's breathing coincides with what is seen in the virtual environment and controls how the user moves through it.

Unello Design has come up with some meditation and relaxation experiences for Google Cardboard and Oculus Rift. Eden River is a relaxing nature experience and Zen Zone is a guided meditation journey. Individuals also can explore "sound sculptures" using their 3D music apps.

Perhaps the most well-known relaxation app is Guided Meditation VR, created by Cubicle Ninjas. This app offers four relaxing immersive environments to enjoy during a guided meditation session.

The market for improving mental health through the use of VR has been well established based on decades of scientific research.

I had the pleasure of meeting their founder and CEO, Josh Farkas, at a We Are Wearables VR event in Toronto last October. Among a densely packed crowd of hundreds of people eating pizza and drinking beer, I sat down, put on an Oculus and headphones and tried the Costa Del Sol beach vacation VR experience. The environment was visually appealing and relaxing, but I was only in the experience for a few minutes so I didn't have a chance to go through the guided mediation portion.

The most shocking part came when I removed the headset and discovered that I had forgotten I was surrounded by hundreds of people at the packed and noisy conference! Despite the fact that Guided Meditation VR is not clinically validated and is marketed for casual enjoyment and relaxation, it still has the ability to have significant positive impact on people's lives.

In one example, Josh and his team attended a military conference where they shared their work with active duty officers who generally struggle with a very high rate of suicide caused by mental trauma and stress. A veteran of the Vietnam War and another soldier who had been deployed in Iraq both broke down crying while trying the demo, stating they hadn't felt that relaxed in years. They were extremely excited at the notion that experiences like these could help others, especially those on active duty.

In another example, a young man who was wheelchair-bound because of a serious neurological condition tried the experience on the Oculus Rift. He reacted by moving around a bit. Unsure of what this meant, Josh asked the mother, who said, "He wants to give you a hug."

The Guided Meditation VR team is now working to improve the experiences to be as



accessible as possible for those with limited mobility. As VR and apps like this become mainstream, we likely will uncover additional groups of people who can feel profoundly better through experiencing something as simple as a virtual Zen garden.

## **Bringing light to mental darkness**

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The market for improving mental health through the use of VR has been well established based on decades of scientific research. However, this market is still in some ways in its infancy as the technology to date has not been advanced enough to allow massive patient access across the world.

Still, the majority of companies working in this space are focusing on developing clinical tools used by professional therapists to help them treat patients in person. Will the technology become good enough to enable safe, effective treatment in the absence of a professional therapist or clinician? Will we see increased diagnosis and treatment of patients, resulting in societal health and economic benefits?

In a few years' time there should be a lot more data available from clinical studies to properly evaluate these new treatment modalities in different psychiatric conditions. Until then, we are bound to see an explosion of apps making all sorts of different claims — some supported by data and some yet to be validated.

# DARPA Created A Virtual Therapist — And 'People Love Interacting With Her'

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BI [businessinsider.com/darpa-created-a-virtual-therapist-2014-6](http://businessinsider.com/darpa-created-a-virtual-therapist-2014-6)

MEGAN GARBER, The Atlantic 2014-06-01T18:34:00Z

A veteran is having a virtual therapy session. His counselor is named Ellie, and she is, among other things, a very good listener.

She's responsive to the soldier's comments. She reads the subtleties of his facial expressions. She nods appreciatively at his insights. She grimaces, slightly, when he tells her about a trauma he experienced.

Ellie is an avatar, a virtual therapist developed at USC with funding from DARPA, the Defense Department's advanced research center.

And "people love interacting with her," says Louis-Philippe Morency, a research assistant professor at USC's Institute for Creative Technologies.

Morency has been working with Ellie — part of the university's SimSensei project — for several years now. In that, he has helped to build a program capable of reading and responding to human emotion in real time. And capable, more to the point, of offering those responses via a human-like animation.

