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How Can We Help Patients Benefit From the Metaverse?

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In the 1990s, the term “virtual reality” (VR) had a far different connotation: headsets were large, unwieldy, and could cost upward of thousands of dollars. Using these headsets in a clinical setting involved wiring a patient up to measure their physiology while they dealt with a heavy head-mounted display (HMD). Today, VR headsets are far less expensive and far more user-friendly. Instead of wiring up patients to measure their body metrics, patients can benefit from inexpensive wearable sensors that monitor their heart rate. And rather than being limited to virtual settings, new technologies allow people to navigate the metaverse: a new frontier of healthcare technology that is poised to radically shift the way providers approach mental and emotional health.

Patients want affordable, convenient, and effective healthcare. The metaverse is uniquely positioned to help deliver these solutions. In this article, the term “metaverse” will refer to online experiences that may combine VR, augmented reality (AR), and artificial intelligence (AI) in order to create immersive, interactive online experiences that seamlessly merge physical and digital worlds (Wiederhold & Riva, 2022). Al-

though the intersection between the metaverse and healthcare is in its infancy, we can glean promising future directions by studying the challenges and opportunities facing VR therapy.

The Potential of Virtual Reality and the Metaverse in Healthcare

Excessive levels of anxiety have been shown to negatively impact treatment outcomes and increase patient suffering (Kassahun et al., 2022). In over 1,000 patients at the Virtual Reality Medical Center, we’ve shown that VR can lower in-hospital pain and anxiety, can lower cost of treatment by enabling providers to use local anesthesia rather than general anesthesia, and reduce recovery time and length of stay (Wiederhold et al., 2014a; Vazquez, et al., 2017; Wiederhold et al., 2014b). VR can be used as a surgical continuum of care, providing pre-procedure reductions in anxiety and assisting with post-op recovery.

VR can also complement therapeutic interventions for mental health conditions, which we saw with a patient named Julie (not the patient’s real name). At 18 years old, she had experienced a horrific car accident which changed her life forever: her father was killed on impact, and it took two hours to remove her from the wreckage. After over a year of operations, her physical wounds began to heal – but the invisible wounds began to manifest. She developed post-traumatic stress disorder. She arrived at the Virtual Reality Medical Center with one small goal: she wanted to drive the 15 minutes each way to her physical therapy appointments by herself.

Therapy began by training her how to control her thought processes and monitor her heart rate, among other metrics. Then she was immersed in a virtual environment. On the first day, all she was comfortable doing was to sit in a virtual car; she couldn’t turn on the ignition, and she couldn’t drive. The virtual scenarios progressed at the patient’s own pace, so as not to re-traumatize her. Ultimately, she not only achieved her goal of driving herself to physical therapy, but she also achieved independence. She went back to college, obtained her degree, and is now living the life she was meant to live. That is the power of VR.

This case demonstrates one of the many benefits of VR: it allows providers to recreate the sights and sounds of a specific trauma in a controlled setting, and monitoring the patient's reactions helps reveal what to focus on in therapy. For Julie, this trauma involved a car; for other patients, such as current and former military members, virtual settings can recreate combat in Iraq or Afghanistan and facilitate emotional processing at the patient's own pace. VR can also be combined with other conventional therapies, such as medication and biofeedback, to support a patient's recovery and symptom management. And by sending a headset and wearable device to a patient, VR can complement telehealth, allowing patients to continue working on coping methods at home – a particular benefit to patients in rural and underserved areas that require outpatient support.

The Challenges Facing Virtual Reality

Although VR and the broader metaverse have great potential, this technology is still in its infancy – and we can expect it to experience growing pains. For example, to more effectively scale, clinical settings will require a universal platform; currently many VR systems don't work well with others. At present, cost, connectivity, and technical expertise are also roadblocks for patients who aren't able to receive VR headsets through their insurance and lack reliable internet access. And although designers can create a range of worlds that can help a patient emotionally process their traumas, it still isn't easy to customize VR worlds for each patient - particularly less common disorders.

