

Violent Video Games May Kill Your Short-Term Focus: Violent video games may negatively affect a player’s attention and concentration on a short-term basis after brief exposure



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This study examined the effects of brief exposure to a violent video game on a test of attention and concentration in 12- to 14-year-old males with low-volume video game play histories. We hypothesized that subjects who played 45 minutes of a violent video game would perform significantly worse on a widely-used neuropsychological test when compared to their baseline performance. Participants were given two versions of Digit Span Forward (DSF), a neuropsychological test that measures attention and concentration. Each subject was tested with DSF Version 1 at baseline and then again with DSF Version 2, immediately following 45 minutes of playing a violent video game. Results revealed that subjects performed significantly worse after brief exposure to a violent video game. Previous studies have linked video game playing for extended and intermediate periods of time to attention problems in both high-volume and low-volume players. This study demonstrates that brief exposure to violent video games may also have a negative effect on attention and concentration.

INTRODUCTION

Every day, millions of children and adolescents in the United States play video games (Granic, Lobel & Engels, 2014). A Pew Poll study found in the United States that 99% of boys and 94% of girls play video games (Lenhart, Kahne, Middaugh, Macgill, Evans & Vitak, 2008). In a 2009 Harris Poll, researchers found that American youth, aged 8 to 18, averaged 13 hours a week of video game play (Gentile, 2009).

In a 2007 study with 1254 middle school students, aged 12-14, researchers at Massachusetts General Hospital found that one quarter of girls and two-thirds of boys reported that they played at least one M-rated game “a lot in the past six months” (Olson et al., 2007). The boys in this study reported that two out of their favorite three game were rated M; girls in the study reported that a rated M game was number two in their top three favorites. More than 50% of the boys in the study endorsed the statement “I play electronic games because I like guns and weapons” (Olson et al., 2007). Additionally, a recent Pew Poll study reports that 50% of boys, aged 12 to 17, state that their favorite games were rated M (mature) or AO (adults only) (Lenhart et al., 2008).

Both non-violent and violent video game playing has been

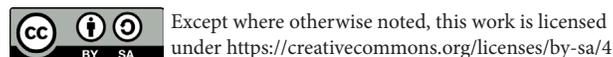
associated with concentration and attention problems, such as having difficulty maintaining focus on less exciting tasks, like schoolwork, and having a shorter attention span. In a 2010 study, researchers found that children playing non-violent video games between 2 ½ and 3 hours a day were 67% more likely to have attention and concentration problems (Swing, Gentile, Anderson & Walsh, 2010). In 2012, researchers found that children and adolescents that spent more time playing video games had more attention problems, even when pre-existing attention difficulties were statistically controlled for in the analysis (Gentile, Swing, Lim & Khoo, 2012). Bailey, West, and Anderson (2010) also found attention and concentration deficits in young adult male subjects who played violent video games for 40 hours a week or more.

There is also some evidence that suggests violent video games have a more harmful effect on attention and concentration ability than non-violent video games. In 2014, Anderson presented data at the International Society for Research on Aggression Symposium from a recent Iowa State University (ISU) study with 210 student subjects. He found that video game players who play first-person-shooter (FPS) games self-reported more attentional difficulties than subjects that played third-person games, action games, real-time strategy games, and other types of video games (Anderson, 2014). In another 2014 study, also presented at the International Society for Research on Aggression Symposium, Anderson assessed the impact of intermediate exposure to violent and non-violent video game play on proactive executive functioning in 62 low-volume players. In his presentation, Anderson defines “proactive executive functioning” as the “ability to keep context information active” and is “conceptually... most similar to ‘attention’ in the context of real world attention problems.” The study found that subjects with minimal video game use histories experienced a significant reduc-

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tion in proactive executive control when playing FPS video games for 10 sessions in 50-minute intervals. These same subjects, when playing SIMS 2 (Electronic Arts, Inc., 2002), a non-violent video game, for the same period of exposure time, experienced an increase in proactive executive control.

Given indications that extended and intermediate level exposure to both violent and non-violent video games are associated with attentional difficulties in high-volume and low-volume youth players, we chose to explore the impact of brief exposure time to video games on attention abilities. Because FPS video games are associated with a significant reduction in “real world” attention ability, we focused specifically on the impact of FPS video games on attention abilities. This is the first study that examines the impact of 45 minutes of exposure to FPS video game play on attention and concentration immediately after video game immersion, and the first study to examine brief exposure to any kind of video game play on minimal-use players. We hypothesized that young, low-volume video game players would perform significantly worse than their baseline scores on a neuropsychological measure of attention and concentration after playing an FPS video game for 45 minutes.

