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An abstract illustration featuring stylized profiles of people's heads and hands holding mobile devices. The colors are vibrant and contrasting, including shades of green, blue, purple, pink, and teal against a dark background. The composition suggests a focus on human interaction with technology.

Technology and Innovation  
in Psychology

# Major Trends in Virtual Reality Therapy: Ready for Widespread Distribution

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Many people are surprised to learn that Virtual Reality (VR) is not a new technology. Dominated in the 1960s and 70s by Military and Space applications, development of the complex software required support from supercomputers. The late 90s saw, for the first time, much easier-to-use software that could run on desktop computers. This allowed for the birth of VR Therapy. Since that time, major advancements in technology, driven primarily by the gaming and entertainment industries, have brought us to a place where a single head-mounted display (HMD) costing roughly \$300 can be used to deliver high quality VR therapy in the home.

Because VR is now much easier to use and much less expensive (my 1<sup>st</sup> HMD in the mid-1990s cost \$20,000), many therapists are beginning to evaluate whether VR should be added to their practice. This brief overview will assist the reader in deciding whether or not to take the technological plunge.

Ten aspects of VR and related advanced technologies that have the capability to improve both patient care and outcomes are as follows:

1. There are multiple randomized controlled trials that show VR therapy to be clinically effective. Recent meta-analyses confirm moderate effect size for many clinical applications when compared with active interventions. (Ma et al., 2021; Riva, Wiederhold & Mantovani, 2019) Studies conducted by clinicians and researchers around the globe over the past 25 years have been published in *Cyberpsychology, Behavior and Social Networking Journal*, <https://home.liebertpub.com/publications/cyberpsychology-behavior-and-social-networking/10> as well as other prestigious Medline-indexed journals, showing VR's success with culturally diverse populations.
2. Many VR applications are marketed directly to patients now. These include phone apps, which can be downloaded and used with an inexpensive Google Cardboard HMD (~\$10), and direct-to-consumer apps for use both immersively and non-immersively for prevention, education and treatment. One app, freely available in 17 languages, with accompanying protocols, <https://www.covidfeelgood.com> can be viewed on YouTube or using a smartphone and HMD (Meyer et al., 2022). Useful prior to or during treatment,

these same apps can be helpful to maintain treatment gains after completion of therapy, for homework assignments between sessions or as a self-help tool for stress management, mild anxiety and depressive symptoms.

As we continue to see the proliferation of apps, we will need to conduct clinical trials to demonstrate their safety and efficacy for our patients. The UK's National Health Service established criteria almost a decade ago to help with evaluation and recommendations, and in the U.S. the FDA has more recently established a digital software pre-certification program to help with regulation.

3. With the introduction of Meta's Oculus HMD in 2016, as well as HMDs from HTC and Samsung, we began to see the promise of affordable, sustainable VR hardware. And in the past few years, new advanced computer chips enable VR to be displayed in wireless HMDs. Pico and Oculus are just two examples of less expensive wireless version of HMDs, making delivery of VR even more practical.
4. Measuring vital signs and physiology is now routinely done with a smartphone or wearable device. There is an abundance of smart watches (Apple passed the 100 million mark in 2020) and other wearables – rings, patches, ear clips - that make collection of objective metrics easy and convenient. The use of this objective data has been shown to enhance patient care and outcomes. This significant improvement has caused insurance companies to take notice, with the creation of new reimbursement codes for wireless monitoring.

Mental health parity has seen the integration of behavioral health interventions regularly incorporated into the management of chronic diseases such as diabetes, hypertension and chronic pain. In 2007, the Quantified Self movement began with forums on self-tracking tools for diet, sleep, and mood tracking. Researchers still face the obstacle of crunching "big data" to provide helpful information to users, but with Artificial Intelligence (AI) this is becoming much more straightforward than it was 15 years ago.

