

Video Games and their Effects on Cognition

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Introduction

Video games have proven to be one of the most popular mediums of entertainment in the world. Due to the popularity of video games, many different genres have been created with different aspects of play in mind. There are many examples of this. Among the most popular would be first person shooters (FPS) focusing on extremely quick reactions and split second decision making, role playing games (RPG) focusing on more build style and creativity of how you want to play, and massive multiplayer online role playing games (MMORPG) which have qualities of both prior genres. With the ever-increasing popularity of this industry, researchers naturally began to wonder how this medium of entertainment affects the greater population of consumers, adolescents, and young adults. In decades past, a large amount of this focus was aimed at the social side of video games. Specifically, do video games make people, mainly children, more violent and aggressive was the question at hand. While this hypothesis has been proven wrong time and time again, many parents still believe that video games are nothing more than a way for their children to be antisocial and lazy. However, in response to this mentality, researchers have conducted studies for decades to see the positive effect of video games on our cognitive functions in order to see if video games truly are a detriment to society.

Research of how these games affect the cognitive functions of different age groups date back to the late 1980s (Green and Baevlier, 2004). While these studies were conducted in different ways compared to the modern day, it shows that there has been an interest in not only how video games affect us as consumers, but also how they can and are useful to our cognitive development. Since the 1980s, science, technology, and research methodology has come a long way and helped expand our understanding of this topic. In addition, our understanding of how the human mind learns and strengthens itself through repeated actions and outcomes has become

greater. Furthermore, as games continue to become more demanding of the individuals that play them, it is hypothesized by many researchers that the cognitive benefits, if they exist, will increase as well. The main focus of this essay is to sample some of these more recent studies through both the researchers themselves and those who have compiled many studies over the years to analyze vast amounts of data. After the analysis, a more focused look at what this data means will be discussed on how video games affect the cognitive functions of adolescents and young adults. **This paper argues that video games are able to positively affect cognition in adolescents and young adults through consistent time playing games and should not be seen as a detrimental way for people to entertain themselves and pass time.**

Methods

The methods used for this research paper were as follows: use google scholar to find reputable and peer reviewed sources that were either literature reviews of multiple years of data and refined to a more specific topic, or a research study looking to answer both a broad and more focused question through their observations. Studies and literature reviews made within the last 6 years were preferred for the topic. Older studies and literature reviews were used as supporting data. In addition, these older studies and papers were also used to help look at the data from more recent sources from a different angle. This could be due to how video games have been steadily increasing in both difficulty and demands for performance. For example, Martinez et al. was a research study performed on participants that have been playing video games for multiple years (gamers) and took place in 2023, and Deleuze et al. (2017) had gamers that, while similar, had slightly lower numbers in some portions of the study. While this could be due to humans naturally having slight differences from each other or the test being used, it could also be due to a trend of video games becoming ever more demanding of the individuals that play them. The

main focus of this paper comes from the data of studies like Martinez et al. (2023) and Deleuze et al. (2017), so seeing any other trends from the data between years was noted for further interpretation.

Results

1. Literature Review

The literature chosen and reviewed varied from each source with a slightly different perspective on the topic of video games and how they affect cognition. Brilliant et al. (2019) focused on reviewing the data from 9 prior studies to determine how video games affect a person's brain through MRI imaging. The detailed results of each study were broken down into the age of the participants, type of game used, duration of the study, and what brain activity/change was found in the participants. They discovered that each age group was noticeably affected by the use of video games with children being an outlier group, but it was noted that the cause of the children's age group being an outlier could be contributed to the fact that the children's brains have such intense development during this period in their lives that it could be clouding the results. It was also noted that the main benefit of each group was an increase in grey matter in the part of the brain most used for that specific game. This is said to be very similar to training the brain for specific tasks which could be beneficial for everyday tasks such as driving or keeping focus at work.

Choi et al. (2020) used 4 different studies in their literature review to determine if different video game genres affected the brain in different ways. They determined that there are 5 main genres of video games of focus in their chosen studies: traditional games (TG), simulation games (SG), strategy video games (SVG), action video games (AVG), and fantasy games (FG). They further divided SVGs, AVGs, and FGs into subcategories. The literature review found that

each genre of video game tested had different results across the same categories. Attention, working memory, visuo-spatial function, probabilistic learning, problem solving, and second language were the categories found to be positively affected by the game genres specified. While each game genre had a positive effect in each category, each genre had different levels of effectiveness at increasing cognitive performance in each specified category. It was also noted that playtime and skill in that genre of video game also plays a factor in how much improvement is seen in each category. “Although League of Legends (LoL) top-ranking players were better at selective attention than players with lower-level skills and less gaming experience, one hour of AVG session resulted in better selective attention in less skilled players” (Choi et al., 2020).

