Violent video games: The media scapegoat for an aggressive society

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Abstract

There are plenty of researchers willing to ride the media bandwagon and suggest a relationship between violent video games and aggression (e.g. Bartholow, et al., 2006; Barlett, et al., 2007; Giumetti & Markey, 2007; Bushman & Anderson 2009). However, there are methodological problems associated with many of the studies, these range from video game selection and complexity of game play, to inappropriate participant selection and measures of aggression (Ferguson, 2007). Goodson & Pearson (2009) used reliable measures of physiology (EEG, ECG, and respiration) and cognitive appraisals of aggression (Buss & Perry Aggression Questionnaire) in an immersive environment. In two studies, the physiology and cognitions of 70 participants were measured playing either a violent or non-violent video game. The participants were recruited carefully based on their experience of playing video games. Controversially, it was shown that driving games induced higher levels of aggression than violent first-person-shooters. Even when the players were conducting acts of a horrific nature in a game (e.g. chainsawing a body in half), aggression levels and brain activity were still lower that those induced by a driving game. Pearson & Goodson (2010) proposed the 'real life stressor' hypothesis where situations that can induce an emotional response in real life, can also result in a similar response when they are created within the gaming environment. The latest fashion of 'Grand Theft Auto' type games, which incorporate large environments and morality decisions, are an ideal platform to test the validity of this theory. This paper aims to examine the effects of playing videogames on cognition and physiology in light of the current research. It will demonstrate why, rather than appeasing the media hype machine, it is now time to change the direction of video game research and investigate the emotional responses induced by games that imitate potentially real life situations.

Key Words: Video games, violence, aggression, methodology, validity, brain activity, emotions, life experience, morality.

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## 1.	Introduction

On the evening of Sunday 21ˢᵗ October 2007 17 year old Daniel Petric walked into a room in his parents house and asked his mother and father to close their eyes because he had a 'surprise' for them. Daniel then shot his mother and father in the head, killing his mother and wounding his father. Daniel Petric planned and carried out the attack because his parents had taken away his 'violent' video game, Halo 3. The media referred to Petric as the 'Halo 3 Shooter' and 'Halo 3 Killer' amongst other titles and gave in depth accounts proposing that he was unable to distinguish between reality and fantasy and even suggested that Petric believed that his parents would not be dead forever but would 'regenerate' as in the game.

There are a large number of examples of the media using emotive or sensationalising statements to link video games to the perpetrators of some very violent and horrific crimes. 'Murder simulators' were blamed for Virginia Tech shooting on the 16ᵗʰ April 2007, where a student opened fire in a dormitory and classroom killing 32 people. 'Grand Theft Auto cop killer' was used to describe Devin Moore, an 18 year old from Fayette Alabama, with no previous criminal record, who gunned down and killed 2 police officers and a 911 dispatcher on the 7ᵗʰ June 2003. 14 year old Stefan Pakeerah was killed by Warren LeBlanc, 17, in a park after reportedly mimicking the controversial game Manhunt. On the 27ᵗʰ February 2004 LeBlanc reportedly armed himself with a claw hammer and a knife, and lured Pakeerah to the park to steal from him before stabbing him repeatedly. The press reported the crime with the headline 'Hammer Brother goes on Manhunt'. Media headlines such as these would suggest that the playing of violent video games was the 'cause' of all these killings.

2.   Current literature

Anderson & Bushman (2001) claimed that there was clear support to suggest that playing violent video games increased aggressive behaviour. This was reported to occur by a process where the violent games taught the players how to become aggressive by a number of mechanisms including priming previously learned aggressive schema, increasing physiological arousal or by creating an aggressive state. Anderson & Bushman (2001) proposed that violent video games act to facilitate the learning of aggression as a schema to deal with everyday situations and that the responses to social interactions are as a result of behaviour that has been learnt through video games. It was also proposed that after a few exposures to violent media that the interpretation of social behaviours could be modified to induce an increase in aggression (Anderson, 1983; Anderson & Godfrey, 1987; Marsh, Hicks, & Bink, 1998).