MATERIALS AND METHODS

Participants

The subjects for this study were 12 seventh-grade boys aged 12 to 14. All subjects had low-volume video game usage histories, averaging 6 hours or less of video game play per week. All of the subjects had played Halo Reach at least once before enrolling in my study. Participants were recruited from four local middle schools. The subjects were all academic high-achievers from upper-middle-class and upper-class families (all annual family incomes over \$150,000). Subjects were white, African-American, and half-Asian/half-white. Subjects came from families with one to three children. All but one subject resided in two-parent households, with one subject residing in a single-parent household (Table 1). Authorities at Flintridge Preparatory School approved the study, and informed consent was obtained from the adolescents’ legal guardians.

Attention and Concentration

Attention and concentration scores were measured using two different, but equivalent, versions of a neuropsychological test called Digit Span Forward (DSF). DSF is a measure of concentration and attention (Lezak, 1983). It is one of 15 sub-tests that make up the Wechsler Intelligence Scale for Children (WISC-IV). Subjects received a scaled score for their performance on this task to control for any age effects.

On Day 1, subjects were given Version 1 of DSF by an examiner who had been given training in standardized test administration by a licensed clinical psychologist. Subjects were verbally presented with a series of digits at a rate of approximately one digit per second. After each series, subjects were asked to immediately recall the digits in the order that they were given. A scaled score was derived based on the number of digit strings that were

accurately recalled. On Day 2, subjects were given Version 2 of DSF, and a score was derived in the same way. Higher scores indicate better performance on the DSF.

Age	
12	7
13	4
14	1
Academic Achievement	
Straight A’s	3
Mostly A’s	7
Equal A’s and B’s	2
Annual Family Income	
>150,000	1
>250,000	11
Race/Ethnicity	
Non-Hispanic white	8
Half-Asian/Half-white	3
African-America	1
Family Size	
Only Child	2
1 Sibling	5
2 Siblings	5
Household Status	
Two-Parent Household	11
Single-Parent Household	1

Table 1. Participant Demographics

Violent Video Game Exposure

The video game used during the exposure period in this study is called Halo Reach (Microsoft Game Studios, 2010). It is a FPS game rated M for violence. Halo Reach meets the operational definition for a violent video game according to a California law written by California state senator Leland Yee: “. . . a video game in which the range of options available to a player includes killing, maiming, dismembering, or sexually assaulting an image of a human being.”

Procedures

Subjects completed the protocol in this study on two different days. On Day 1, subjects were evaluated after school on a day when they had not played video games for at least 18 hours. Subjects consumed a protein bar before testing began to ensure that hunger and low energy levels did not interfere with subjects’ performance during the protocol. Version 1 of DSF was given to subjects on Day 1 in order to establish a baseline measure of subjects’

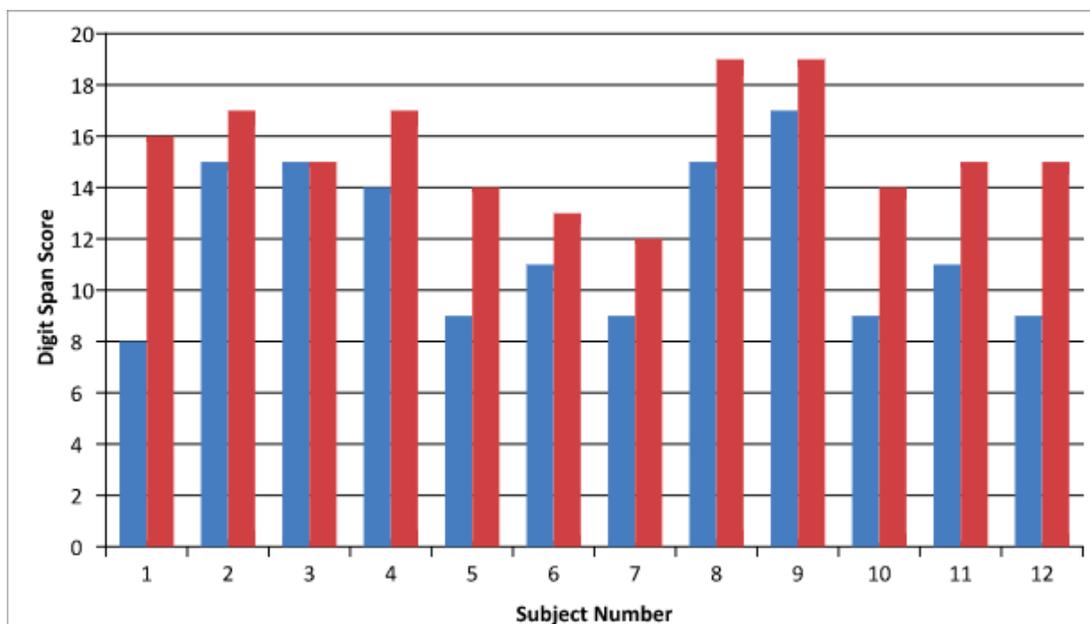


Figure 1. Attention and Concentration Scores Before and After 45 Minutes of Violent Video Game Play. Blue = baseline; red = post-exposure.

attention and concentration.