2. Studies

The studies chosen each focused on different angles of the same topic of video games and their effect on cognition. The focus of Deleuze et al. (2017) was if different genres of games had varying levels of positive effects on reaction time and inhibition. The researchers broke the participants up into 3 groups based on their preferred game type: massive multiplayer online role-playing game (MMORPG), massive online battle arena (MOBA), and first-person shooters (FPS). Each participant was required to be an active gamer meaning they would play a video almost every day. It was found that, while all 3 genres had reduced reaction time (i.e. faster), FPS was slightly lower than both MOBAs and MMORPGs but had more errors during the trials. The conclusion determined by the data was that FPS gamers are faster at reacting but have a harder time stopping their actions once they have started. However, it was also noted that “the difference in reaction time between gamers favoring online FPS and MMORPG can be considered a nonsignificant trend” (Deleuze et al., 2017). The researchers believe that the reason behind this discrepancy is that many of the MMORPG gamers they had as participants also

played FPS games. This was not present with the MOBA group, which would explain why this group didn't have this relationship with the others.

Martinez et al. (2023) was a study conducted to see how different ages, education levels, and playtime affected the cognitive functions of individuals. The study showed that overall playtime positively affected the accuracy and efficiency of the tasks performed for the study. This was done by separating the 496 participants into the above categories (age, education, playtime), and recording and analyzing the data recorded. This study was done in this way to show the impact of playtime of a specific game compared to overall playtime. For example, Deleuze et al. (2017) noted the discrepancy of playtime, or hours played per week, between MOBA and MMORPG players being higher than FPS players.

Discussion

Both the literature review and studies show a positive correlation between video games and cognitive function in many areas of the brain. Brilliant et al. (2019) shows which parts of the brain are the most profoundly affected by video games. This type of information is crucial when it comes to determining how games can be useful as training tools or for adolescents to improve their brain functions while gaining enjoyment. Of the studies chosen, Martinez et al. (2023) delved into how playtime, age, and education level are all contributing factors to how our brains are affected by video games. Most notably, prior video game studies were based on a flat range of playtime to be determined as a gamer rather than placing all the data relative to each other. This could mean that some of the prior studies used in the literature review could have even larger differences compared to the control group than previously thought, as well as differences within the gamer groups used in those studies. While this doesn't mean that playing video games for hours on end is good or beneficial to adolescents or young adults, there were multiple trends

showing that more playtime in a specific game genre leads to further heightening of that specific skill set, and the cognitive functions associated with it. This same study also proved an earlier theory from Brilliant et al. (2019). The theory in their literature review was that children might be affected by video games just as, if not more, than adolescents but the data is inconclusive as their growing brain is reminiscent of the changes shown by the gamers in the studies reviewed. This new way of graphing the data and showing how age also affects how much of an impact video games have on cognitive functions used by Martinez et al. (2023) could give way to a new methodology for this type of research.

The main issue with the topic presented and sources used is the lack of more recent information. The topic has not been widely researched in the past decade over other aspects of video games on the human mind. Specifically, how video games affect emotional control and if they cause instability or recklessness in adolescents. Recently, more studies have been conducted on the benefits of video games in order to show the positive effects of this industry, and how they are useful for developing certain areas of the brain.

Since the late 1980s, researchers have been developing new and more effective ways of identifying how video games affect the cognitive functions of the human mind. These studies have evolved to a point where more focused studies have been created and conducted. Many recent studies have moved on from the sole idea that video games increase reaction speed and hand-eye coordination. Instead, new studies are focusing on how different genres of video games affect different areas of the brain and how much of a change is taking place. With the knowledge found that video games have a positive impact on cognitive functions such as attention, spatial memory, and reaction time (or responsiveness), being able to see how these are improved in children could lead to parents having less problems with allowing their children to play games

for as long as they do. Further refining this focus and developing new studies on the subject will no doubt lead to a greater understanding of how video games affect the cognitive functions of adolescents and young adults.

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