Can fantasy influence reality? An investigation into adolescent video game usage, with a particular focus on violent video games and gender and whether there is an association with aggressive and delinquent behaviour

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ABSTRACT

Previous research predicts and establishes that exposure to violent media can have a detrimental effect on an adolescent's development; particularly in terms of behavioural processes and conduct. This study aimed to examine whether there is an effect of violent content and gender on video gaming usage, internet gaming usage and aggressive and delinquent behaviour. One hundred and thirty two, fifteen to eighteen year old secondary and sixth-form/college students completed a questionnaire consisting of three sections. Firstly participants were asked about their video gaming and internet gaming usage and preferences. The second part was a survey asking about their delinquent behaviour in the last year and finally an aggression questionnaire to assess their aggressive characteristics. Through statistical testing (2x2 full between subjects ANOVA design) one significant result was identified; participants in the high violent content median had a higher rate of video game usage than participants in the low violent content median. The interaction between video gaming usage, violent content and gender was found to be close to significance, so independent sample t-tests were run and it was revealed that males have a higher video gaming usage when violent content is high. Correlation analysis identified a positive significant association between the aggression and delinquency means and a regression analysis revealed that knowing an individual's aggressive score predicts their delinquent behaviour better than gender and/or gaming usage. Limitations and directions for future research were also discussed.

KEY WORDS:	VIOLENT VIDEO GAME CONTENT	VIDEO GAME USAGE	GENDER	AGGRESSIVE BEHAVIOUR	DELINQUENT BEHAVIOUR

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Introduction

The world which we live today is one that it is saturated and perplexed with violence. Whether it is from everyday life experiences or through lifestyle choices every individual, and in particular every child is exposed to this culture, which seems to grow more throughout time. The media is a large scale and dominating corporation which contributes to this increased and heightened exposure (Dowd, Singer & Wilson, 2006). As the media has evolved it has brought with it an abundance of ways in which to communicate and what is more it has become more advanced and accessible throughout this growth. So, is it just enough to put forward the idea that increased violent and aggressive acts, especially amongst adolescents, are linked to this colossal establishment, or is it merely a contemporary 'folk devil'? (Sternheimer, 2007).

In 2011 the world saw two awful and immoral criminal acts of behaviour which could, on some levels, be linked to the viewing of media violence. The first was the Norway Massacre where Anders Breivik shot dead 69 people in an unprovoked attack against unsuspecting and innocent people. It was found that in his 243 paged online manifesto he stated that he used the video game Call of Duty: Modern Warfare 2 to help prepare for the attack. This is a military style first person shooter game where players can assume the role of soldiers where they combat a digital 'war on terror' (Shaw, 2010). The second significant event took place in the summer of 2011 when the worst riots in the UK for decades broke out. "The majority of total arrests were for acquisitive crimes, particularly burglary (41% of all arrests). Almost a quarter (23%) of total arrests related to disorder offences (violent disorder, public order and breach of the peace).....The vast majority of arrestees were male (89%). Forty-six per cent of all arrestees were aged 18 to 24 and around one-quarter (26%) were juveniles (aged 10 to 17)" (Home Office, 2011, p.g. 4). Grand Theft Auto is a video game where players can partake in delinquent and criminal acts similar to those observed in the riots of 2011 (theft, burglary and criminal damage).

These two events therefore trigger the questions:
Are some individuals incapable of separating the fantasy world of the game from their reality, or does it influence their behaviour? Could certain violent video games be an alternative risk factor for some individuals' behaviour?

Adolescence is a time where individuals experience not only biological and physical alterations to their bodies but also dramatic changes to their cognitive, behavioural and social functioning and this can lead to detrimental effects on their behaviour (Forbes & Dahl, 2010). There are significant changes in the structure and functioning of the brain (Giedd, 2008) especially in the pre-frontal cortex. Blakemore (2008) states that activity in different regions of the frontal cortex decrease between adolescence and adulthood and a study comparing the intentions of the two age groups showed that the neural strategy for thinking about intentions changes and so ultimately this may affect the social-cognitive behaviour of adolescents (Blakemore, den Ouden, Choudhury & Frith, 2007). This is supported by studies of the lateral orbital frontal cortex (lOFC, involved in responding to external stimuli) which have shown that it is involved in increasing or decreasing the onset of aggressive behaviour if an individual is exposed to violent cues (e.g. video games) (Blair, 2004).

Furthermore Strenziok et al (2010) found that interaction between areas in the pre-frontal cortex (especially the lOFC) desensitises participants to more aggressive media which can “restrict the linking of the consequences of aggression with an emotional response, and therefore potentially promotes aggressive attitudes and behaviour.” (p.g. 1). However the authors do acknowledge the fact that individuals who have an aggressive predisposition may already have this desensitisation and so their aggressive acts may be a result of their personality characteristics and not neural connections.

During adolescence individuals become more attracted to behaviour that causes an increase in stimulation and arousal and it has been found that this is a contributing factor to risk taking actions, which can be aggressive and delinquent (Lynne-Landsman, Graber, Nicols & Botvin, 2011). Krahe and Moller (2010) found that developmental changes (hormonal and cognitive functioning) during adolescence are thought to be characterised by a raised level of aroused and aggressive behaviours. Kirsh (2003) states that adolescents may seek out sensation-producing activities by watching or engaging in violent media as it act as a rewarding experience. Furthermore studies have revealed that heightened arousal levels are an explanatory factor in the increased attraction teenagers have to violent media stimuli (Kirsh, 2006). Additionally Anderson et al (2003) found that this increased viewing of media violence can be exciting and arousing for adolescents, and thus can increase aggressive behaviour through arousal-transfer. Summing up, Kirsh (2010) concludes that during adolescence, reorganisation of the social brain structure results in it being a period where individuals are most at risk and vulnerable to the effects of violent media (with regards to arousal and aggression) than any other stage of development. However Blakemore (2010) recognises that developing brain regions in adolescence are likely to be affected because of interplay of numerous factors, including the social environment and puberty hormones rather than one independent cause.