In 2002, based on several previous models of aggression (including Bandura, 1973, 1983; Berkowitz, 1990, 1993), Anderson & Bushman proposed the General Aggression Model, GAM. According to the GAM,

aggression is the result of the activation of specific schemas or representations located in memory that are related to aggression. Thus the more often these schemas are activated and modified by violent media the more aggressive an individual becomes, repeated exposure contributes to the development of an aggressive personality. There is also a Behaviouristic component to the GAM in that the each violent media episode experienced acts as a stimulus that shapes behaviour. Social interactions are a result of social knowledge and these rely on learnt processes to deal with events in the physical and social environment. The GAM proposed that repeated exposure to violent media results in hostile social interaction schemas that create aggressive cognitions, aggressive responses to social interactions and in turn more aggressive individuals.

There is a large body of literature that supports the media demonization of video games (e.g. Bartholow, Bushman, & Sestir, 2006; Barlett, Harris, & Baldassaro, 2007; Giumetti & Markey, 2007; Bluemke, Friedrich, & Zumbach, 2010) and reports that there is a link between video game violence and both physiological and cognitive measures of aggression. Increases in heart rate and skin conductance have been recorded in individuals playing violent video games (Calvert & Tan, 1994; Panee & Ballard, 2002; Arriaga, et al., 2006; Barlett, et al., 2007) and increases in blood pressure (Ballard & Wiest, 1996; Panee & Ballard, 2002). Bartholow, et al., (2006) proposed that when individuals that played violent video games were shown violent images they have lower amplitude P300 event-related brain potentials (ERP) than individuals that played a nonviolent video game. An ERP is a measured response of brain activity to a perception or thought.

Past research does not only focus on physiological measures of aggression but the impact of playing violent video games on the cognitive appraisal of situations or information. In addition, previous research would suggest that playing violent video games resulted in higher scores on psychometric measures of aggression (Funk, Bechtodlt-Baldacci, Pasold, & Baumgartner, 2004; Ulhmann & Swanson, 2004; Arriaga, et al., 2006; Bartholow, et al., 2006; Barlett, et al., 2007; Giumetti, & Markey, 2007). Where open-ended stem stories have been employed (Anderson & Bushman, 2001; Barlett, et al., 2007; Giumetti, & Markey, 2007) it has been reported that individuals that play violent video games complete the stories with increased violent content compared to those that have played nonviolent video games. Anderson & Bushman (2009) proposed that playing violent video games resulted in a direct decrease in prosocial helping behaviours, where individuals were less likely to help someone in distress or a violent social situation. In fact video games have been blamed for peer reports of increased aggression (Silvern & Williamson, 1987; Kronenberger, et. al., 2005) and an increase in the amount of time taken to recognise happy facial expressions (Kirsh & Mounts, 2007).

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3.   Methodological limitations

It is not surprising to observe an interaction in the literature between the research that has investigated the effects of playing violent video games and the GAM (e.g. Anderson & Bushman, 2002; Ulhmann & Swanson, 2004; Anderson 2004; Arriaga, et al., 2006; Bartholow, et al., 2006; Barlett, et al., 2007; Giumetti, & Markey, 2007; Carnagey, Anderson, & Bushman, 2007; Anderson & Bushman, 2009). However, there is now a growing body of literature that raises serious questions about the validity of the proposed link between violent videogames and aggression. Ferguson (2007) conducted a meta-analysis of 17 published studies, they were made up of 21 observations and the total sample size was 3602. The results of the meta-analysis indicated that there was a publication bias for both experimental and non-experimental studies of video game violence and aggression (Ferguson, 2007).

Ferguson (2007) reported that unreliable measures of aggression were taken during the course of many of the studies in the meta-analysis, this lead to larger effects sizes being reported. Anderson & Dill (2000) report using a measure of aggression called the Taylor Competitive Reaction Time Test (TCRTT). Ferguson (2007) reports that there was no evidence presented in this study or other research using the TCRTT (e.g. Anderson & Bushman, 1997; Giancola & Chermack, 1998; Anderson, Lindsey, & Bushman 1999) to suggest that the measure had external validity, as no research establishing a correlation with the measure and violent populations had been conducted. Cherek, Moeller, Schnapp, & Dougherty (1997) proposed that the study of human aggression in the laboratory under controlled conditions can only be credible when there is concordance between human aggressive behaviour inside and outside the laboratory. Ferguson & Kilburn (2010) stated that Anderson's et al., (2010) research contained numerous flaws and that they were overestimating and over interpreting the influence of violent video games on aggression and misinforming the public debates on this issue, in fact there is a negative correlation between youth crime and increases in violent video games.

