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### Research Essay Draft 2

Multimedia entertainment is a part of a majority of people's lives. It has an influence on the decisions people make, what to eat, where to go, what to do, video games are no exception. Over recent years there has been a rapid growth in the video game industry, leading many researchers to examine the practical use of video games in the medical industry. Research evidence concerning whether video games can serve as a means of improving the average person's relative brain functions. The increase in video game popularity among the young and old has led many studies to adopt video games for learning with a focus on enhancing cognition, memory, response times, multitasking, and treatment for people diagnosed with ADHD, ADD, and Dyslexia (Kefalis).

The benefit of good memory and attention in modern society can be the difference between one task and another. With a world of information at one's fingertips it can be difficult to process everything seen within a day, much less remember it. Studies have been done to find if video games have any positive benefits on the average person's memory and cognition. Many of the tests done used two or more groups of people including non-gamers in one and expert gamers, or people who play for more than seven hours a week in another, with varying levels of play a week between the two. When it comes to action games such as first person shooters, expert gamers outperform nongamers, with experts being able to track objects moving at high speeds, detect minor changes in objects, switch between tasks easily, and mentally rotate objects

more easily (Boot). Other studies support these findings. Studies done by McDermott et al, Blacker et al, tested experts' visual short term memory against non gamers when playing action games. McDermott et al's experiment consisted of two groups of 28 male gamers and 25 male non-gamers. McDermott et al found that expert players had faster well-learned memories, and were able to recall multiple memories faster than non gamers. Blacker et al did two experiments, with the first using colored stimuli to test player processing speed with results of experts having better visual short term memories overall. Participants consisted of 121 Temple University undergraduates, 106 males, 15 females. The second experiment consisted of complex shape stimuli, increasing the demands of processing among the players. The second experiment consisted of 47 individuals from Experiment 1 and were divided into a group of 23 AVGPs and in a group of 24 NVGPs. Results showed that expert gamers have an advantage in visual short term memory, while also confirming that having complex geometry increased the difficulty for non gamers (Kefalis). In terms of casual games, or non violent games, there is a plethora of studies done. To find whether playing casual games could improve cognition, Baniqued et al conducted a study where four groups of 209 young males aged 18-30 were tested with the following parameters respectively: working memory and reasoning, adaptive working memory and reasoning, active control casual games, and no contact control. Training sessions were held two or three times a week where participants played for 20 minutes for ten different sessions. The results showed that casual games can improve cognition but transferring the cognitive abilities to untrained tasks was rather limited, despite the improvement to working memory and attention span (Kefalis). Another study by Colzato et al was done to test the extent video games could improve the cognitive abilities of a person. Two groups of 26 experienced game players and 26 non-gamers were tested. The results showed experts have faster reactions and are more

accurate in working memory than non-gamers, but both hold relatively the same stopping efficiency. Finally, studies done by Nouchi et al and Ballesteros et al used games specifically made for improving the memory and cognitive abilities of the person. Nouchi et al used Brain Age and Tetris to test the beneficial effects of video games on cognitive function and to decipher if there is any difference according to the type of game played. 32 participants took part in the study and were randomly assigned to either group to play one of the two games. The participants were asked to play each video game (Brain Age or Tetris) over 4 weeks for at least 5 days each week, 15 minutes per day. On the first day of training, all participants were tested on a series of neuropsychological and behavioral tests. After the 4 weeks of training, all participants were re-examined to assess their performance on some neuropsychological and behavioral tests (Kefalis). According to the results, the brain age games improved executive functions, working memory, and processing speed while Tetris improved attention and visual-spatial ability (Kefalis). Ballestros et al on the other hand used Lumosity to test a person's age-declined cognitive functions and subjective well beings. Participants consisted of 40 healthy older volunteers who were randomly separated into either the experimental or control group. Those in the experimental group played 20, 1 hour sessions over 10-12 weeks on 10 different games from Lumosity. The results showed that the experimental group enhanced compared to the control group in controlled processing, attention, immediate and delayed recall memory (Kefalis). Overall, video games can improve a person's cognitive ability and memory function, and video game therapy can be used as an option for managing chronic traumatic brain injury in patients who have ameliorate balance and attention deficits (Aging Research).