Aggressive and violent behaviour has been studied for several decades with many different psychologists proposing theories to explain the nature of this human conduct. Much research focuses on children and adolescents with regards to how and why this negative behaviour may develop. The social learning theory devised by Bandura (1965) with the very famous study of the ‘Bobo’ doll proposes that children can learn this behaviour through imitation of aggressive models and by receiving positive reinforcements for violent conduct. So, it is feasible to suggest from this research that if children can learn this way then perhaps the violent media does, in some way contribute to increased violence in society. This experiment is said to be the pinnacle point of where research into the effects of violent media on children’s behaviour began (Baron, 1977). Bandura’s study does have one main, obvious criticism however, in that the experiment lacked ecological validity as generalisation to the real world media influence is questionable.

From here many theories were developed to explain human aggression. The General Aggression Model (GAM) is seen as “dynamic, social-cognitive, developmental model that includes situational, individual and biological variables and provides an integrative framework for domain specific theories of aggression.” (Anderson & Carnagey, 2004, p.g. 173). It incorporates all social learning and social cognitive theories that were proposed over the preceding decades and thus creates a social–cognitive framework for understanding aggression and violence.

Furthermore a major advantage of this theory is it can be applied to violent behaviour outside the laboratory setting further strengthening its validity (DeWall, Anderson & Bushman, 2011).

Anderson and Bushman (2002) outline GAM by referring to it as “the person in the situation” and state that there are two main influential input factors on a person’s behaviour. The first is person factors which include what characteristics the individual brings to the situation (e.g. traits, gender, beliefs, current states, scripts and attitudes). The other is situational factors which simply refer to the environment surrounding the individual (e.g. aggressive cues, provocation, incentives, frustration). These inputs can then go on to affect the individual either independently or interdependently by influencing their internal state (cognition, affect and arousal). The interconnections between these three routes predict the behaviour of the individual through appraisal and decision processes. Anderson and Bushman enforce the idea that this theory is a cycle and that the outcome behaviours pass through the social encounter and form part of the inputs for the next episode. This model has been applied to a variety of situations and has received compelling, consistent and reliable support for its explanation of human aggression (DeWall & Anderson, 2011). It has also been used to interpret the on-going research into the effects of exposure to violent media (Carnagey & Anderson, 2004). The violent media content individuals are exposed to desensitise them not only to violent media but also real-life violence and according to the GAM this can cause the development of stable patterns in aggressive cognitions, emotions and attitudes and ultimately increases the risk of aggressive behaviour (Holtz & Appel, 2010).

Research has shown that aggressive behaviour in childhood, which can be triggered by a variety of risk factors (neglect, psychological maltreatment, parental discipline and media, Zahrt & Melzer-Lange, 2011) does increase the likelihood of an individual engaging in delinquent activities during adolescence (Yi et al, 2011). So, following on from this aggressive and delinquent behaviour in adolescence can be determined by a variety of risk factors at multiple levels which span from biological, psychological and contextual influences (Frick, 2006).Boxer, Huesmann, Bushman, O’Brien and Moceri (2009) state that the adolescent literature overlooks, quite considerably the risk factor violent media may have on the development of such anti-social behaviours as many scholars do not regard it to be robust or significant (Ferguson, 2010). Nevertheless, much research seems to contradict and oppose such assumptions.

Meta analyses conducted by researchers (Anderson & Bushman, 2001; Bushman &Huesmann, 2006) have revealed that a high level of exposure to media violence in childhood does increase the risk of aggressive and anti-social behaviour in adolescence and young adulthood. Meta-analyses are seen as a robust form of statistical testing as they allow stronger conclusions to be drawn because they incorporate many individual experiments (Shaughnessy, Zechmeister & Zechmeister, 2009). These were considered effective meta-analyses because authors controlled for other risk factors (social class, intellectual functioning and parenting) and so the results obtained show media violence can affect aggressive and delinquent behaviour independently. However Anderson and Bushman did note that there was some evidence (through measuring Five-Factor personality trait) showing that children with aggressive personalities were more predisposed to expose themselves to more violent media.

So the research is partially flawed as aggressive characteristics may be an influence and the direction of causality cannot be determined. Furthermore Boxer, Huesmann, Bushman, O'Brien and Moceri (2009) state that these researchers failed to provide a reliable measure with regards to what is considered to be physically aggressive, violent and delinquent behaviour. Additionally a study by Ferguson, Miguel and Hartley (2009) found that media violence exposure (violent television programmes) was not found to be a predictor in the development of youth violence and aggression. Their research showed that other risk factors (depressed mood, negative relations with family and delinquent peer associations) were the more consistent and stronger predictors. However the effect sizes for all the risk factors these researchers looked at were relatively small and so question how reliable these results are. Moreover, Levermore and Salisbury (2007) investigated whether there was a relationship between virtual and actual aggression with regards to youth exposure to violent media and their findings suggested that there is an association. They then go on to highlight that this research is important in the broader sense with regards to suggesting a possible influence for the development of aggressive and delinquent behaviour in adolescents. This study has a robust methodology as it used both quantitative (self-report questionnaires) and qualitative (interviews) data collection methods which produce more valid and reliable results. Yet a meta-analysis on the impact of violent media on aggressive behaviour revealed that little concern should be related to the risk violent media has on public health (Ferguson & Kilburn, 2009).