Goodson & Pearson (2009) identified a large number of methodological flaws in previous research that undermined the validity the results and any conclusions drawn from them. A number of studies, rather than recruiting participants, have forced undergraduate students to take part to obtain course credits (e.g. Barlett, et al., 2007; Giumetti, & Markey, 2007; Anderson et al., 2009). The motivation of the participants to complete the tasks in the study reliably is debatable. The majority of researchers have not taken the participants gaming history into account (e.g. Anderson & Bushman, 2002; Ulhmann & Swanson, 2004; Anderson 2004; Arriaga, et al., 2006; Bartholow, et al., 2006; Barlett, et al., 2007; Giumetti, & Markey, 2007; Carnagey, Anderson, & Bushman, 2007; Bushman & Anderson, 2009).

Pearson & Goodson (2009) proposed that video game players could be self-categorised easily and reliably into three types; non-gamers, casual gamers, and experienced gamers. Not only did prior video game playing experience have an impact on both cognitive and physiological measures, but it was also possible to determine the participants game playing experience from the experimental data. When violent video game researchers do not take the participants prior experience into account they are regarding participants to be of similar status and combining the data from several conditions into one and analysing it in that way. This is a serious fundamental flaw when investigating the effects of violent video games on individual's physiology and cognitive appraisals as it renders the results meaningless.

Due to the advancements in technology it is imperative for researchers investigating the effects of violent video games to use the most current gaming systems and video games available (Barlett, et al., 2007). This enables researchers to attempt to make generalisations from the results to the population of video game players. However, Goodson & Pearson (2009) suggested that few researchers have adhered to this paradigm, and in many cases, conducted research with games that were extremely out dated. For example Arriaga, et al., (2006) required participants to play *Doom*, a video game release in 1993, some 12-13 years earlier. In the time period when the research was conducted, the Playstation2, Xbox, and PC's with the capability to play far more technologically advanced games were available, the research was already dated before it was published. Bushman & Anderson (2009) used a range of very out dated games (*Carmageddon 1997, Duke Nukem 1996, Mortal Kombat 1992, & Future Cop 1998*) where the level of graphical detail and violence was minimal compared to video games available on the latest generation Playstation3, Xbox360, or high end PC's. This again demonstrates very poor methodology, and the ability to draw any reliable conclusions from the results of stimuli that were 11-17 years out of date is very questionable.

Goodson & Pearson (2009) also identified researchers that had selected video games by title rather than by content, in some instances researchers (e.g. Barlett, et al., 2007; Giumetti & Markey, 2007) compared the effects of 2 almost identical video games, *Doom 3*, and *Return to Castle Wolfenstein*. This demonstrates a clear lack of understanding of the content and nature of the videogames selected. Previous researchers have also failed to identify the fact that prior gaming experience will have an impact on the participants ability to play the game, either by keyboard control or joy pad/stick. Non-gamers have no experience of playing video games, the latest games in their effort to be more 'realistic' have become very complex and require a degree dexterity to play. If this variable is not taken into account when designing research (selecting a game) it is more than likely that any measures taken will relate to the frustration of playing the game rather than

the participants interaction with the violent content (Goodson & Pearson, 2009).

It is quite evident from the literature that the previous research contains a catalogue of methodological flaws and it is beyond the scope of this paper to describe them all but some are more evident than others as a marker for poorly designed research. Lieberman, Solomon, Greenberg, & McGregor (1999) proposed the 'hot sauce paradigm' in which the measure of aggression was the amount of hot chilli sauce participants gave to "another participant". In the age of wide screen televisions and large displays Giumetti & Markey, (2007) asked participants to play video games on a 13inch display surely providing the least immersive environment possible for their research. The ecological validity of Bushman & Anderson's (2009) study has to be questioned, not only did the use extremely dated stimuli, but also they staged a fight outside the laboratory where they conducted their research. When participants playing the violent video games did not go to stop the fight, Bushman & Anderson concluded that violent video games reduced an individual's prosocial helping behaviour.

