Abigail Pugh

The Huey helicopter shakes and vibrates with the sound of enemy fire below as it touches down in a jungle clearing. Above the noise of its engine, you hear frightened voices shouting and the loud crackle of mortar fire. Your task is to exit the aircraft, then run across the open field into the shelter of the trees, passing through a hail of live missiles as you go.

This scenario is intimidating enough for those of us who have never directly experienced war. For one of the estimated 800,000 U.S. combat veterans who live with post-traumatic stress disorder or other chronic anxiety problems, it means reliving terrifying events they would rather forget. Luckily for this veteran, the above scenario is not real. At least not anymore. He is in fact safe in a psychotherapist's office, using virtual reality to confront his trauma. But the anxiety he is going through is actually real. The sweating, increased heart rate, trembling and churning stomach are anything but virtual.

So why is he putting himself through his worst fear, over and over again?

Because he has chosen to expose himself to fear to finally beat it. He is doing so in a virtual environment, using Virtual Reality (VR) technology. In VR simulations, the user does not merely watch images and hear sounds, but can often also interact with the environment. Movements of the user's body are translated into movements through virtual space. The experience is often described as immersive because the user feels he or she is actually "there." All the senses can be involved, with touch or even smell added to some VR packages to add depth to the experience.

Although most often associated with amusement parks and sci-fi movies, VR is becoming a promising treatment tool for therapists to treat various psychological conditions, ranging from anxiety disorders such as phobias, social anxiety, public speaking anxiety and post-traumatic stress disorder to addictions, eating disorders, sexual dysfunction and depression.

The main application for VR is as an exposure tool, a controlled means of experiencing a challenging situation. Decades of research have established that repeatedly experiencing fear in safe situations allows the body and mind to accommodate and eventually overcome extremely anxious responses to feared objects or scenarios. Page Anderson, a psychology professor at Georgia State University in Atlanta, Georgia, says the two main questions asked by researchers in the early days of VR therapy were: Could VR actually elicit anxiety enough to do meaningful exposure therapy? And, if the client shows signs of improvement during VR exposure, could changes in the virtual world lead to changes in the real world? Results have shown that the answer is "yes."

Dr. Barbara Rothbaum, an associate professor of psychiatry and behavioral sciences at the Emory University School of Medicine in Atlanta, was one of the earliest adopters of VR technology in clinical practice. In 1993, she and her team used simulations of height to expose study participants with acrophobia (fear of heights). "At the time, we didn't know if we were on the cutting edge or the absolute fringe," says Rothbaum, who is also director of the school's Trauma and Anxiety Recovery Program. The results from the tests were impressive: seven out of 10 of those repeatedly exposed to "virtual" heights chose to expose themselves to real heights unaccompanied by the therapist. Rothbaum says her later work with clients with a flying phobia has also been very successful. The VR technology is particularly useful in the post-9/11 era, where access to real airplanes (previously the exposure tool of choice for many therapists) is now impossible.

Giuseppe Riva, a research professor of psychology at the Catholic University in Milan, Italy, has pioneered the use of virtual reality with clients who have distorted ideas about their own body shape. He describes the initial insight that led him to VR: "Even though the body is usually considered the most personal part of our perceptive experience, our perception of the body is not direct," he explains.

"Evidence that this body representation can exist independently of sensory input is found with the phantom limb phenomenon, the subjective sensation that an amputated limb is still present."

Riva uses computer-generated images of various body types and asks clients to walk into a virtual room, weigh themselves on virtual scales and compare their body, as represented graphically, with other body types (see sidebar for a session description). Good results, such as more accurate assessment of real body shape and increased motivation to change eating habits, are often seen within six weeks.

VR may also be an important new treatment device for addiction problems. Rothbaum is currently at work on a virtual crack house project, which involves simulating the experiences of crack buying and smoking. Using conversations with clients who are addicted to crack, Rothbaum's team created an accurate script and visuals, so the crack house would be as realistic as possible. Users smoking the drug, others having sex, $20 bills being exchanged for a hit—these are all key cues offered by the virtual crack house. Growing accustomed to these cues and learning to refuse drugs in this controlled environment may reduce the client's temptation in the real world.

VR environments are planned for treating other addictions, too, including tobacco smoking. In the smoking simulation, users can even adapt the program to show their favourite brand.