The field of study into whether or not there is an association between violent media and aggressive and delinquent behaviour in adolescents is very contradictory. As previously stated the vast majority of research into the effects of violent media on adolescents has been concerned with television programmes and films. However there is a growing body of literature into whether violent video games (VVGs) have an impact on an individual's behaviour. This may be due to the fact that, although video games are comparatively new they contribute considerably to the media industry. Estimated figures show that the global video game industry in 2009 was worth between $45 and $50 billion dollars (PriceWaterhouseCoopers, 2009) and that it is expected to grow four times faster than the media and entertainment industry as a whole. To put it in conventional terms, in the UK the video game market outgrew the cinema industry in 2009 (Cinema market: theatres and DVD. BBC News, 2010, cited in PriceWaterhouseCoopers, 2009). These figures emphasise just how vast and substantial the video game market is and what is more is it has been found that early adolescence is the representative age of when video game usage is at its highest (Rideout, Roberts & Foehr, 2005). This elicits the assumption as to whether this astronomically large industry is having a negative effect on adolescents' behaviour, particularly the violent content of video games.

Anderson et al (2003) identified three major concerns and differences into the impact VVGs may be having on adolescents when compared to other forms of media violence. Firstly there is the fact that children and adolescents have an exceptionally high rate of usage when engaging in this media. Secondly, because the individuals are no longer just observers but they become active participants in the violence they are exposed to, which adds an extra dimension to the already multifaceted medium (Funk, Baldacci, Pasold & Baumgardner, 2004).

Finally, research shows that the rate of violence per minute is much higher in video games when compared to TV programmes and films which ultimately increase the viewer's contact to hostile behaviour. These issues have provoked an increase in concerns amongst not only parents, but policy makers as well, which draws attention to the need for this area to be examined more comprehensively.

There are two major areas into studying the effects of VVGs and these are short term and long term consequences. Bushman and Huesmann (2006) examined the short term effects and found that experiencing violence through a video game can either develop (through observational learning) or activate aggressive schemas and scripts and that this can cause feelings of hostility and physiological arousal. Polman, de Castro and van Aken (2008) observed that active participation in VVGs led to boys exhibiting more aggressive behaviour than the passive viewing condition. Yet this finding was not apparent for girls and so proposes the theory that these findings are only specific to boys and that the discrepancy may be due to gender differences in their daily activities with regards to playing VVGs (boys play more video games and prefer violent content more than girls do) (Kronenberger et al , 2005). However, a more recent study revealed that there are short-term effects of VVGs on female students; the VVG increased implicit aggressiveness (Liu, Zhou, Zhang, Wei & Chen, 2011).Yet, research has shown that these outcomes do dissipate rapidly after playing VVGs and so empirical evidence is lacking into exactly how long these outcomes will last (Barlett, Branch, Rodeheffer & Harris, 2009) and endorses the need to observe possible long term effects.

Anderson et al (2010) conducted a meta-analysis into VVG (violent video game) effects on aggression, empathy and prosocial behaviour in Eastern and Western countries. They particularly focused on aggressive behaviour, cognition and affect as well as physiological arousal, empathy/desensitisation and prosocial behaviour. They found significant effects for all these factors across both cultures, therefore indicating that exposure to VVG can have similar negative outcomes to other forms of violent media. Furthermore the meta-analysis revealed that the VVG effect on aggressive behaviour did not differ between males and females, highlighting that both genders are affected in similar ways. This investigation used exceptionally high quality sampling and analytical methods to acquire the most valid results as possible, consequently making the meta-analysis a very reliable source in this field of research (Huesmann, 2010).

However Ferguson and Kilburn (2010) criticise Anderson et al's methodology stating that they included many studies that are unrelated to serious aggression (Przybylski, Weinstein, Ryan & Rigby, 2009; Ryan, Rigby & Przybylski, 2006) and excluded those that were related (e.g. Ferguson, San Miguel & Hartley, 2009; Barnett, Coulson & Foreman, 2008, cited in Barnett & Coulson, 2010). Additionally the critiques also say Anderson et al used a biased sample of unpublished studies and therefore conducted an analysis that is deemed unreliable. What is more is they used bivariate correlations when they could have used better estimates of controlled effects, and what effects they did observe were weak and inconsequential (r =.15). Bushman,

Rothstein and Anderson (2010) responded to this opposing article by defending their work and addressing the criticisms and stated that there is no evidence of publication bias in the Anderson et al meta-analysis and that the studies that were excluded did not meet their inclusion criteria, and that it was not a case of purposeful exclusion. Furthermore the claim that the effect size observed was insignificant in size was counter argued by the theory that "the effects are larger than many effects that are deemed sufficiently large to warrant action in medical and violence domains." (p.g. 182). This research again shows how contradictory and ambiguous this area of study is. More recent investigations seem to be specifically examining whether there are effects of online gaming and first person shooter games on aggressive and delinquent tendencies in adolescents (Holtz & Appel, 2011). Initial findings from these studies are revealing that these factors do have predictive effects on these externalising behaviours. Although internet gaming is a relatively new phenomenon it is developing and becoming popular at a rapid rate due to the progression in technology and the advancement and accessibility of the internet.

Since 2004 the online and wireless market has grown rapidly (PWC, 2009), De Prato, Feijóo, Nepelski, Bogdanowicz and Simon (2010) state this growth has been "driven by the increase in the number of broadband subscribers, the innovation in available games, and the transition to handheld devices and the newest generation consoles." (p.g. 61).The prevalence of online gaming was found to be very high with 71% of gamers (both males and females) having played some form of online game in the past 3 months (De Prato et al, 2010). Griffiths (2010) states that the main difference between online and offline gaming is that when individuals are online they can play endlessly against and with other people, with particular emphasis on the fact that the other players are real and that this can be very rewarding and psychologically engrossing. Online gaming has also been linked to pathological gaming where individuals exhibit addictive characteristics (Gentile, 2009).
Gentile et al (2011) stated that youths who became pathological gamers play video games online for at least 31 hours per week. Furthermore they found that these individuals played more violent games which led them to have more normative beliefs about aggressive behaviour and also increased the likelihood of them engaging in physical acts of aggression compared to non-pathological gamers. As internet gaming is in its early stages of development the research available in this area is relatively sparse. Nevertheless, it does provoke the question as to whether online violent video gaming can also contribute to aggressive and delinquent behaviour in similar or different ways to offline violent video gaming.

