A game for the pain: Virtual reality could help back aches

Physical therapists advise patients with back pain to stay active. Many of those patients, though, are afraid of making their pain worse.

“In all levels of back pain, if people have a high amount of fear, they move the lumbar spine less,” says James Thomas, an Ohio University physical therapy professor who’s conducted research on the phenomenon. That sets them up for further pain and disability.

How can therapists motivate reluctant individuals to get up and go? Thomas thinks the answer might be immersive video games—especially those that use cutting-edge technology such as virtual reality head-mounted displays that place the patient right on the playing field.

Thomas and Christopher France, Distinguished Professor of psychology, received a $470,000 grant from the National Institutes of Health to study the impact of the novel gaming system on back pain patients. The research team is in the process of recruiting subjects to test the system’s effectiveness.

Users play virtual dodgeball by either wearing the Oculus Rift, a head-mounted display offering a totally immersive experience, or by wearing 3D glasses and controlling an animated avatar in the game, Thomas says.

Building the game itself was no small task. Thomas and France developed the original game concept—the high-activity dodgeball game paired with a monetary mechanism that encourages game interaction—and worked with three technology companies to integrate the motion tracking hardware with the gaming software. Thomas spent a year rebuilding his Motor Control Lab in Grover Center, outfitting it with better motion capture cameras that could detect the smallest joint movement, investing in new Oculus Rift headsets, and adapting Python computer code to make the system work.

“Our team generated a massive amount of code to modify a variety of aspects of the game,” he says, which allows the research team to customize the program for each participant.

Study subjects are tested, then get three days of training on the game, and then are re-tested. Researchers can view in real time an animated model of how patients are moving their bodies during game play, calculating the degree of movement at the spine and other joints, Thomas says.

The game has shown enough potential in these early lab tests that Thomas and colleagues have developed new versions. As an alternative to dodgeball, the team has created a virtual dojo in which patient coordination is assessed through a series of rapid reaching movements to targets located in the virtual world. And Thomas is planning to add tactile feedback to the dodgeball game—if players get hit by virtual ball, they would feel it as a small vibration on the limb.

The end game? Thomas envisions a home version that could be played on a television set or a tablet computer so that back pain patients have the convenience of improving spine motion right in their own living rooms.

THOMAS AND FRANCE WERE AWARDED $470,000 FROM THE NATIONAL INSTITUTES OF HEALTH TO STUDY THE IMPACT OF THE GAMING SYSTEM ON BACK PAIN

(Left) Software tracks the skeletal and muscle movements of the study volunteers so that the researchers can understand the impact of the virtual game play on the body.
(Above) Users play virtual dodgeball by either wearing the Oculus Rift, a head-mounted display offering a totally immersive experience, or by wearing 3D glasses and controlling an animated avatar in the game.