But researchers concede that VR, although life-like and immersive, has yet to duplicate the experience of real life. Thus, VR exposure is less traumatic than in vivo (real-life) situations. But this brings with it a key advantage for VR: it is less intimidating to clients, who might otherwise be reluctant to seek treatment. A 2001 study conducted by Spanish clinical psychologist Azucena García-Palacios and colleagues found that 80 percent of participants preferred VR to in vivo exposure therapy.

Other advantages of VR over in vivo therapies are convenience for the therapist and client; increased control over exposure; reduced time and protection of client confidentiality. The treatment is also
potentially more economical than in vivo work, since it takes place in
the therapist's office and can be customized to the exact exposure
needs of the client.

In the early 1990s, when VR first showed promise as a treatment
tool, costs were very high. But systems are becoming less expensive,
and graphics power is far superior to the original machines. Treatment
of clients who have a phobia of public speaking, for example, is much
easier using contemporary VR equipment than it was at the outset,
when digital audiences were difficult to create. The audience can now
be created using digital photography, while only the speaking platform
is virtual. Today's fast Internet connections mean that more and more
VR environments are becoming available on the Internet, opening up
exciting possibilities for long-distance therapy.

Given the possibilities of VR as a treatment modality, a key research
direction must be the randomized comparison of virtual treatments to
today's empirically established modalities. With evolving technology
and client and professional acceptance, virtual reality could soon play
a significant new role in mental health and addiction care.

"Virtual" mental illness:
VR as an empathy-building tool

People with schizophrenia report that the visual and auditory hallucinations they
experience are very intrusive, often disturbing and difficult to differentiate from
actual events. Through VR, individuals without the condition can, for the first
time, see and hear life through the lens of the disorder. Janssen Pharmaceutica,
which makes schizophrenia medication, has developed a simulation of schizo-
phrenia. One user of the program describes his experience: "While spiders
climb all over the room, the psychiatrist leans over his desk and shows his face
close to mine, his eyes squint, red and evil ... the voices won't let me pay atten-
tion. 'Loser, loser, loser,' screams one."

Measuring impairment:
VR as a diagnostic tool

Researchers at the University of Southern California in Los Angeles have
announced the potential value of VR as an assessment tool. In a study published
in the Proceedings of the International Conference on Disability, Virtual Reality
and Associated Technology in 2002, Albert Rizzo and his team tested eight
boys, aged six to 12, who had been diagnosed with attention deficit hyperactivity
disorder (ADHD), and 10 non-ADHD children. Using a specially designed virtual
classroom, the children's performance was measured on a vigilance task, using
the blackboard in the virtual room. The first task was set in good conditions. The
second task had built-in distractions, such as a paper airplane circling or a car rum-
bling past the window. The children's body movements were measured. Results were
compared with those from conventional neuropsychological testing and with
behavioural ratings from parents. The children with ADHD performed more slowly,
made more mistakes and were more easily distracted and physically active during
the test than the control group. The data suggest that the virtual classroom may be
a more efficient, cost-effective and accurate tool for measuring attention problems
in children than traditional measures.

When fact and perception clash:
VR in eating disorders

The following is paraphrased from a report by Giuseppe Riva, which describes
a session with a female client with anorexia nervosa who had lost 1.3 kilo-
grams during the last week.

Moving around in a virtual space contain-
ing images of various body shapes,
"Mary" was uncertain about the "ideal" and "real" figures, and seemed to have
considerable difficulty both in comparing herself with these images and in
discussing her thoughts and corresponding emotions. Mary chose between panels
that represented the dimensions of her real body and another body shape with
slightly more fat. She chose the latter body shape and said: "I see myself in
this way, but I don't know whether I am like this!"

The therapist informed her that the other shape was in fact a more accurate
impression of her body. The feelings induced by the view of her own digitized
image were very strong. "It's so strange to see me. I'm so thin!"

Comparison between her photo and her
chosen image made Mary aware of the
great difference between her subjective
body image and the objective representa-
tion. Finally, Mary managed to realize,
and simultaneously verbalize, her misper-
ception of her body image. "I'm thinner
than I thought. My illness doesn't make
me feel objective and rational. What I see
isn't reality. I see myself as obese."