This was a non-experimental design where school and college students (aged 14-18) were asked about their video gaming habits as well as their aggressive and delinquent behaviour. The first part of the questionnaire was based on the work of other researchers (Anderson & Dill, 2000; Funk, Baldacci, Pasold & Baumgardner, 2004) and aimed to ask adolescents about their favourite video games, how much violence these games contain, how much violence they prefer and the amount of time they spend playing games during the week and at the weekend. This part of the questionnaire was newly developed because existing questionnaires do not ask individuals specifically about their internet gaming habits (what video games they play online/ the amount of time they spend playing these video games online during the week and at weekends and also how they communicated with other gamers online).

The delinquency questionnaire is a measurement of self-reported violent crime which was first developed by the National Institute of Mental Health investigating delinquent behaviour in the National Youth Survey (Elliot, Huizinga, & Ageton, 1985, cited in Anderson & Dill, 2000). This questionnaire has been repeatedly used by a variety of researchers investigating whether there are effects of VVG on delinquent acts by adolescents (e.g. Anderson & Dill, 2000; Ferguson et al, 2008; Ferguson, Olson, Kutner & Warner, 2010). The final part of the questionnaire asked participants about their aggressive characteristics and the Buss-Perry Scale (Buss & Perry, 1992) was used as it has also been used in a range of studies investigating the effects of VVG on aggressive behaviour (e.g. Anderson & Dill, 2000; Farrar, Krcmar, & Nowak, 2006; Mehroof & Griffiths, 2010).

Based on the findings of Anderson et al (2010) and Griffiths (2010) the main predictions at this stage are; there will be an effect of violent content and gender on aggressive behaviour, there will be an effect of violent content and gender on delinquent behaviour, there will be an effects of violent content and gender on video gaming usage and there will be an effect of violent content and gender on internet gaming. There will be association between aggressive and delinquent behaviour, there will be an association between aggressive behaviour and video gaming usage, there will be an association between aggressive behaviour and gender and there will be an association between aggressive behaviour and internet gaming. The GAM would be supported if the participants who are in the high violent content group had higher levels of aggression and delinquent behaviour than those in the low violent content group. In the same way the GAM would be supported if there is an association between aggressive and delinquent behaviour and also if there is an association between video gaming usage and delinquent behaviour.

Method

Participants

The study received ethical approval from the Department of Psychology Ethics committee at the University of Chester in accordance with the BPS guidelines. One hundred and thirty two 15-18 year old male (61) and female (71) participants took part in this study from a variety of ethnic and social economic backgrounds and participants that had special educational needs were not excluded. Participants were recruited from Shropshire and Cheshire secondary schools /college and sixth forms and three age groups were used (year 10, 12 and 13).Written consent was obtained from a member of staff from the school/college and they gave blanket consent for students to participate. A Pearson's chi-square analysis revealed a significant effect of gender in terms of gaming preference (first favourite video game **$x^2(4)=25.73$, *p* <.001,** second favourite video game **$x^2(4)=12.00$, *p* <.05** and third favourite video game **$x^2(4)=10.6$, *p* <.05**). Table 1 below shows what genre of video games males and females prefer playing in terms of their first, second and third favourite video games. A Pearson's chi-square analysis revealed no significant difference between age groups in terms of video gaming preference (first favourite video game **$x^2(8)=10.64$, *p* >.05,** second favourite video game **$x^2(8)=4.81$, *p* >.05** and third favourite video game **$x^2(8)=7.74$, *p* >.05**).

Table 1
A table to show the crosstabulation of gender and genre of video game preference

Genre		Video game preference (%)		
		First	*Second*	*Third*
Sport	**Male**	42.5	38.5	38.2
	Female	57.5	61.5	61.8
Fighting with hands	**Male**	0	72.7	66.7
	Female	100	27.3	33.3
Fighting with weapons	**Male**	72.3	54.5	62.5
	Female	27.7	45.5	37.5
Fantasy	**Male**	15.4	0	34.8
	Female	84.6	100.0	65.2
Education	**Male**	57.1	50.0	20.0
	Female	42.9	50.0	80.0
x2		25.73*	12.0**	7.74**

Note. *=P<0.01
** = p<0.05

Measures

The questionnaire comprised of three sections; a background questionnaire asking demographic information (age and gender) and video gaming and internet gaming use and preferences section (Appendix D); a survey asking about delinquent behaviour (Appendix E); and an assessment of adolescents' aggressive characteristics (Appendix F).

Video/internet gaming usage and preferences section

This section (based on reading of Anderson & Dill, 2000; Funk, Baldacci, Pasold & Baumgardner, 2004) requested information about adolescent's three favourite video games and which category best described them; sport; fighting with hands; fighting with weapons; fantasy; education. They were asked how much violence do these games contain/they prefer; (Likert scale) 1-little; 7-extreme. Adolescents were asked to choose from six time range categories about the amount of time they spend playing these video games during the week and at weekends; (Likert scale) less than 1 hour; 1-2h; 3-4h; 5-6h; 7-8h; 9+h. For internet gaming adolescents were asked what video games they play online; sport; fighting with hands; fighting with weapons; fantasy; education. How they communicated with other gamers online; head piece set; on screen; both; none. What kind of contact they had with friends/strangers; little/no contact; some friendly contact; verbal communication can get quite heated; have arguments/abusive swearing. Adolescents were asked to choose from six time range categories about the amount of time they spend playing these video games online during the week and at weekends; (Likert scale) less than 1 hour; 1-2h; 3-4h; 5-6h; 7-8h; 9+h. A Cronbach's alpha test revealed this questionnaire had high reliability (0.95).

