

games: IMPROVING HEALTH



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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 useful tools in the fight to preserve well-being, heal the injured and train the professionals who respond to medical emergencies.



PHYSICAL FITNESS

A 2011 study conducted by scientists at Brigham Young University proved that video game exercise can help achieve physical wellness. The study showed that middle-school students who played active video games - such as *Wii Boxing* and *Dance Dance Revolution* - experience enough exercise to meet recommendations for physical exercise. Georgetown University researchers conducted a separate study on overweight teenagers in Washington, D.C. using the Wii version of the game *Sports Active*. Scientists found that children who played various games competitively and in groups lost weight, felt better about themselves and developed increased focus necessary for academic achievement.

To help keep children fit, many schools are discovering computer and video "exergames," which promote increased activity and generate excitement. In Pennsylvania, for example, the Connellsville Area School District used a grant from the Highmark Foundation to purchase gamer bikes and *Dance Dance Revolution*, a game that requires players to vigorously dance across four arrow-shaped floor pads following a game-generated pattern set to music. In New York, the Parsippany-Troy Hills School District purchased wristband monitors and related equipment that will track students' heart rates while playing video games. 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 their own homes. Each Nintendo Wii workout also comes with a homework assignment, such as identifying the different parts of the cardiovascular system.

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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*.

Students are not the only ones using video games to stay fit; senior citizens and personal trainers are also embracing the concept. Retirement communities across the country, such as Grace Presbyterian Village in Dallas, use Nintendo's Wii at their facilities to keep seniors physically active. Brenda Terry, vice president of rehabilitative services at Grace Presbyterian Village, marvels, "When our residents hear they're going to play Wii, they're more willing to get up from their chairs and start their therapy." 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 2010, these championships included more than 240 teams from 27 states.

Personal trainers and fitness clubs, including Gold's Gym and the YMCA, also use interactive fitness systems that employ video game technology to make exercise more appealing. For example, seven of the Middle Tennessee YMCA facilities feature exergaming activities like *Dance Dance Revolution* for young clients. YMCA officials say the games have improved players' endurance, speed, hand-eye coordination and balance. A new I-Gym Kidz in Miami designed specifically for children ages 6 through 13 features active video games that help keep kids entertained and focused while they exercise. Moreover, research by the American Council on Exercise revealed that the game's "standard" and "difficult" modes burn calories at a rate comparable to "the benefits people get with high-impact aerobics." 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*. Nintendo and AHA also hosted the "Innovations in Getting Active" summit in January 2011, where leaders in the areas of fitness, science, health care, video games and education converged to talk about the power of game play to encourage physical activity, especially active game play.

4 to 6.7

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



HEALTHY HABITS

The health community is also embracing the use of games in the overall promotion of healthy habits. The Robert Wood Johnson Foundation established the Health Games Research Program in late 2007 to further the use of games in health. The \$8.25 million program has since distributed 21 grants to hospitals and universities across the country for research and development of original game designs that require physical activity or promote healthy habits. The center also launched an online health games information database in April 2010 that enables researchers, game developers, health professionals, educators, funding agencies and policy-makers to access a wide-ranging compilation of health games, research findings, publications, organizations and events in this growing field. In addition, the foundation will release a new peer-reviewed academic journal in fall 2011 on the growing body of research that shows how electronic games can serve as a public health tool.

Similarly, Kaiser Permanente established the Healthy Eating Active Living Program. The HMO's most notable project in this area to date is a free online game entitled *The Incredible Adventures of the Amazing Food Detective*. The computer game teaches 9 and 10-year-olds about nutrition and exercise. In the game, children choose one of several adventures that

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Percent increase in upper arm strength among stroke patients who played video games or used virtual reality tools in their physical therapy programs, according to a University of Toronto study.

involve solving a “mysterious outbreak of unhealthy habits,” a process which includes hands-on activities such as measuring sugar in sodas. After 20 minutes, the game shuts off, forcing players to engage in a different activity for the next hour.

In March 2010, the U.S. Department of Agriculture (USDA) launched its “Apps for Healthy Kids” competition as part of First Lady Michelle Obama’s Let’s Move! campaign to end childhood obesity. The competition called on software developers, game designers and students to create innovative, engaging applications and games based on USDA’s health and wellness data sets that encourage children to eat healthier foods and be more physically active. The ESA’s president and CEO, Michael D. Gallagher, served on the competition’s judging panel, alongside experts from the fields of technology, nutrition and education. The USDA announced a group of 12 winners in September 2010, including grand prize winner *Trainer*, a computer game that challenges players to maintain the health of a virtual creature through proper nutrition and fitness training, and requires them to exercise along with their creature by using a webcam.



