

Bringing the Smells of War Home, via Virtual Reality

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On an Orlando college campus, veterans and active duty soldiers suffering from post-traumatic stress disorder inhale the unmistakable smell of burning tires, rotting garbage and Middle Eastern spices as part of a virtual reality treatment for the psychological wounds of war.

Participants sit in a chair wearing a head-mounted display and video goggles connected to a computer system and a scent machine that puffs out the odors, recreating their memories of war, from insurgent ambushes and roadside bombs to witnessing comrades die.

From the outside, it looks like the soldiers are playing a video game, but therapists hope that on the inside, they are healing.

The Trauma Management Therapy program, now available to South Florida active duty soldiers and veterans with PTSD who volunteer, is part of a clinical study at the University of Central Florida that uses sights, sounds and smell to help ease the episodes of anxiety, sleeplessness and nightmares. With new waves of soldiers returning as American forces withdraw from Iraq and Afghanistan, researchers are hoping the combination of traditional therapy and virtual-reality simulation - with an emphasis on smell - to help decrease post-traumatic symptoms.

"The point is not to make people comfortable with these events, but to decrease the emotion that has gone along with them so someone stops being afraid to drive under an overpass because it triggers a reaction related to a bridge attack they lived through in Iraq," said Deborah Beidel, director of the UCF Anxiety Disorders Clinic. "Think of it this way: If you were afraid of dogs, how do you get past that fear? You have to be around a dog. You have to confront the fear."

Between 11 percent and 20 percent of veterans of the Iraq and Afghanistan wars have PTSD and more than 200,000 veterans have been treated for the disorder at facilities run by the U.S. Department of Veterans Affairs – statistics that are driving the military to explore alternate treatments including acupuncture, yoga and meditation. The Military Operational Medicine Research Program has invested about \$297 million in active research projects addressing PTSD, from prevention to treatment.

Virtual-reality exposure therapy is among the promising tools.

As part of the \$5 million study, Beidel is leading a team of therapists who use the Virtual Iraq and Virtual Afghanistan software to simulate war experiences based on the memories of the soldiers. The participants, all from Florida so far, describe in detail the traumas to a therapist who uses the information to create a virtual combat landscape. Participants come in daily for three weeks for 90 minute sessions followed by group therapy. Previous therapies that used the virtual reality software - some minus the scent machine took longer, usually months. This latest process is faster but still highly controlled, with the soldiers describing their experiences to a therapist who, with the click of a mouse, sets the scene on the computer.

In short, the soldier or veteran is the narrator. The therapist is the producer.

The treatment starts with the participant dropped into a virtual Humvee as a driver or passenger or gun turret operator. The computer program can be tweaked for day or night, sunny or sandstorm, quiet or with helicopters roaring overhead, peaceful or with snipers on rooftops. The truck can rumble along a bustling street with markets or along a desert highway - a platform under the chair is designed to make the chairs vibrate. Chatter can be heard in English or Arabic. Insurgents can be seen lying dead or lurking around corners.

With each description of scenery or action or sound, the therapist points, clicks and recreates. Participants in the program are encouraged to remember smells, which researchers believe are a particularly strong trigger for reliving experiences. The computer software is connected to a scent machine with an air compressor and fan that puffs out whiffs of 13 scents right near the participant's nose. Working with military researchers, the specific odors, including cordite, charred hair and gunpowder, all developed by EnviroScent, an Atlanta-based company, use synthetic aromas and essential oils mixed with a gel substrate, said Emorie Sherwood, EnviroScent's Product Development Manager.

"The sense of smell drives many behaviors because of the way in which the brain is structured. Other senses pass through filters, are separated and processed and then re-integrated into the brain. But with olfactory stimulants, it doesn't pass through the filtering system," said Ronald Hoover, a U.S. Army research portfolio manager. "What we have found is that smell has a more direct connection to the memory, and it's very salient and tends to be more resilient to the passage of time, which is why you can have childhood memories that are based on a scent."

The idea is to tell, retell and relive the most horrific traumas over and over until the memory loses its emotional punch, a process known in psychological circles as exposure therapy and habituation. During treatment, the participant's heart rate often increases, palms sweat, anxiety surges. At any point, though, they can stop.

"We don't want the participant to lose the memory. Rather, we want them to be able to take the highly emotional content and process it out of the memory so it's not so powerful," said Hoover, a licensed psychologist. "PTSD can be such a debilitating condition. When soldiers return with problems, we take the responsibility to address those with the utmost seriousness."

Active-duty service members with PTSD are often re-deployed before they recover, said Hoover. The study also explores whether compressed treatment daily over three weeks is as effective as once a week for 17 weeks. At UCF, the first participants who went through the longer program reported their nightmares decreased from every night to once a month. Earlier this year, the U.S. Army added \$1.5 million to develop the three-week intensive program, particularly for active-duty service members. "We have soldiers rotate back out on deployment before they get to finish the therapy, so we are hoping to find treatments that are successful in shorter periods which will heighten our completion rate," Hoover said.

Virtual reality as therapy is not new, just improved. In 1997, researchers introduced Virtual Vietnam. The computer system placed veterans – suffering from what was then called battle fatigue or shell shock – in a jungle or aboard a helicopter hovering over a river.

The new, technologically superior, programs were created by Albert Rizzo, a clinical psychologist at the University of Southern California who began looking at ways to help soldiers almost immediately after

the war in Iraq started in 2003. He had already been using virtual reality to treat patients with attention deficit disorders. Then he discovered Full Spectrum Warrior, a game used as a training tool by the Department of Defense and wondered if the same technique could be used in therapy. "We use gaming software to create realistic combat environments. We are bringing the war home so we can treat our wounded service members," he said. "They have gone through and seen horrible things so it's not easy *for* them to revisit. It's hard medicine for a hard problem."

Rizzo said the system can be particularly attractive – and without the stigma of traditional treatments – for younger soldiers.

"You have a generation of soldiers, Marines and service members who grew up in a digital world, who have played thousands of hours of computer games," he said. "That is the group you may be able to appeal to and get them to come in and get treatment."

Army Sgt 1st Class Kevin Todd, in the service more than two decades, brought back the horror of war after returning from Kuwait in 2004. He lived with the anxiety, the depression, the nightmares – the relentless loop of killing people or being killed – for seven years before asking for help. Last June, he started the Trauma Management Therapy weekly program - the longer version of the treatment using Virtual Iraq as part of his recovery.

"The first thing you have to do is admit you have a problem and then be willing to express it, and be willing to talk about what actually happened to you ," said Todd, 47, who is in the process of being medically discharged "I used to have nightmares every day. I didn't want to go to sleep. Now I have them a couple times a week. I am making progress."

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