National Youth Survey on delinquent behaviour (National Youth Survey Elliot, Huizinga &Ageton, 1985, cited in Anderson & Dill, 2000)

The Delinquency Scale is a self-report 45-item questionnaire on specific behaviours of adolescents over the last year. Items ask an individual to estimate how many times in the past year he or she has, for example "purposely damaged or destroyed property belonging to a school"; never; occasionally; frequently; very often. Of the 45 items, 7 pertain to illegal drug use (i.e., "How often in the last year have you used alcoholic beverages; beer, wine and hard liquor?"). To make the questionnaire more ethically suitable 28-items were removed and some items were modified, for example "lied about your age to gain entrance or to purchase something; for example, lying about your age to buy liquor or get into a movie;" was changed to; "lied about your age to purchase a video game." A Cronbach's alpha test showed this questionnaire has good reliability (0.7).

Buss-Perry Aggression questionnaire (Buss & Perry, 1992)

The Buss-Perry Aggression questionnaire is a 29-item self-report questionnaire measuring trait aggressiveness through four distinct sub traits. These sub traits are physical and verbal aggression, anger, and hostility. Items such as "If somebody hits me, I hit back" represent physical aggressiveness, and items such as "I can't help getting into arguments when people disagree with me" represent verbal aggressiveness. Items such as "Some of my friend's think I'm a hothead" and "At times I feel I have gotten a raw deal out of life" measure anger and hostility.

It has a 7-point Likert Scale for the participants to rate themselves in terms of how characteristic each item is of themselves; 1-extremely uncharacteristic of me; 7-extrememly characteristic of me. Buss and Perry (1992) report a coefficient alpha for the questionnaire at .89 and test-retest reliability at .80. After a Cronbach's alpha was run it revealed excellent reliability as well (0.93). This questionnaire was not changed or modified as it was found to be age appropriate and standardised.

Procedure

Secondary schools and colleges were approached in writing (Appendix A) asking if they would allow some of their pupils to participate in the study by completing the questionnaire. Passive blanket written consent was obtained from a member of staff at the school/college (Appendix B). Participants were informed verbally and via the information sheet (Appendix C) that they did not have to participate in the study and that their completion and handing back of their questionnaire acted as their informed consent. It was also stressed that the study was completely confidential and anonymous and that they had the right to withdraw at any time, but they were also told that once they had handed their questionnaire in they would no longer be able to withdraw. Participants that were happy to complete the questionnaire were told to pull off the information sheet and retain for themselves in case they needed to contact any of the names/numbers for support. Once all questionnaires had been handed in participants were thanked and reminded of the support on the information sheet they could use if they had been affected by the content of questionnaire.

Design and Analysis

There are two IVs; gender (based on the significant results of the Pearson's chi-square analysis)(2 levels males and females); and levels of violence (2 levels; high verses low). Three DVs: aggressive behaviour (from (1) extremely uncharacteristic of me to (7) extremely characteristic of me), delinquent behaviour (from (1) never to (4) very often) and gaming usage (from less than 1 hour to 9+). The two levels for gender and the two levels of violent content will be analysed usinga 2x2 full between subjects ANOVA design with the aggression, delinquency and gaming usage scores.

Results

Preliminary analyses

To begin with a violent content measure was created by computing the violent content and amount of violence preferred questions together (questions 4 and 5).

Missing values in the data were addressed by creating replaced mean sores. For the aggression questionnaire items 7 and 18 were reversed score. A median split for the violent content and the gaming usage composite scores was done to create two levels, high (6 and above) verses low (below 6). A correlation was run to test the face validity and a significant positive correlation was found between "how much violence do these games contain" and "how much violence do you prefer in your video games" **(r =.88, *p* (two-tailed) <.001)** so the questions were merged to create a composite measure of violence. A gaming usage measure was also created by combining the video and internet gaming usage questions together (questions 6, 7, 11 and 12) and a significant positive correlation was again revealed between all four questions (shown below in Table 2) **(all *p*s (2-tailed) <.001)**showing they were measuring the same construct.

Table 2

A Table to Show Pearson Correlations Between the Video Gaming and Internet Gaming Usage Questions (6, 7, 11 and 12)

Question	**6**	**7**	**11**	**12**
6) How much time on average do you spend playing video games during the week?		0.86*	0.82*	0.8*
7) How much time on average do you spend playing video games at the weekend?			0.78*	0.87*
11) How much time on average do you spend playing video games against/with others via internet gaming during the week?				0.9*
12) How much time on average do you spend playing video games against/with others via internet gaming during at the weekend?				

Note. *p< 0.01

A 2x2 (gender; 2 levels males and females; and levels of violence; 2 levels; high verses low) full between subjects ANOVA was performed on the delinquency, aggression and video game usage measures. The means and standard deviations can be seen below in table 3.

Table 3

A Table to Show the Means and Standard Deviations For Gender (Males And Females) and Levels Of Violence (High Verses Low) with the Delinquency, Aggression and Video Game Usage Measures.

	Males				**Females**			
	High		**Low**		**High**		**Low**	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Aggression	80.97	3.61	84.68	8.15	86.27	4.87	77.19	3.93
Delinquency	21.77	0.49	22.21	1.11	21.17	0.66	20.82	0.53
Video Game Usage	11.52	0.62	6.37	1.41	7.53	0.84	5.58	0.68

Note. M = Mean
SD = Standard Deviation

Effects of Violent Content and Gender on Aggression

2x2 ANOVAs were performed on the aggression mean scores and no significant result was found with the violent content median **(F<1)** or gender **(F<1).** Additionally there was no significant interaction between aggression, violent content and gender **F (1,128) = 1.38, *p* >0.05.** This shows that aggression levels were similar between boys and girls, and the level of violent content did not have a significant effect on aggression scores.