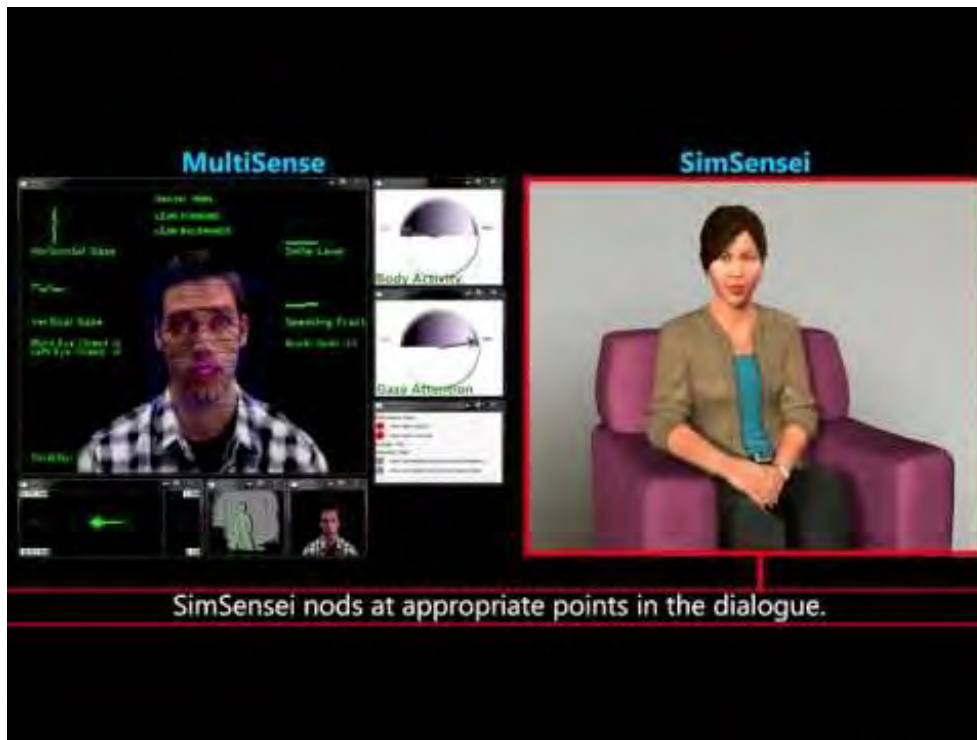
To build that system, the SimSensei team took a three-step approach: first, they analyzed actual humans interacting, to observe the linguistic and behavioral nuances of those conversations. From there, they created a kind of intermediate step they nicknamed the "Wizard of Oz." This was "a virtual human," as Morency describes it, "with a human behind, pressing the buttons." Once they had a framework for the rhythms of a face-to-face therapy session, they added facial-movement sensors and dialogue managers — creating a system, all in all, that can read and react to human emotion.

And to all *that* they added animation modules, giving a body — well, a "body"— to their program. Ellie was born.

If you have a conversation with Ellie, her creators say, she will be able to suss out symptoms of anxiety, depression, and — of particular interest to DARPA — PTSD. The avatar can also, they say, help to prepare soldiers before they've gone to the battlefield. "You want to train people on non-verbal behaviors," Morency puts it; so, for example, soldiers can be attuned to subtle facial cues from people they might encounter in a theater of war.



Morency and his team have been demonstrating Ellie and her fellow virtual-psychologists in Los Angeles, to people curious about what it's like to be analyzed by an avatar. So far, more than 500 people have talked to her. And — here's the surprising thing — they seem to enjoy the experience. The set time for each demo was initially 15 minutes; Morency says people kept extending their time with Ellie, however — up to 30 minutes. That's because, Morency figures, "they don't feel judged" by her.



Watch Video At: <https://youtu.be/ejczMs6b1Q4>

And that's in turn because, as he puts it,

Ellie is an interviewer, but she is there as a computer. She doesn't have judgment directly. So people love talking to her ... they're more themselves. They're really expressing and showing something that usually if you know that people are around you — or as an interviewer — they think, 'Oh, I'm going to be careful.' But with Ellie, they're more themselves.

Morency compares the appeal, actually, to that of pets. "People, after talking to Ellie, they feel better," he points out. "Some people talk to their dogs; even though the dogs don't understand it ... I think there's a little bit of that effect — just talking with *someone* makes you feel better."

# VR May Change the Future of Therapy

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 [elemental.medium.com/vr-may-change-the-future-of-therapy-eaf2b5f87118](https://elemental.medium.com/vr-may-change-the-future-of-therapy-eaf2b5f87118)

October 23, 2019

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**Researchers are studying how virtual reality can treat everything from PTSD to anorexia to anxiety**

