How Video Games Change the Brain

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This year's American Academy of Neurology (AAN) Annual Meeting featured a nook of the exhibit hall called the Innovation Hub. Per the AAN website, it was intended to "...offer dynamic, interactive opportunities to explore the brain's final frontiers." Throughout the week, the hub featured twice-daily wine and painting sessions, improv sketch comedy intended to improve clinician communication skills, and a panel discussion on how playing video games changes the brain.

After the latter session, Medscape interviewed the three panelists—neurologists Pearce Korb, from the University of Colorado; Jose Posas, at Ochsner Health System; and Eric R. Anderson, director of telemedicine at Corticare—about their own video game habits and the neurologic benefits and risks of gaming culture.

Can you briefly review the demographics—or "epidemiology," if you will—of gaming? It seems it's not just for kids anymore.

Pearce Korb, MD, Associate Professor, University of Colorado, Anschutz Medical Campus

Korb: In a 2018 survey from the Entertainment Software Association, 64% of US households reported having a video gaming device. It’s definitely not just for children anymore, as the average age of gamers was 36 among women—who comprised 45% of those polled—and 32 among men.

The prevalence of video gaming was even evident at our AAN session. The audience consisted of adult neurologists and other professional healthcare providers, who are presumably busy balancing the demands of clinical care, research, advocacy, and continuing education. However, when asked who considers themselves a "regular" gamer, the majority of this intergenerational, internationally diverse audience raised their hands.

Video games have been shown to help with rehabilitation in multiple neurologic conditions, including stroke. What data are there suggesting that gaming may have use in healthcare?
Jose Posas, MD, Residency Program Director, Department of Neurology, Ochsner Health System

Posas: Video games have been used in patients with stroke, Parkinson disease, cerebral palsy, and ataxia and in geriatric patients, in various ways to various degrees.[1] But I don't think that dispensing with actual human rehabilitation is the way of the future. I do, however, think video games will have selected uses. They can have a significant benefit to patients and be used to underscore and promote neuroplasticity. They can also be a convenient way to supplement physical therapies.

Can you speak to the studies looking at gaming and physical changes in the brain?

Posas: MRI and functional MRI studies show that interconnectivity and neural network circuit development can be strengthened with video gaming, especially in developing brains. Moreover, in terms of gray-matter measurements, video games can induce changes in the dorsolateral prefrontal cortex, the parahippocampal and somatosensory regions of the brain, the entorhinal and occipital cortices, and parts of the temporal and parietal lobes. Some of these structures even show an increase in size and density on conventional MRI in adult gamers, a population whose brain in theory has less neuroplasticity.[2-4]

The fifth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) tentatively included Internet gaming disorder as a condition to consider. Do you feel that gaming addiction is simply another form of reward-based addiction, whether it's drugs, gambling, or sex, for example? Does it really need its own singular diagnosis?

Eric R. Anderson, MD, PhD, Vice Chair of Quality, SOC Telemed; Director of Telemedicine, Corticare; Owner, Intensive Neuro

Anderson: Yes, the DSM-5 did include this in the section on conditions recommended for further research, and then the World Health Organization released its definition of "gaming disorder" in
September 2018. Although I do believe that, at its core, it would be considered a behavioral addiction, I think it can be argued that because of the pervasiveness of digital media and the ability to potentially trigger behaviors and adapt to users, it represents a different and separate entity from other behavioral addictions.

**Are there proven approaches to treating gaming addiction?**

**Anderson:** There has been promising evidence for cognitive-behavioral therapy and other psychological approaches, including a handful of proprietary approaches that are geared specifically toward Internet and gaming addictions. There is insufficient evidence at this time in regard to pharmacologic treatments. Despite the low level of evidence, there is a large demand for interventions worldwide, and many organizations have stepped forward to treat these patients.

**Do you play video games yourself? If so, what are your favorites?**

**Korb:** I play video games regularly, and my current game of choice is Fortnite. There are several reasons I play, but primarily it is a way to stave off burnout by bonding and keeping up with my old friends. We live far away from one another but our "squad," named the C-Squad after a long-forgotten inside joke, is only a headset and login away from a few hours of hilarity (I'm terrible at the game, and it is a source of much enjoyment from my betters) and stress relief.

**Anderson:** I have migrated from arcade and PC gaming to more mobile gaming on my iPad. I currently play PlayerUnknown's Battlegrounds (PUBG) and a wide array of other games. I am often playing one or two games seriously at a time, and another two or three off and on. I often migrate from one game to another over the course of 3-6 months.

**Posas:** Yes! I play Fallout 76 and Skyrim, among others. Currently, I'm playing Far Cry 3, and then I'll move into the newer games in that franchise. My gamertag on Xbox One is "Satynalian."

**How do you recommend providers talk to their patients about video games? Are they recommended in moderation? Should patients avoid them altogether if possible?**

**Anderson:** It's nearly impossible to remove video games from our current culture, but I would always recommend parent supervision. I think it's important to be involved with what our children are doing, and if our kids play games, it would be valuable to play with them, so that we can monitor what happens in the game. Many games are online now, which opens a doorway to influences from all reaches of the Internet, and we should be aware of what types of people our kids are interacting with on the Internet.

**Korb:** As Dr Posas pointed out in the talk, open questions about video games can serve several purposes in medicine and neurology. It can be a bonding tool for the majority of patients. It can also serve as an informal index of cognitive ability. Lastly, as per the addiction potential that Dr Anderson summarized, it would be important to screen for maladaptive gaming habits.

**Posas:** In patients with [concussion](https://en.wikipedia.org/wiki/Concussion), who are frequently in their adolescent years and frequently on their phones, I use video games as a sort of social currency to get buy-in for my treatment plans. "What game are you playing? What game do you play at home? How are your scores? Are they worse since your concussion? Can we talk about why that is?"
It's almost like magic. If I can build rapport with them about this, they open up and share their symptoms with me; I can then explain things that make sense to them from neurologic perspectives. I use a carrot model in return to learn, and then eventually in return to play. If they claim to be symptomatic from doing homework for more than 30 minutes, then I explain to them that they should not then engage in a 6-hour Minecraft or Fortnite or PUBG binge. There is evidence\(^5\) showing that moderate use, about 1-2 hours per week, can improve neural connections in adolescent patients. The potential for lifelong benefit from having stronger neural circuitry and more robust gray matter is a potential area for study and long-term benefit for patient populations of all age groups.

References


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