Effects of Violent Content and Gender on Delinquency

2x2 ANOVAs were performed on the delinquency mean scores and no significant result was found with the violent content median **(F<1)** or gender **F (1,128) = 1.82, *p*>0.05**.

Additionally there was no significant interaction between delinquency, violent content and gender **(F<1).** This shows that delinquency levels were similar between boys and girls, and the level of violent content did not have a significant effect on delinquent scores.

Effects of Violent Content and Gender on Video Gaming Usage

2x2 ANOVAs were performed on the video gaming usage mean scores and a significant result was between the amount of violent content **F (1,128) = 14.24, *p*<0.01**. Participants in the high violent content had higher scores **(9.52)** than participants in the low violent content median **(5.97).** No significant effect was observed for the effects on gender **(F<1).** Additionally there was no significant interaction between video gaming usage, violent content and gender **(F<1)** but it was close to significance **(*p*-value = 0.09).**

Due to this interaction approaching significance independent sample t-tests were run. The violent content median was first split (high vs. low) and an independent t-test was run on gender (male and female) with the mean video gaming usage dependent variable.

Results indicate that when violent content is high there is a significant difference in video gaming usage scores between males **(M = 11.52, SD = .90)** and females **(M = 7.53, SD = .61) t (77) = 3.09, p<0.05;** males have a higher video gaming usage when violent content is high. However when violent content was low no significant difference was found in gaming usage between males **(M = 6.37, SD = .73)** and females **(M = 5.58, SD = .30); t (51) = 1.09, p>0.05.**

Identifying Predictors of Delinquent Behaviour

A Pearson's correlation was run on gender, mean aggression scores and the mean gaming usage scores. A significant positive correlation was found between the aggression and delinquency means; **r = .93, *p* (2-tailed) <.001.**

A linear regression was then run and delinquency was entered as the dependent variable with the mean gaming usage, the mean aggression and gender being entered as the predictor variables. The analysis showed that these factors account for **15.6%** of the delinquency scores. Table 4 shows the *b*-values of each predictor and there relationship with the delinquency scores.

Table 4

A Table to Show the *b*-value Coefficients for the Predictors (Gender, Mean Aggression and Mean Video Gaming Usage) of Delinquent Behaviour Scores

Variable	*SE B*	*β*
Gender	0.62	-1.04
Mean Aggression	0.01	0.06*
Mean Video Gaming Usage	0.61	-0.05

Note. R^2 = .18
*p< 0.00

The β -values show that there is a positive relationship between the mean aggression scores and the mean delinquent scores, so as aggressive scores increase so do delinquency scores.

But a negative relationship was found between the gender and mean video gaming usage predictors. So knowing an individual's aggressive score predicts their delinquent behaviour better than gender and/or gaming usage.

Aggression (*b*=0.4); this value indicates that as aggression scores increase by one point, delinquency scores increase by 0.4 points. Therefore, every additional characteristic of aggression is associated with an extra 0.4 increment of the individual being delinquent.

Discussion

Main Findings

The purpose of the present study was to examine the effects of exposure to violent video games (VVGs), of video game usage and the links with delinquent and aggressive behaviour in adolescents. The results indicate that after performing 2x2 ANOVAs on the aggression mean scores no significant result was found with the levels of violent content or with gender variables. Additionally there was no significant interaction between aggression, violent content and gender. So the first hypothesis is rejected.

2x2 ANOVAs on the delinquency mean scores also revealed no significant results with regards to the violent content median or gender; and again there was no significant interaction between delinquency, violent content and gender. So, the hypothesis that there will be an effect of violent content and gender on delinquent behaviour is also rejected.

The final 2x2 ANOVAs which were performed on the video gaming usage mean scores did disclose a significant result with the violent content median. It was found that participants in the high violent content median had higher video gaming usage scores than participants in the low violent content median. However, no significant effect was observed between video gaming usage and gender, and there was no significant interaction between video gaming usage, violent content and gender; but it is noteworthy that the interaction was very close to significance. So independent t-tests were run to examine this interaction further and results indicated that when violent content is high there is a significant difference in video gaming usage scores between males and females, with males having a higher video gaming usage.

This means the third hypothesis (there will be an effect of violent content and gender on video gaming usage) can be accepted and demonstrates that there can be an effect of violent video game (VVG) media on some aspects of human behaviour more than others especially when it comes to gender differences.

As a composite score of video game usage was created, incorporating the internet gaming scores, internet gaming as an independent factor was not looked at. It was decided that not every individual would have access to the internet and so data regarding this area would be limited. So the hypotheses that there will be an effect of violent content and gender on internet gaming and there will be an association between aggressive behaviour and internet gaming are rejected as they were not specifically tested.

A Pearson’s correlation was run on gender, the mean aggression scores and the mean gaming usage scores to identify predictors of delinquent behaviour. A significant positive correlation was found between the aggression and delinquency means, and a linear regression was then run and a positive relationship between the mean aggression scores and the mean delinquent scores was found; so as aggressive scores increase so do delinquency scores. However a negative relationship was found between the gender and mean video gaming usage predictors. So, it can be stated that knowing an individual’s aggressive score predicts their delinquent behaviour better than gender and/or gaming usage.

Therefore the hypothesis that there will be association between aggressive and delinquent behaviour can be accepted but the hypothesis that there will be an association between aggressive behaviour and video gaming usage and there will be an association between aggressive behaviour and gender have to be rejected.

Overall the results are mixed in what this investigation set out to look at and to what it actually found; so explanation of the original question is not as clear-cut. However because of the contradictory nature of this field each result and hypothesis will now be examined further in terms of how these findings fit into previous research and results. In addition, the theoretical and practical implications, limitations and future research will be discussed concerning the inconsistent results.

