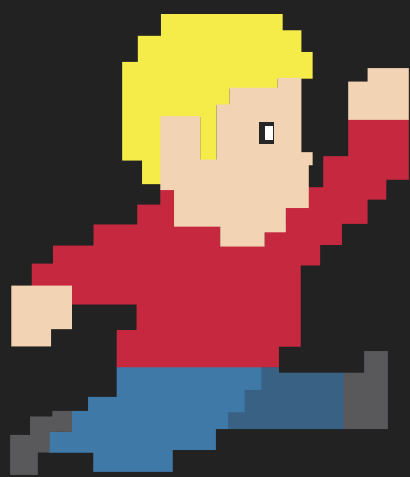


Do Video Games Rot the Brain?

A NEUROSCIENCE MYTH



MANY PEOPLE REMEMBER BEING TOLD BY THEIR PARENTS THAT VIDEO GAMES ROT YOUR BRAIN FORTUNATELY, THIS IS JUST ANOTHER BRAIN MYTH.

72%

OF GAMERS ARE 18 OR ABOVE.



3 BILLION HOURS ARE SPENT COLLECTIVELY EVERY WEEK BY US GAMERS IN FRONT OF THEIR SCREENS.

BENEFITS OF VIDEO GAMES ON THE BRAIN

Video games not only change our brain performance, but also the structure. In 2017 scientists collected data from 116 studies of gamers and the effects that video games had on their brain. 22 of them showed structural brain changes and 100 showed changes in functionality and behaviour. Video gamers displayed **improvements** in several types of attention such as **selective attention and sustained attention** and the regions of the brain involved in **attention and memory** were **more active in gamers than non-gamers**, as well as **needing less activation** to stay focused during **demanding tasks**.

Evidence has also shown that playing video games **increases both the size and efficiency** of the parts of the brain responsible for **visuospatial skills**. The hippocampus is the region of the part associated with memory and attention, with the right side specifically involved in **spatial memory** and in long term gamers, the **right hippocampus was enlarged**. Another report written by PhD researcher Marc Palaus stated that people who were avid gamers before adolescence had **better working memory** despite not playing anymore.

START GAME

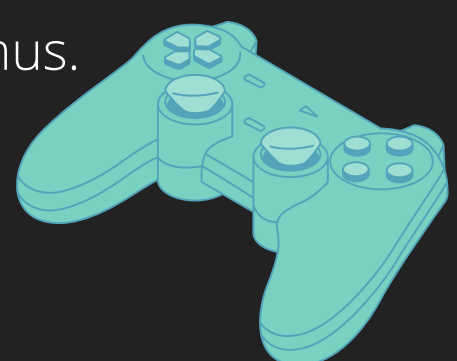


Are video games addictive?

- Addiction is defined as a brain disorder characterised by compulsive engagement in rewarding stimuli despite negative consequences.
- Video game addiction is currently not recognised by the American Psychiatric Association as a disorder, but rather a condition requiring further study.
- A study published in 1998 showed that video gaming releases dopamine, the neurotransmitter responsible for feelings of happiness.
- The amount of dopamine secreted while gaming was similar to that after intravenous injection of drugs like amphetamine or methylphenidate
- Video games have addictive qualities: fast pace, instant gratification and unpredictability
 - Brigham Young University recently conducted a 6 year study, also the longest study ever done on video game addiction, and found that 90% of gamers don't play in a way that is harmful or negative in the long term.
 - The 10% that did develop an addiction displayed higher levels of aggression, antisocial behaviour, depression and anxiety.
- However the two groups were the same in variables at the beginning of the study, showing that gaming may have had an influence on these factors.
- The two main predictors of video game addiction were found to be being male and low levels of prosocial behaviour.

Action video games and gray matter

- The central nervous system is made of both grey matter and white matter.
 - Grey matter makes up the outer most layer of the brain
 - It gets its colour from a large concentration of neuronal cell bodies
 - Grey matter plays the most significant role in controlling movement, memory, thinking and emotions.
- Playing video games can have both positive and negative effects on grey matter depending on the type of game.
- Researchers in China performed MRI studies on the brains of 18 college students who spent 10 hours a day online playing action and shooting games. Compared to a control group who only spent 2 hours everyday online, the gamers had less grey matter.
- A similar study showed that in a group people who don't usually play video games, playing action video games caused them to lose gray matter in the hypothalamus.



SUPER MARIO VS WORLD OF WARCRAFT

The effects on brain function depend on the game

- Researchers asked 43 people who don't play video games to spend 90 hours over 10 weeks playing either Super Mario games or action video games.
- The action video game group lost grey matter while the Super Mario players gained grey matter.
- Playing Super Mario games and other spatial games allows us to use and improve spatial navigation, memory and induces structural brain plasticity.
- Shooter games often already have an inbuilt GPS and all we need to do is click and shoot. We aren't really using our hippocampus, instead using the caudate nucleus, a part of the brain's reward system.
- This causes the dopamine rush associated with video games and over time we favour this instant gratification over using hippocampal memory.
- Synaptic pruning is the way our brain gets rid of synapses that are no longer in use. If we don't use it, we lose it, and that is the case with our gray matter.
 - The prefrontal cortex is the area responsible for decision making, judgement and impulse control. The brain develops back to front and hence the prefrontal cortex is the last area to develop fully. It is because of this that action video games are dangerous for adolescents.
- A study showed that in a group of 45 adolescents, playing only 30 minutes of violent video games immediately lowered activity in the prefrontal regions compared to non-violent game players. Just 10-20 minutes of violent gaming was shown to increase activity in brain regions associated with anxiety and emotional reaction whilst reducing activity in the frontal lobes associated with emotion regulation and executive control.
- The less developed frontal lobes means that adolescents are more likely to neglect long term goals in favour of short term gratification such as gaming.

BRAIN MYTHS

The warning that playing video games will rot your brain is a brain myth commonly taught by parents or teachers in order to prevent children from playing video games for too long. Playing video games will not rot your brain, however as with all myths, there is some truth behind it. Indeed, action or violent video games cause a decrease in grey matter and hippocampal function which leads to a decrease in the brain's competency in spatial navigation and memory. However, spatial games such as Super Mario games increase hippocampus size and are a beneficial way to improve problem solving skills and memory.

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