5. VR therapy continues to expand in the successful treatment of many more conditions. VR apps are being created to assist with the treatment of chronic conditions such as insomnia, traumatic brain injury (TBI), and stroke. In the mid-1990s early case studies were published, highlighting VR's value in treating specific phobias and posttraumatic stress disorder (PTSD). (Wiederhold & Wiederhold, 1996). Now clinicians around the globe use VR to treat many varied disorders, including numerous specific phobias, anxiety disorders, eating and weight-related disorders, schizophrenia, PTSD, and burnout. VR also provides relief for individuals during both acute procedural pain and chronic pain. VR-enhanced stress inoculation training prior to traumatic events has been useful in both civilian and military first responder populations.
6. VR has been used as an assessment tool for two decades. In addition to behavioral avoidance tests, often done prior to exposure therapy, VR cognitive assessments have

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proven useful. Several groups have developed these tools to assess activities of daily living in older individuals or those who have suffered head trauma. Additionally, after an injury from a fall, balance and the vestibular system can be assessed during and after physical rehabilitation. Another study showed that post-deployment PTSD severity may be predicted based on pre-deployment heart rate variability systematically collected during VR. This allows for added training prior to deployment (Pyne et al., 2016). New AI programs have been used to diagnose depression and perhaps predict suicide risk. As we move more of our lives online, and with the advent of the metaverse, we may have easily accessible tools to provide earlier interventions for those with mental disorders.

7. Enhanced telehealth and home care complement hybrid care. Beginning in 2012, early adopters began to offer at-home VR. Ushered in by COVID, we have seen a dramatic uptick in the number of clinicians offering telehealth services since 2020. Now, we are seeing clinicians offering the combination of VR and telehealth, changing both how and where we can offer behavioral health services. It is possible to seamlessly transition effective care from the clinic to the home using VR, telehealth and wearable biosensors. With these new tools, we can augment treatment protocols and patients can improve their own mental health and well-being at home or on the go between sessions by using tools spanning the continuum from non-immersive to immer-

sive and interactive. For example, some patients may prefer to watch a 360-degree video on their computer screen or smartphone while others may choose to don a HMD and use the accompanying hand controls to “walk around” in the VR world, freely exploring at their own pace. Good therapeutic judgment will guide the choice of tools used for each individual patient.

8. Avatars combined with conversational AI are becoming increasingly important clinical tools. Recent coverage of the Google Lambda AI program suggested that a sentient AI being had been created. Other AI programs have passed the Turing test according to some experts. These artificial agents may prove beneficial in communication with patients. Not seeing them as a replacement for therapists, but rather understanding how to apply them appropriately to supplement care, could aid in overcoming the current shortage of therapists. Previously the Uncanny Valley described a rather uncomfortable feeling one encountered when viewing an “almost” realistic avatar. The human brain could detect subtle differences which prevented full acceptance as another human. Now with the advent of more advanced graphics, one sometimes struggles to tell the difference between human and AI beings.
9. The metaverse is (finally?) here. In the 90s, precursors to the metaverse, such as Online Traveler, were used successfully for group therapy and treatment of social anxiety. With new technologies such as AI, 5G and cloud computing, we will soon have the ability to feel fully “present” (the user’s sense of “being there”) with our patients, even as we provide treatment at a distance. We can conduct a group session or accompany our patients on a flight without physically being in the same location or even having to put on a HMD.
10. For more than a decade, we have seen a paradigm shift from a disease model to a prevention model in healthcare. We now have within our grasp the latest tools and technologies to offer proactive care. We also have new insurance codes to support that care. Now we require more proven preventive protocols that take advantage of the power of VR. We also need to consider further collaboration/integration with primary care medicine. Finally, we need to realize the value of data-driven therapeutics and the increasingly important role they will play in the future of healthcare.

As psychologists, it is imperative that we stay informed about new technology developments. We have an important role to play in the creation of patient-centric, technology-enhanced protocols. Providing individuals with tools that can facilitate the translation of skills from the clinic to the home, we can afford individuals the opportunity to become active participants in their own health and well-being. ■

Complete references for this article can be found at [www.cpapsych.org](http://www.cpapsych.org) – select *The California Psychologist* from the Professional Resources menu.

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