



# GAMES: IMPROVING HEALTH

The health of the American people is serious business. In a relatively short time, entertainment software has become a valuable partner in that cause. Computer and video games now serve as tools in the fight to preserve well-being, heal the injured, and train the professionals who respond to medical emergencies.

## PHYSICAL FITNESS

One study released by the University of Kansas Medical Center in 2013 underscored how video games can help achieve physical wellness. The study showed that players who participated in the weight loss training through *Second Life* lost a comparable amount of weight to people in the more traditional, clinic-based program. When comparing the results gathered from patients using a virtual weight-maintenance program to data from other studies on face-to-face maintenance programs, the researchers found that the virtual program was more effective. A March 2014 study from the UnitedHealth Group echoed these findings. Researchers found that giving children active video games to play while they follow a weight management program boosts their moderate and vigorous activity levels. The kids who played active video games also lost more weight than children who only followed the weight management program.

To help keep children fit, many schools are leveraging active video games to promote increased physical activity. In California, for example, the Fresno Unified School District used a grant from the California Endowment to purchase a special classroom version of *DanceDanceRevolution*, a game that requires players to vigorously dance across four arrow-shaped floor pads following a game-generated pattern set to music. The *DanceDanceRevolution Classroom Edition*, a joint initiative from Konami and UnitedHealthcare, allows up to 48 students to simultaneously participate in a dance session by using a mat outfitted with a "smart card reader" that tracks an



**37 Percent**

Percent of fewer errors that surgeons who played video games at least three hours a week made in simulations of laparoscopic surgery compared to non-players according to a report published in the *Archives of Surgery*.

individual student's progress. Additionally, the Idaho Digital Learning Academy incorporated Nintendo's Wii Fit into its physical education classes. Students receive instructions online and can do their classes from home. Each Nintendo Wii workout also comes with a homework assignment, such as identifying the different parts of the cardiovascular system.

Students are not the only ones using video games to stay fit. Senior citizens and personal trainers also embrace active games. Retirement communities across the country, such as Grace Presbyterian Village in Dallas, use the Nintendo Wii at their facilities to help seniors stay active. Video games also improve elderly players' overall wellness. Researchers from North Carolina State University found that senior citizens who played once a week or more reported higher levels of well-being, positive mood, social functioning, and better self-reported health than non-gamers. In addition, the National Senior League sponsors a National Wii Bowl each spring and fall, and recently named the top 40 Senior Wii Bowling teams in the world. In 2013, these championships included more than 290 teams from 33 states.

Video games can also make exercise at the gym more appealing. The makers of the genre-defining *Guitar Hero* recently launched GoGi, a game platform that uses Bluetooth technology to connect to cardio gym equipment. Players wear a sensor on their bodies that tracks their movements and displays their actions on screen. Famous athletes and celebrity personal trainers are also working with game companies to develop their own rigorous game workouts. *Tony Horton's P90X* and *Shaun T's Insanity*, as well as workouts from well-known trainers like Tracy Anderson and Jillian Michaels, are available for Microsoft's Xbox One. Making use of muscle mapping, balance calculations, and limb orientation detection, these games offer players immediate feedback to help improve their

techniques, prevent overextensions, and more. The American Heart Association (AHA) also recognizes the benefits of the Nintendo Wii as a fun tool people can use to stay in shape. AHA teamed up with Nintendo to promote the system, and the organization's logo now appears on packaging for products like *Wii Fit Plus* and *Wii Sports Resort*.

In April 2012, ESA partnered with the President's Council on Fitness, Sports & Nutrition to launch the Active Play Presidential Active Lifestyle Award Challenge in April. Through this innovative partnership, Americans can now earn their Presidential Active Lifestyle Award, or PALA+, through active video game play. The PALA+ program requires children to be physically active for 60 minutes each day and adults to be active 30 minutes a day, five days a week for six out of eight weeks.

## MEDICAL RESEARCH

Recently, video games have played a pivotal role in medical research. The growth of crowdsourcing games offers researchers a new, innovative way to garner help from game players around the world.

Cancer Research UK created *Play to Cure: Genes in Space*, a game that enables gamers to contribute to vital research by coding vast amounts of data about cancer genes. Players navigate a spaceship through valleys and mountains, tracing a



## 4 to 6.7

Number of calories kids burn per minute playing exergames like *Wii boxing*, *Cyber Trazer*, *Light Space*, *Sport Wall* and *Xavic*. Compare that to the 4.4-calorie burn kids would get walking on a treadmill at 3 mph.



course that helps scientists identify genetic mutations that often predict the development of cancer. Additionally, researchers from UCLA created an online game, *BioGames*, in which players must distinguish malaria-infected red blood cells from healthy blood cells by viewing digital images from microscopes. Researchers found that “non-expert” players were able to diagnose malaria-infected red blood cells with a level of accuracy that was within 1.25 percent of the diagnostic decisions made by a trained medical professional.

Other games are helping doctors expand treatment knowledge to clinicians and players without a rigorous medical education. A web-based game, *Septis*, is modeled after the popular computer game, *Tetris*. Developed by medical professionals at Stanford University and funded by the Pentagon’s Defense Advanced Research Projects Agency, the game challenges players to keep a patient alive and find a cure for sepsis by observing the patient’s vital signs.