Anderson and Bushman (2002) have revealed that a high level of exposure to media violence in childhood does increase the risk of aggressive and anti-social behaviour in adolescence and young adulthood. The results from this study do not fit into Anderson et al's findings as no interaction was found between exposure to violent content and aggression for either gender. The difference in findings could be accountable to the fact that this current study looked at the effects of video games independently and not media violence as a whole. Furthermore Anderson and Bushman (2002) argue some risk factors are only relevant in cross sectional studies and that when longitudinal and experimental studies are conducted into the effects of violent media these risk factors can be more easily controlled for revealing an independent significant positive media effect. This again may shed light on the differences in findings. Conversely though Ferguson, Miguel and Hartley (2009) found that media violence exposure (violent television programmes) was not found to be a predictor in the development of youth violence and aggression. The present research findings therefore support this notion as no significance was found between an individual's violent content exposure, aggression or delinquency scores.

Focusing in more on the effects of VVGs on adolescents the current results still do not fit with the research on which the predictor hypotheses were based on. Anderson et al's (2010) meta-analysis found VVG exposure is a causal risk factor for increased aggressive behaviour, aggressive cognition, aggressive affect and decreased empathy and prosocial behaviour across Eastern and Western societies, giving it cultural validity. The research questions proposed were hoping to yield a similar result to this robust study, but the findings were not consistent with the meta-analysis. Differences observed in the findings may be due to the fact that Anderson et al conducted a meta-analysis and the results obtained were based on experimental, cross-sectional and longitudinal designs, whereas this investigation only fits into the cross-sectional category. What is more is that Anderson et al also measured a variety of different factors, whereas again this study only looked at aggression and delinquent behaviour. So the type of measures used may be accountable for the discrepancy in findings.

However the results do support the meta-analysis conducted by Ferguson (2007) which revealed no relationship between VVG exposure (both usage and content) and aggressive behaviour. Furthermore Ferguson (2010) revealed that VVG exposure was not a predictor of serious youth violence, which again is consistent with the present findings regarding delinquent behaviour.

This result can be paralleled with the statistical data showing youth violence and video game sales in the United States (NPD Group, Inc./Retail Tracking Service and Youth violence data obtained from Childstats.gov, cited in Ferguson, 2008) over a ten year period (1996-2006). It was revealed that despite the fact that video game sales increased substantially in this period, the number of violent youth offenders in the USA fell. This highlights that dramatic increases in the amount of video game sold are correlated with dramatic decreases in youth violence; the present study therefore further supports this statistical evidence.

Recent reviews by the US Supreme Court into the Brown v Entertainment Merchants Association case (EMA, 2011, cited in Sacks, Bushman & Anderson, 2011) and the Australian Government (2010, cited in Ferguson, Miguel, Garza, & Jerabeck, 2012) investigated the research into the negative effects of VVGs (experimental, correlational, longitudinal and meta-analytical data) and found it to be inconsistent, weak, not credible and abundant in methodological flaws. This investigation also sought out to examine what factors can be associated with delinquent behaviour. A significant positive correlation was found between the aggression and delinquency means. It was revealed that knowing an individual's aggressive score could act as a predictor for delinquent behaviour better than gender and /or gaming usage. So the hypothesis that there will be association between aggressive and delinquent behaviour can be accepted. Referring back to Anderson and Bushman's (2002) GAM it is clear from this investigation that the situational factor of VVGs does not have an effect on aggressive behaviour. However, from the result that were established and outlined above it is evident that person factors which are characteristics the individual brings to the situation, in this case an aggressive personality do have a consequent effect on aggressive behaviour and subsequent delinquency. Anderson and Bushman did observe in their study that there was some evidence showing that children with aggressive personalities were more predisposed to expose themselves to more violent media. This is consistent, in some respects with the current findings as an individual's aggressive score was found to predict their delinquent (anti-social) behaviour better than gender and/or gaming usage. So this supports the theory that an individual's trait aggression is more of a predictor of VVG use and consequently criminal and delinquent acts than VVG exposure (Ferguson et al, 2008).

Studies (Ferguson, Colwell, Mlačić, Milas & Mikloušić, 2011) have found that negative personality traits such as high aggression were a significantly better predictor of violent acts in adolescents than media violence. Furthermore they also found that any correlations (which were very weak) between media violence and violent acts could be understood through underlying personality variables such as trait aggressiveness. Other research has found that personality can guide media preferences (Rentfrow, Goldberg & Zilca, 2011) as individuals seek out media entertainment that highlights and ultimately strengthens their personality and so VVGs may be played more by those who exhibit an aggressive predisposition to them. Ferguson, Miguel, Garza and Jarabeck (2012) conclude that any relationship between VVGs aggression and delinquency can be seen as merely a by-product of other factors, especially personality traits in an adolescent's life.

Ferguson et al (2011) concludes that the effects of VVG exposure are exaggerated and may be better explained with the theory that some individual's aggressive personalities result in them being more inclined to seek out violent media. The present findings therefore support and fit into this area of research considerably.

Ferguson (2010) addresses the research that states VVGs have an effect on adolescent's behaviour as a "21st century folk devil" (p.g. 78). He states that society has created somewhat of a Moral Panic with regards to this area of research with societies constructing "folk devils" in which blame has been shifted onto VVGs in an attempt to elucidate problems of youth violence and aggression. By this it means that VVGs are seen as a more convenient factor (than say family environment, genetics, poverty and inequality which are very controversial and difficult problems) to which blame can be attached for this the problems of juvenile violence. Kurtner and Olson (2008, cited in Ferguson, 2010) state that VVGs can be classed as what is known as a "straw man". This is where politicians can create a manifestation that is seemingly taking action against youth violent crime when it fact it is just being used as a "scapegoat" for the problem. Ferguson, Miguel, Garza and Jarabeck (2012) warn that if an attempt is not made by the scientific community in the future to undermine this moral panic regarding violent VVG exposure than a "*cargo cult science*" could occur which is defined as "a field which has trappings of a science but which, in fact, resists the process of falsification" (p.g. 144). This ultimately means society needs to focus in on much more important causes of aggression and delinquency and not be distracted by the exaggerated conception of the effects VVG (Ferguson & Kilburn, 2010).