4.   Appropriate research

In an ongoing series of studies, Goodson & Pearson aimed to address the methodological flaws associated with the previous research and provide a new and balanced approach to video game research. In the first study (Goodson & Pearson, 2009) 30 participants were recruited, the sample consisting of 15 males and 15 females. The sample could also be subdivided into 7 experienced gamers, 11 casual gamers, and 12 non-gamers. Three games, each of a different genre, were used: a racing game (*Project Gotham Racing 3*), a first person shooter (*Perfect Dark Zero*), and a 3D table tennis game. The games were setup so that they would be demanding, but not over complicated to control, this was to take into account the lack of experience of non-gamers. The FPS was set to a 'death match' in a small urban setting, there were no weapon choices, the participants played against 15 console controlled characters' and they were all armed with 'pump action' shot guns, in a 'kill or be killed' scenario. On death, the participant's character respawned and play was almost instantaneous, this was to ensure that all the participants regardless of experience, played the violent video game for the full experimental period of 5 minutes. For the racing game a basic track and car were selected so that the controls were not complex. The 3D table tennis game gave the participants the perspective of viewing behind the character they were controlling, and facing down the table tennis table. The game was set up as a 3-match tournament and the difficulty setting was easy.

The participants played the video games on an Xbox360 with a Samsung 40inch High Definition LCD television and a Logitech surround sound system. Measures of both heart and respiration rates were taken and

EEG activity was recorded from the frontal, temporal, parietal, and occipital regions at standard electrode locations using an electrode cap. A Biopac MP150 system was used to amplify all physiological parameters. The Buss & Perry (1992) Aggression Questionnaire (BSPAQ) was used to measure aggression, this is a validated measure of aggression used on forensic samples. The BSPAQ is typically utilised for measuring trait aggression, however, it has been used to measure state aggression by some researchers (e.g. Ulhmann & Swanson, 2004); the use of the BSPAQ to measure state aggression is supported by research that suggested that any evaluation of behaviour is dependent on the current emotional state (Lewis & Critchley, 2003).

The experimental procedure was quite simple; participants were randomly assigned to one of the three experimental conditions, whilst trying to balance participants by gaming experience and sex. The participants were connected to the EEG and physiological feedback equipment and given time to relax. Baseline measurements were recorded from the participants before any experimentation took place, and were recorded continuously during game play. The participants then played the FPS, racing game, or table tennis game for 5 minutes, and were then disconnected from the equipment as quickly as possible and asked to complete the BSPAQ. All ethical guidelines and procedures were followed during the research.

The EEG data showed that the participants who, regardless of experience, played the driving game had a significant increase in activity in brain regions associated with the expression of aggression. There was little difference between the participants that played the FPS and the table tennis game. However, when experience was taken into account, the greatest increase in brain activity in regions associated with the expression of emotions was observed in experienced gamers that played the racing game. Again, the FPS and the table tennis game had little impact on the increase of brain activity. The data from the BSPAQ suggested that the video games had little impact on the cognitive appraisal of aggression, and the scores were that of what would be expected in a typical sample (Smith & Waterman 2004; Palmer & Thakordas, 2005). However, when experience was taken into account, the participants with prior experience playing the racing game had an aggression score that would normally be associated with violent offenders (Smith & Waterman 2004). The data for the heart rate change and respiration rate change were inconclusive, one possible explanation for this phenomenon is the immersive qualities of all of the games, the combination of the hi-definition graphics, surround sound and large screen.

Controversially Goodson & Pearson (2009) demonstrated that the violent content of video games was not the key factor in the inducing aggression in the participants. This is in direct opposition to previous research (e.g. Anderson & Bushman, 2002; Ulhmann & Swanson, 2004;

Anderson 2004; Arriaga, et al., 2006; Bartholow, et al., 2006; Barlett, et al., 2007; Giumetti, & Markey, 2007; Carnagey, et. al., 2007; Anderson & Bushman, 2009). The categorisation of participants by the prior gaming experience was a very important methodological feature, and the finding that experienced gamers responded differently to non-gamers and casual gamers. Another key issue raised by Goodson & Pearson (2009) was the scoring of the BSPAQ. The questionnaire was created using a large sample (Buss & Perry, 1992), the results demonstrated that the measure had little discriminatory power with smaller samples, as seen in research with small forensic samples (Smith & Waterman, 2004).