The skill of multitasking is a dedicated ability and a useful one for people to have in the current age of information. Coupled with multitasking is the ability to unconsciously shift

attention between one task and another, otherwise known as set-shifting or task switching (Kefalis). Many studies were done, but studies using action video games found greater results when it comes to improving one's ability to multitask and switch. Dobrowski et al conducted a study using first person shooters and real-time strategy games. The study included 90 people who were divided into 3 groups, those who played first person shooters, those who played real-time strategy, and those who played no games. Results found that action video games of different genres may not have an equivalent enhancing effect on the shifting aspect of executive functions and visual attention (Kefalis). However, Real-time strategy players showed superior performances compared to non-gamers on task switching and at multiple object tracking (Kefalis). Green et al furthered the study of task switching by testing the effect of action video games on the ability to task-switch. According to the results, The expert gamers showed the same advantage when using vocal responses, however the reaction time of expert gamers was greater than the non-gamer. Green concluded that training with action video games could reduce the mental cost of task switching (Kefalis). Despite this finding, video games should not be played religiously as another study noted that participants who played the most games did not protect against distraction of other media while multitasking (Cardoso-Leite). Overall, action video games can help on the aspects of blocking irrelevant information, focus, and the ability to task-switch (Rothbart). With that said it should only be played in moderation as too much information is more taxing starting out.

Not many people may think it but video games can improve reading speed with no compromise to accuracy. When it comes to people plagued with ADHD, ADD, and Dyslexia video games can be used as one of the easiest and fastest methods of treatment compared to the current methods. Franceschini et al performed two studies, the first in 2013 and the second in

2017. The first study done by Franceschini tested reading, phonological, and attentional skills. They wanted to test the hypothesis that action video game training has been proven to increase attention abilities, and see how well it could be transferred to treating children with dyslexia. Two matched groups of children with dyslexia were tested for 9 sessions of 80 minutes per day. According to their findings, only playing video games improves children's reading speed, without any cost to accuracy, more than one year of spontaneous reading development and more than or equal to highly demanding traditional reading treatments (Kefalis). The second study done by Franceschini et al in 2017 tested reading skills and phonological working memory, visuo-spatial attention, auditory, visual and audio-visual stimuli localization, and cross-sensory attentional shifting. Two matched groups of 28 English-speaking children with dyslexia were tested before and after they played action and non-action video games. They observed an improvement in word reading and phonological decoding speed, without any cost in accuracy. Action Video Games training improves reading skills without a direct targeting of phonological, orthographic or grapheme-to-phoneme decoding (Kefalis). Ochi et al took a different route in their studies. They conducted a pilot study and they developed a neurofeedback game for attention training in adults. The participants consisted of 17 adults who were separated into two groups of high risk and normal based on their initial assessments of ADHD symptoms. The game used a brain computer interface system to detect the attention levels of players from their brain activity. When the player had a low attention level the background of the game slowly dimmed to black and left the field of view only in the center of the screen as to help the player regain the focus. Their finding suggests that neurofeedback training could be effective as an alternative treatment for ADHD, because the attention level, the time retained at elevated levels and the time users used to refocus has improved for the high risk group (Kefalis). A separate

study supporting the aforementioned proved that action video game training improves not only the basic letter-to-speech sound integration but also lexical recognition. Moreover, the AVG speed reading improvements were bigger than those obtained by the highly demanding traditional phonological and orthographic treatments and equal to the letter-to-speech integration training (Franceschini).

Despite the benefits there will always be some amount of opposition, especially when it comes to the debate of violent video games and their correlation to violence, more specifically in children. A study was done to find this correlation, testing grade school boys and girls. Three groups were formed, the first consisting of those that did not play games, the second consisting of children that played for less than 30 minutes a day, and the last consisting of children that played for more than 30 minutes a day. The results showed that boys played more than girls and that boys were more inclined to play violent games. To top it off, no significant difference in aggression was found between people that played for more than 30 minutes a day and people who played for less than 30 minutes a day. However, a significant difference in prosocial behaviour was found in the children who played for more than 30 minutes as compared to those who played for less than 30 minutes (Wiegman). One interesting finding was that children with a lower overall intelligence had a higher preference for violent games, and boys who had a preference for violent games had higher violent tendencies than those who did not prefer violent video games. One deciding factor for the results was that video games' themes often revolve around aggression and many video games contain aggressive behaviour. Thus, a great deal of video games correspond to the masculine gender stereotype, making them less appealing for girls (Wiegman). The conclusion was that video games do not directly cause violence they will

decrease prosocial behaviour in children, but more studies need to be conducted to prove any further correlation (Wiegman).

Video games were made and designed as a form of media, starting from arcade games then shortly moving into home entertainment. Studies have proven the benefits of video games when played in moderation, with benefits to memory, cognitive ability, reading fluency, and medical treatment. Despite this however, games do have an influence on younger children and parents should take part in the responsible use of games, respecting their ESRB rating, and taking note of the content within the game their children play. It is completely certain if video games cause violence or violent tendencies, however it is clear that video games decrease prosocial behaviour in children and can cause aggression. Parents should take caution when allowing their children to play games, and it is recommended that parents actually play the game before their child. Nonetheless, video games will continue to be a part of a majority of people's home entertainment and will continue to grow, and continue to evolve with emerging technology. The benefits will continue to increase and so will the unwanted side effects, but as long as the people are educated and properly informed on what to do and what not to do the dangerous can be reduced to a minimum. It is a game after all.

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