Limitations

The measure used to identify aggressive characteristics of the participants was the Buss-Perry aggression questionnaire and although a coefficient alpha, test-retest reliability and Cronbach's alpha was reported the questionnaire measures different sub traits of aggression (physical and verbal aggression, anger, and hostility). Anderson et al (2010) propose that to get the best measure of aggression studies should just look at physical sub types; this is because they state that physical aggression is the most frequently modelled and rewarded in violent video games.

A further limitation is that the video game questionnaire (despite its high Cronbach's alpha reliability) asked about the amount of time an individual spent playing any type of video game rather than enquiring specifically about time spent playing violent video games. This could therefore have impacted on the results and be classed as an inappropriate or weak measure of exposure to video game violence.

Another limitation of this investigation is the problem of social desirability. Within this study social desirability was not controlled. Consequently participants' responses may have been influenced by others around them and how they feel they "should" respond; this ultimately may have had a detrimental effect on the observed results. Furthermore adolescence is a time when individuals are most exposed to peer pressure and so by distributing the questionnaires in a classroom environment may have led to some individuals responding in a way that they might feel was desirable to their peers. To overcome this predicament a method that could have been employed is indirect questioning. This is a projective technique that asks individuals to answer structured questions from the perspective of another person or group.

Originally the questionnaires aimed to examine the effects of VVGs on video game usage, delinquent and aggressive behaviour with regards to age (year 9, 10, 12 and 13). This is because it would have been interesting to examine whether there was a difference between age groups and in particular differences in the age restrictions set by the authorities for certain games. However due to difficulties in recruiting school aged pupils, perhaps due to the nature of asking adolescents about delinquent behaviour or because of the problem of consent (under 16's) it was not possible to question any year 9 pupils and only a few year 10 pupils (10 participants). This low sample size for this age group may have violated some of the assumptions for parametric testing (e.g. homogeneity of variance); therefore the design had to be modified and the effects of age could not be considered.

Future Research

Following the final limitation future research needs to examine whether there are age differences in this area of research. Anderson et al (2010) acknowledge that in their review they stated that the studies they used lacked the observation of age effects as little evidence in effect sizes has been found between young children and adolescents. They went on to propose that age needs to be examined with participants that are sampled from the same population and using the same measures.

At first this investigation set out to examine whether there would be an effect of violent content and gender on internet gaming and also if there would be an association between aggressive behaviour and internet gaming. However as previously stated this did not occur due to the design of the questionnaire and the questions being asked about this topic area were not specific enough. Yet there is a great need for this research to be undertaken as the internet is such a predominant and rapidly developing worldwide medium, with initial findings establishing causation between this factor and negative adolescent conduct (Holtz & Appel, 2011). Even so, some researchers do stress the need to employ "gold standard approaches" when carrying out studies in this new media area. This concern is disclosed to avoid the conflicting results that have been identified in the VVG effects literature and to also avoid another media generation of "folk devil" regarding aggressive and violent behaviour in youths (Ferguson, Miguel, Garza & Jarabeck, 2012).

Finally, based on the findings of this study which presented no significant results of VVG on negative behaviour, it may be prudent to examine the positive effects of video games on an adolescent's development. Ferguson and Rueda (2010) found that for some individual's VVGs acted as a mood-management activity that provided them with the ability to endure stress. The nature of the games allowed players to assert control over virtual environments which provided them with an environment to offset feelings of helplessness and hostile feelings. Researchers (Ferguson, Cruz & Rueda, 2008) have also identified that certain types of action games can have a positive effect on visuospatial cognition (higher perception, processing, visual memory and mental rotation). Bavelier et al (2011) (Bavelier, Green & Dye, 2010) also found that action games can be beneficial on spatial cognition and that these genre of games also have practical implications in rehabilitation (visual skills for individuals suffering from amblyopia/'lazy eye'). However there is no distinction between violent and non-violent video games in these studies so it does create an area of research that needs to be looked into.

Also, initial research is showing that social involvement levels can be increased when playing VVG as it allows some gamers to develop social communities online. What is more is these social connections that occur within the VVG online world are meaningful as they can encourage offline social experiences (Barnett & Coulson, 2010) and prosocial behaviour (Ferguson & Garza, 2011).

Lastly, it has been found that VVG with a military based theme can increase prospective soldiers' understanding of modern day war with regards to violence, terror and warfare (Shaw, 2010). Additionally Gackenbach, Ellereman and Hall (2011) have identified some preliminary findings that VVG (especially battle themed games) can help inoculate soldiers against the negative effects of deployment (e.g. severe nightmares), but more extensive research is needed. So research into the positive effects of VVGs is promising but far from complete. More extensive research into this area is needed.

Conclusions

The present findings show that the effect of VVGs on the conduct of adolescents is not considered a predominant risk factor in the development of delinquent and aggressive behaviour. In light of this it is therefore reasonable to suggest that the effects VVGs have need to be examined from a more objective rather than ideological viewpoint. What is more is that the VVG exposure theory may actually be distracting and hindering society from much more plausible and significant causes of aggression, thus creating a negative and confounding problem within itself. Consequently it is reasonable to suggest that misleading research into this area could be resulting in unnecessary policies, debates and financial efforts being imposed on a risk factor that is not deemed significant.

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