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Tessa Love

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Oct 23, 2019 · 6 min read

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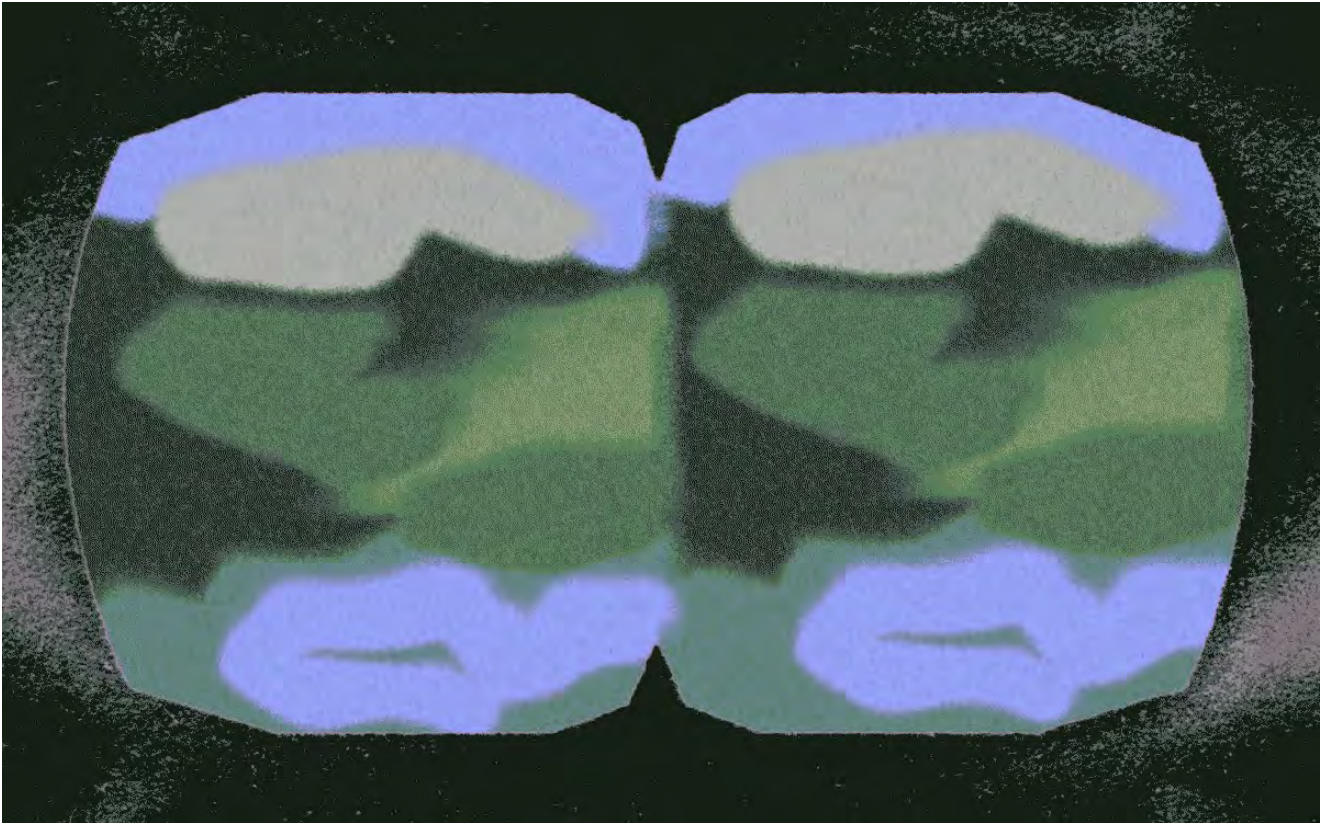


Illustration:

Researchers are discovering that virtual reality (VR) is more than just a fancy way to play video games. It's proving useful in therapy.

“What does head-mounted display virtual reality provide people?” says Skip Rizzo, research professor and director for medical virtual reality at the University of Southern California’s Institute for Creative Technologies. “It can immerse a person in an environment that can help them to get over their fears or confront their past traumas, all in a controlled stimulus environment.”

Rizzo started studying the potential of VR as a clinical application back in the 1990s when the first wave of hype around the technology surged. His initial research explored the use of game-like environments to help people recover from brain injuries. When early research proved successful, he started to explore other applications. So far, VR has shown to be useful for treating post-traumatic stress disorder (PTSD) and eating disorders and diagnosing depression and attention deficit disorders.

The area where VR seems to have the biggest impact is in the treatment of PTSD. People with PTSD often cope by avoiding the triggers that set off the anxiety, fear, memories, and thoughts associated with the traumatic event. While this protects them in the short term, in the long term, it reinforces the idea that those triggers are as harmful as the PTSD makes a person believe they are, and makes it harder for that person to heal.

To work past this, psychologists have found the use of what's called graduated exposure therapy to be highly effective. The therapy involves the gradual, repeated "reliving" of the traumatic event in their imagination. The idea is that through this imagined exposure, the person suffering from PTSD can process the emotions associated with the trauma and learn that there is no longer anything to fear.

The problem with this treatment, however, is having to rely on the imagination. Can people really effectively imagine their traumatic experiences? And what about the ones who are unwilling or unable to do so?

That's where VR comes in. Instead of imagining the environment or event, the technology safely transports the user to another place, from the comfort of the therapist's couch.

“That's the beauty of all this. You can get people on a cognitive level to engage with the things that they fear, but their brain still reacts to it as if it's the real thing.”

Rizzo says the benefit of this is multifaceted. It circumvents a person's avoidance tendency and it also "tricks" the brain into believing this exposure is real. According to Rizzo, while the frontal lobe is aware of the simulation, the limbic system — aka the fight-or-flight area — reacts as if it's really happening.

“That's what we're trying to do. We're trying to activate that fear, but in a place where nothing really bad happens to break that cycle of conditioning,” he says. “That's the beauty of all this. You can get people on a cognitive level to engage with the things that they fear, but their brain still reacts to it as if it's the real thing.”