On Day 2, subjects were again evaluated after school on a day when they had not played any video games for at least 18 hours prior to their testing session. Subjects once again consumed a protein bar before they were exposed to video game play. The subjects played Halo Reach for 45 minutes and immediately after, were given Version 2 of DSF.

RESULTS

Table 1 provides participant demographics. On average, the subjects performed significantly worse on DSF after playing Halo Reach for 45 minutes compared to their baseline scores. The mean baseline scaled score before exposure to violent video game play was 15.50 (SD = 2.20). After playing the violent video game, the mean score decreased to 11.83 (SD = 3.16). Figure 1 provides the DSF scaled scores for all 12 subjects at baseline and post-exposure.

A paired sample t-test was used to analyze the differences between subjects' DSF performances before and after violent video game play. A significant difference was found ($p < 0.0001$).

DISCUSSION

The results of the present study support the hypothesis that brief exposure to violent video game play would negatively affect attention and concentration on a short-term basis in male teen players. The present study provides an important source of new information regarding the impact of brief exposure to FPS violent video games on academically high-achieving video game players. To date, no study has examined this particular variable when evaluating the impact of video game play on attention and concentration.

Future investigations could explore whether intellectual functioning plays a role in the way FPS video games impact a player's attention. Since all 12 of the present study's subjects are academic high-achievers, it would be beneficial to explore whether players with lower levels of intellectual functioning or academic success are less, more, or equally vulnerable to brief exposure to FPS violent video game play.

This study also provides an important source of new information regarding the impact of brief exposure to FPS violent video games on players with minimal-use histories. Another important future area of study should include exploring whether minimal-use players are more vulnerable than heavy-use players to the impacts of brief violent video game play on attention and concentration. Even though the American Academy of Pediatrics has recommended two hours or less of screen activities (television and video games) per day for teens and children (AAP, 2001; AAP 2009), the present study demonstrates that two hours of violent video games per day may be harmful to a player's attention and concentration ability on a short-term basis. Playing violent video games for less than an hour, especially before starting homework or studying for a test, may in fact, contribute to attention and concentration difficulties on a short-term basis. Further research into how long attention and concentration difficulties are retained after violent video game exposure should also be conducted. Given that male youth prefer violent video games over non-violent video games, they may be especially vulnerable to the negative neuropsychological consequences of even brief violent video game play.

Our results are in contradiction to another study that also evaluated the effect of brief exposure to violent video games. An Indiana University School of Medicine study (Mathews, Wang, Kalnin, Mosier, Dunn & Kronenberger, 2006) found that subjects

who played violent video games had less activity in the pre-frontal cortex, the part of the brain that is associated with concentration. However, this study did not find any differences in actual concentration ability scores when they compared teens who played violent video games for 30 minutes to teens who played non-violent video games for 30 minutes. Our study differs in an important design aspect that may explain the difference between the studies. We added 15 additional minutes to the brief exposure time, which may suggest that there is a threshold time length needed to observe an adverse effect of violent video games on short-term attention and concentration at the brief exposure level. The lack of activity in the pre-frontal cortex found in the 2006 study suggests the possibility that the subjects were being negatively impacted by the violent video game exposure, but just not enough to push them over the threshold needed to translate into diminished performance on an attention task.

Though the present study provides useful evidence for violent video game effects on attention and concentration on a short-term basis, there are three primary limitations worth noting. There is no separate control group used in this study; rather, the subjects serve as their own controls in the repeated measure design. A good way to utilize a separate control group in a future study would be to test attention ability in middle school children after they play a non-violent video game for 45 minutes, allowing us to separate the impact of violence from the impact of playing a video game. It should be noted, however, that DSF scores in other repeated measure designs, with no interference, have been shown to improve in non-significant trends (Woods et al., 2012). The findings in the study conducted by Woods et al. (2012) highlight the significance of the decline in subjects' DSF post-exposure scores in the present study.

Additionally, our sample is very homogenous, made up of high-achieving adolescent males from upper-middle-class and upper-class backgrounds. This homogeneity prevented us from examining the likely effects of brief exposure to violent video games on other intellectual, socioeconomic, or ethnic backgrounds, and prevented us from evaluating response differences between genders. It is worth noting that a previous study found that video game play did not predict attention difficulties or academic performance in children from a largely Latino population, with family income playing a much larger role (Ferguson, 2011). Finally, our study is also limited by small sample size, reducing the power to detect small effect sizes. Despite these limitations, the significant results between the baseline and post-exposure DSF scores are an important finding that is worth expanding upon in a future study with a larger sample size.

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