Pearson & Goodson (2010) in a second study investigated the role of video game content in inducing aggression. An identical methodology to Goodson & Pearson (2009) with a few minor modifications was used. Two games were selected for the study, *Project Gotham Racing 3* and the game with the most violent and gory content available at the time, *Gears of War 2*. 40 participants were recruited, the sample consisted of 20 males and 20 females and could also be subdivided into 14 experienced gamers, 12 casual gamers, and 14 non-gamers. The duration of time that participants played the video games was increased from 5 minutes to 10 minutes. The participants completed the State Trait Anger Expression Inventory (STAXI) after game play.

As with previous research (Goodson & Pearson, 2009) the EEG data showed that the participants who, regardless of experience, played the driving game had a significant increase in activity in brain regions associated with the expression of aggression. In addition, the regions of the brain associated with planning and decision making also had a significant increase in activity in those participants playing the racing game. Unlike Goodson & Pearson (2009) there was a significant increase in both respiration and heart rate change in the participants playing the racing game, this is most likely due to increased sample size in each experimental condition (double). The same problems of the BSPAQ were evident with the STAXI, measures that were created using large samples that have little discriminatory power with smaller samples.

5.   What does it all mean?

There are researchers (e.g. Anderson & Bushman, 2002; Ulhmann & Swanson, 2004; Anderson 2004; Arriaga, et al., 2006; Bartholow, et al., 2006; Barlett, et al., 2007; Giumetti, & Markey, 2007; Carnagey, et. al., 2007; Anderson & Bushman, 2009) who support and fan the media belief that violent video games cause and induce aggression and violence in those who play them. However, this research has now been questioned on a number of fronts, Ferguson (2007) and Ferguson & Kilburn (2010) have identified a large number of flaws in the way that aggression was measured, experimental

data analysed and represented in the literature. Goodson & Pearson (2009) and Pearson & Goodson (2010) conducted a very detailed review of methodological procedures used to investigate the video game violence and aggression hypotheses. A large number of methodological flaws were clearly evident in the majority of the research. Research that addressed the methodological flaws resulted in a very different and somewhat controversial outcome; violent content was not the key factor in inducing aggression in video game players.

The research of Goodson & Pearson (2009) has major implications for all future video game research. When conducting empirical research, when the underlying methodology is incorrect, the results of the research are meaningless and any conclusions drawn from the data are erroneous. Whether the results are applied to the GAM or any other model no inferences or support for the model can be made. In combination with unreliable measures of aggression most of the previous research has set out to prove that video game violence causes aggression and violence rather than investigating the effects, thus producing a self-fulfilling prophecy. This superficial research was driven by a need for media recognition and because it supported the media view it got the publicity it so desired.

Pearson & Goodson (2010) have put forward a different perspective and proposed the 'real life stressor' hypothesis. In reality, a lot of individuals have had experience of stressful or emotion eliciting events related to driving/road traffic incidents. A more likely explanation is that the racing game is activating representations in the brain that relate to such incidents, as emotional events are recalled far more readily than non-emotional events. This theory is supported by the EEG data from both Goodson & Pearson (2009) and Pearson and Goodson (2010) where there was far more activity in regions associated with emotional processing in participants playing the driving game. Higher levels in experienced gamers is most likely due to the competency of the player, i.e. they were engaging with the game more than the non-gamers who were not used to playing video games. Further support for this theory was obtained from the EEG data for participants playing both of the violent video games. While the participants were shooting/killing the opponents there was generally lower brain activity, as most individuals have no experience of handling a gun or killing other individuals. However, when the participants were killed themselves, there was a surge of activity in the regions associated with emotional processing. Most individuals have experience of personal loss/failure. Pearson & Goodson (2010) proposed that the death of the participant in a video game is activating representations relating to personal loss/failure resulting in the observed activity. Therefore reliable research would suggest that situations that can induce an emotional response in real life, can also result in a similar response when they are created within the gaming environment.

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The latest trend in video game design is that of free roaming 'Grand Theft Auto' type games, which incorporate large environments and morality decisions. It is now time to change the direction of video game research and investigate why gamers make decisions and the effects that their decisions have on brain activity and cognitive appraisals of the world and the limits of behaviour. Although it is important to identify the components of video games that induce aggression, it is now time to lay to rest the media hype around video games being the cause of violence in society and move forward to evaluate the effects of the biggest media platform on the face of the planet.

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