Like all kinds of exposure therapy, VR therapy gradually subjects the affected person to the stimulus or environment to ensure they are not re-traumatized. Still, it's important that the person is willing to expose themselves to the trigger. However, even with consent and progression in mind, there is some evidence that prolonged exposure to a trigger — which is considered the "gold standard" treatment for PTSD — could cause more harm than good in some. According to, researchers have found that the therapy has caused a number of veterans to become violent, suicidal, and depressed. How this impacts virtual reality-based exposure therapy is unclear.

Rizzo's lab has largely worked with soldiers and veterans with PTSD and his research has shown that virtual reality therapy is more effective than traditional approaches. In a 2014 study, for example, 20 active-duty soldiers went through an average of 11 virtual immersion sessions. After the treatment, 16 of the soldiers no longer met the criteria for PTSD, and all 20 saw a 50% average decrease in symptoms. A January 2019 study also found the method effective for treating PTSD associated with military sexual trauma. By the end of treatment, 53% of the veterans met the criteria for a PTSD diagnosis. Three months later, just 33% did.

Other studies have found that VR could help treat PTSD experienced by victims of car accidents and the civilians and disaster workers affected by the World Trade Center attacks.

The technology has also been shown to be effective at treating disorders such as anxiety and phobias for the same reason it works for PTSD: By exposing individuals to that which they fear, whether it's a social situation or spiders, they can learn to overcome their avoidant behaviors.

Giuseppe Riva, PhD, has also found that the immersive quality of VR may help treat eating disorders. A professor of psychology at the Catholic University of Milan, Italy, and head researcher at the Applied Technology for Neuro-Psychology Laboratory, Riva first put on a VR headset in 1995 and was struck with a strange feeling: He could no longer sense his body. At the time, he was studying anorexia, which he describes as a “disturbance of the experience of the body,” and wondered if putting people suffering from the eating disorder into a virtual environment could help them overcome it.

In the years since, Riva developed an “embodied” VR experience where people with body-size distortion related to anorexia can inhabit another, different-sized body. The effect of this embodiment was shown to reduce this distortion in people with anorexia. This may work, according to Riva, because body-size distortion is the product of the brain creating its own simulation — that one's body is bigger than it actually is. To correct this, the brain can be tricked with an actual simulation that it can't predict, which forces it to reorient its perception.

“When you enter a different body, your brain is in some way surprised because the brain cannot predict and advance the movements,” he says. “This pushes the brain to recalculate the experience of the body.”

Riva has also looked at how VR might help treat binge eating disorder. Binge eating is characterized by a craving that the individual cannot stop due to a mechanism in the brain that automatically connects the perception of food to the will to eat. To help people with the condition overcome this mechanism, Riva developed an immersive VR environment where people are exposed to simulations of the foods they crave. By way of the foods being simulated, the people in the study are forced to resist eating them, thereby slowly learning to separate the perception of food and the will to eat.

The intervention was shown in his studies to be more effective at curbing binge episodes than traditional cognitive behavioral therapy, which Riva says is due to VR's ability to treat people on a level deeper than language alone.

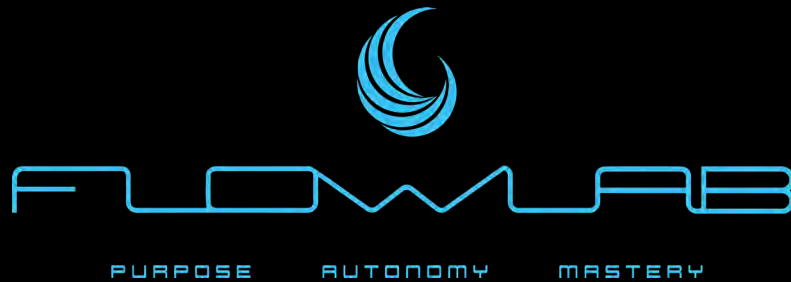
“Virtual reality goes directly to the emotional and perceptive mechanism that's at the basis of our own feeling and beliefs,” he says. “Cognitive behavioral therapy is better at



modifying the meanings and the explanation that you give to that specific emotion and feeling. You have to change both because otherwise, the change is not effective.”

So far, all of these clinical applications are happening in research settings. As the technology becomes more accessible and the research continues to prove its efficacy, Rizzo and Riva say they see a near future where VR is used by therapists across the world. Both researchers also made it clear that VR will not replace traditional therapy, but instead enhance it.

“People will say, ‘Oh, we’re going to do all therapy in virtual reality.’ But that’s missing the point. That’s getting caught up in the excitement about virtual reality,” says Rizzo. “We have a clear path as to what’s a fool’s errand and what’s an inspirational idea. And the research is there to document where it adds value.”



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