As VR therapy continues to expand, multiple formats – ranging from less immersion and interaction to active engagement – may be necessary to meet patients' needs and technological capabilities. Patients who suffer from a type of motion sickness called cybersickness may need to view computer-generated VR worlds that involve less movement, losing an element of interactivity that can aid in presence and immersion (such as being able to look at objects from different angles). Another format is 360-degree video, which is more realistic, but may allow only head movement or "walking" only on a fixed path with no control over movement. Walking freely, at a pace controlled by the patient, is fully interactive and immersive, but up to 10% of patients may suffer cybersickness. Finally, mixed reality/extended reality (XR) combines VR and AR to deliver treatment. XR, used more extensively in physical therapy and occupational therapy, allows patients to engage in conventional exercises while playing games in virtual settings at home.

With each of these formats, content is a large unanswered question: how will we scale virtual worlds that meet the needs of a variety of patients, and how will we ensure that the worlds patients explore are safe and secure? Privacy is a major concern for patients as well as providers. The FDA has reviewed and authorized a growing number of VR/AR devices and approved the marketing of VR systems for chronic pain reduction. Other devices are FDA/CE registered medical devices

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(FDA, 2021; Matthius, 2012). There are many choices of apps, but not all have undergone clinical evaluation.

The Future of Virtual Reality, Augmented Reality, and Healthcare

We've come a long way since the bulky headsets of the 1990s. VR headsets are more affordable, with a wider range of applications and more immersive technology than ever before. Additionally, smartwatches and other low-cost heart rate monitoring devices enable patients and providers to monitor physiological metrics during sessions without intrusive wires. This is a good step in the right direction for wider adoption,

but steps need to be taken to ensure that VR therapy – and, eventually, therapy in the metaverse – is inclusive and clinically validated.

First, it's vital to educate the community about VR, AR, and the metaverse with a combined communications platform that covers a range of touchpoints: conferences, an APA-accredited training program, a dedicated VR therapy/metaverse journal, and specialty workshops that demonstrate the ways providers can incorporate these burgeoning technologies into their practices. This technology has the potential to span multiple health concerns, including stress and anxiety, chronic pain, fibromyalgia, neurological conditions, and PTSD. VR therapy has also been shown to help enhance the cognitive and social communication skills of children with autism spectrum disorder, empowering children to regulate emotions and learn behaviors that complement living in a neurotypical world (Zhao et al., 2022).

Second, patients need to understand how to appropriately use the tools as extensions of therapy, rather than solely entertainment or escapism. That involves teaching patients how to use VR in clinically-validated ways as part of their overall treatment plans. In part, this knowledge gap is attributable to the general public's lack of awareness about VR as a therapeutic tool; one potential solution is to integrate VR into primary care settings, since the majority of patients still present to their primary care provider before meeting with a mental health professional.

Finally, greater clinical attention should be paid to the metaverse, which is positioned to improve the VR of the past and present. One day, metaverse technologies may eliminate the need for cumbersome head-mounted displays, allowing patients to slip on a pair of glasses in order to interact with AR in their real home environments. By melding digital elements in the real world, patients may be able to benefit from more accessible and effective prevention and treatment solutions because they can interact with tools in familiar settings, and potentially experience less cybersickness. Not without its faults, in general AR can cause headaches and eye strain, as opposed to the nausea and upset stomach associated with VR (Stanney, Lawson & Oman, 2021).

Ultimately, the greatest way that VR, AR, and the metaverse will benefit patients is by providing them with the tools to take control of their treatment. Providers can use real-time data to monitor a patient's response during sessions and adjust accordingly, allowing patients to progress at their own pace. Clinically-backed applications can help patients bring coping techniques home, supporting the odds of better long-term outcomes. Providing individuals with the tools for self-care allows them to become more active participants in their own health and well-being. Why not let patients help themselves with the metaverse? ■

Complete references for this article can be found at www.cpapsych.org – select *The California Psychologist* from the **Professional Resources** menu.