## MEDICAL TREATMENT

Medical professionals also use games to address health concerns. With the help of the ESA Foundation, HopeLab – a nonprofit group that aims to improve the quality of life for kids with chronic illness – built on the success of its motivational cancer-education game, *Re-Mission*, with *Re-Mission 2*. *Re-Mission 2* is a series of web-based games that help teach young cancer patients about their treatment regimens. In *Re-Mission 2*, players navigate

the human body to fight cancer. Using treatments such as chemotherapy, antibiotics, and the body’s natural defense mechanisms, players destroy individual cancer cells. The game was developed with the help of 120 young cancer patients from across the country to ensure that in addition to being motivational, the game is also fun. Like its predecessor, *Re-Mission 2* alters children’s perceptions of chemotherapy and inspires them to stick with their treatments.

Today’s multi-touch game technology gives researchers the ability to develop low-cost applications with the potential to treat sufferers of autism, cerebral palsy, and other developmental disabilities more efficiently, and in some cases more effectively, than traditional methods. At the Children’s Hospital of Philadelphia’s Center for Autism Research, researchers teamed up with programmers to create a series of games that help autistic children recognize facial features. In addition, game developer Red Hill Studios is working with the University of California, San Francisco to develop a series of games to help Parkinson’s patients. Using the Microsoft Kinect, the games require players to complete a series of motions and gestures proven to improve the gait and balance of those with the disease.

Students at Champlain College in Vermont have developed games to help people with cystic fibrosis. Patients with the disease develop thick mucus in their respiratory system, which they must cough up to prevent it from clogging their airways. The games engage players in traditional breathing exercises that help clear airways in a fun and interactive way. One game challenges players to drive a race car, fill up with gas and wash the car, while another game tasks patients with blowing slime off of animals they discover in order to earn treasures. Researchers found that patients’ ability to take a deep breath improved significantly after playing such games.

Recent research has also shown that video games can help adults struggling with addiction. Duke University professor Zach Rosenthal applied video games to exposure therapy, creating a game in



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Percent reduction in nicotine cravings among patients who played the video game *Tetris*, according to a Plymouth University study.

which drug addicts navigate a virtual world filled with real-life temptations under a therapist's guidance. The exercise is designed to help patients build tolerance to previously uncontrollable cravings. Additionally, a May 2014 study found that playing the classic video game *Tetris* reduces the strength, frequency and vividness of naturally occurring cravings, including nicotine cravings, by up to 24 percent.

## REHABILITATION

Video games have emerged as a unique rehabilitation tool that helps patients to develop better attitudes and recover from injuries ranging from the irritating to the life-threatening.



Rehabtics, a physical therapy start-up founded by a Johns Hopkins Ph.D. student and entrepreneur, is developing a software program called ArmSPOT that would allow patients to complete physical rehabilitation workouts in the comfort of their own living room. The system aims to make patients more engaged in their rehab and improve their outcomes by turning workouts into a game. The program will collect and later send data about patients' workouts to their doctors, allowing

physicians to better track progress and give patients the extra push to follow through on their doctors' orders. Cadets at the Air Force Academy are developing a program that uses the Xbox One to help stroke victims track their movements. Using the Kinect, patients move their bodies to mimic a stick figure on the screen. The system records the activity and assesses whether patients performed the movement correctly.

Leading hospitals across the country, such as the new Pain Medicine Care Complex at the Children's National Medical Center in Washington, DC, are using video games to help patients manage chronic and often debilitating pain disorders. A Kinect sensor tracks patients' movements as they play one of four of galaxy-themed video games created specifically for the complex. The game transmits technical data and interactive activities to their doctors, who then use the data to objectively identify and monitor pain and then determine how to evaluate techniques used to treat it. Doctors believe that they can use the data to develop more accurate and applicable pain treatments for adults, including for other chronic conditions like autism, cancer, and diabetes.

Soldiers returning from combat in Iraq are playing *Virtual Iraq*, a commercial video game that University of Southern California researchers modified to help veterans cope with the debilitating post-traumatic stress disorder (PTSD). The game takes exposure therapy to a new level, allowing veterans to experience the sights, sounds, and smells necessary to emotionally process traumatic memories.

## MEDICAL TRAINING

Video games also train medical personnel for the life-or-death decisions they have to make quickly. Employees at the Office of Naval Research (ONR) use BreakAway's *Pulse!!* virtual clinical training software that teaches players time management and quick-thinking skills. *Pulse!!* guides nursing and medical students through simulated patient interaction as realistic sights and sounds unfold in the background.

57

Percent decrease in depressive symptoms among those who played casual video games, according to researchers at East Carolina University.





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The University of Maryland Medical Center's Advanced Simulation, Training, Research, and Innovation Center (MASTRI) also utilizes video game technology. In one program, surgical residents face an emergency scenario

and must perform the necessary procedure on a simulated patient through virtual reality computer programs. The program also uses the same motion-sensing technology used to capture an athlete's movement in developing sports video games to help train surgeons to use proper technique.

Dozens of hospitals, medical schools and health foundations have virtual clinics on Second Life where they can stage different training drills. In one drill developed by the University of California San Diego, emergency room nurses must create a triage system to handle their avatar-patients, assessing the health condition of each patient and determining how to isolate the most contagious. In other programs, such as those created by start-up firm MUVE Market LLC, Second Life simulates the patients' symptoms and their response to treatment, including rashes and burns, or exhibiting odd behavior, such as dementia.



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