MEDICAL TREATMENT

Medical professionals also use games to address more specific health concerns. A video game called *Eye Spy* helps ophthalmologists screen children for visual impairments early in life. According to the National Institutes of Health, one in four kids have some kind of vision problem, but most go undetected. *Eye Spy* uses response times and answers in a treasure hunt to pinpoint problems like lazy eye, retinal disorders or even cataracts. In addition, Bayer began selling Didget, a blood glucose meter for children with diabetes that plugs directly into Nintendo DS handheld consoles, in May 2010. Didget boots up an adventure game called *Knock ‘Em Down World’s Fair* that rewards players for performing a prescribed number of tests each day with points that allow them to progress through the game at a faster rate. Players can earn additional points for staying within target blood-sugar ranges, which parents can preset.

HopeLab, a nonprofit group that aims to improve the quality of life for kids with chronic illness, created a game called *Re-Mission* which it distributes, with the help of the ESA Foundation, free of charge to teens and young adults with cancer. The game features a robot that travels through the bodies of fictional cancer patients to destroy cancer cells, battle infections and manage the effects of cancer treatments. In August 2008, the journal *Pediatrics* published research that showed *Re-Mission* helped young patients stick to their treatments more effectively and show greater understanding of their disease.

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 develop skills in facial recognition. 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

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

they must cough up to prevent it from clogging their airways. The games engage players in traditional breathing exercises that help clear airways, but 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 tasks patients with blowing slime off of animals they discover in the game in order to earn treasures. Researchers at the University of Vermont tested the games and found that participants' ability to take a deep breath improved significantly after playing.

Similarly, Harvard researchers developed a tablet game for cerebral palsy patients called *Catch the Butterflies*, which challenges players to catch butterflies fluttering about the screen by gripping a tennis ball and maneuvering its position upon the screen. Using a stylus in the other hand, patients "capture" the butterflies on the screen and slide them into a virtual jar. The game proved to engage patients more effectively than traditional therapy and also provided doctors with better data to record patients' reaction time and progress.



REHABILITATION

Traditionally a source for diversion, computer and video games in recent years have taken on a special meaning for individuals who experience a life-altering injury or illness. Entertainment software has emerged as a uniquely engaging rehabilitation tool that promotes better attitudes and swifter recoveries for injuries that range from the irritating to the life-threatening.

Over the past few years, soldiers returning from combat in Iraq have found awaiting them *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.

In addition, the U.S. Department of Defense (DOD) invested in several digital software systems over the past few years to aid with trauma treatment and rehabilitation, including the *T2 Virtual PTSD Experience* on Linden Labs' Second Life. Developed at Joint Base Lewis-McChord, this virtual environment lets users explore the causes and symptoms of combat trauma, and helps both soldiers and their loved ones learn about PTSD. DOD also awarded a \$2 million grant to Brain Plasticity Inc. to study the effectiveness of Posit Science software in restoring memory and attention in victims of traumatic brain injury, or T.B.I. The Posit Science software strengthens memory, attention, language skills and visual-spatial abilities in aging adults, and could help patients with autism, Parkinson's, and schizophrenia, as well as T.B.I.



MEDICAL TRAINING

Computer and video games also train medical personnel for the life-or-death decisions they have to make quickly. Organizations such as the Office of Naval Research (ONR) have begun to invest in custom-made video games to prepare repeatedly for such scenarios.

BreakAway developed *Pulse!!*, virtual clinical training software that develops time management and quick-thinking skills for ONR. Based on a first-person shooter design, *Pulse!!* guides nursing and medical students through simulated patient interaction as realistic sights and sounds unfold in the background.

The University of Maryland Medical Center's Advanced Simulation, Training, Research, and Innovation Center (MASTRI) is at the forefront of utilizing video game technology in the field of medicine. 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 on 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 tries to simulate the patients' symptoms and their response to treatment, including rashes and burns, or exhibiting odd behavior, such as dementia. Even commercial video games seem to develop effective medical personnel. The February 2007 issue of *Archives of Surgery* reported surgeons who played video games at least three hours a week in their past were 27 percent faster with 37 percent fewer errors in simulations of laparoscopic surgery than non-players.



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